The logo of The Hong Kong University of Science and Technology is in several ways symbolic of the institution. Lyrically we visualise the golden head of wisdom over the open book of knowledge. Between the arms holding the book can be seen a flask representing science. Alternatively, it is a transmission tower representing engineering and technology or communication and management. We can also see a sun radiating gold, that very traditional Chinese colour, over an ocean glowing with the deep blue representative of Hong Kong.

Supporting these emblems are the three Greek letters upsilon, psi and tau, that is: υπτ transliterating as UST. The logo entwines many meanings, as does the University itself.
The arrival of Phase II marks the completion of the University's core campus, giving it the capacity to accommodate up to 7,000 students. For the academic community of HKUST, the campus now becomes the stage on which it may fulfill its vision of a world-class technological university serving Hong Kong and her region.
The objectives of the University are:

(a) to advance learning and knowledge through teaching and research, particularly
   (i) in science, technology, engineering, management and business studies; and
   (ii) at the postgraduate level; and

(b) to assist in the economic and social development of Hong Kong.

from The Hong Kong University of Science and Technology Ordinance, 1987
CONTENTS

The University

Introduction .................................................................................................................. 1
The Campus ................................................................................................................ 1
University and Polytechnic Grants Committee ..................................................... 2
University Organisation ............................................................................................ 2
Academic Faculty ........................................................................................................ 2
Students ...................................................................................................................... 3
Undergraduate Programmes ....................................................................................... 3
Postgraduate Programmes ......................................................................................... 5
The Academic Year ...................................................................................................... 7

Admission of Students

Undergraduate Admission Requirements ................................................................. 10
General Requirements .............................................................................................. 10
Entrance Requirement Equivalents ......................................................................... 11
Departmental Entrance Requirements .................................................................... 12
Requirements for Mature Applicants ...................................................................... 12
Advanced Standing .................................................................................................. 12
Undergraduate Applications .................................................................................... 12
Admission through JUPAS ....................................................................................... 12
Direct Admission ..................................................................................................... 13
Postgraduate Admission Requirements ................................................................. 14
Postgraduate Applications ....................................................................................... 14
Application for Admission ...................................................................................... 14
Selection Procedures ............................................................................................... 15
Students from Overseas ............................................................................................ 15
Admission Enquiries ................................................................................................. 16

Registration, Fees and Financial Assistance

Registration .................................................................................................................. 17
Fees .............................................................................................................................. 17
Financial Assistance .................................................................................................. 18

Academic Regulations

General ....................................................................................................................... 20
Programme Terminology ......................................................................................... 20
Courses and Credits ................................................................................................. 21
Registration ................................................................................................................ 22
Course Grading .......................................................................................................... 23
Grade Review ............................................................................................................ 24
Grade Averages ........................................................................................................ 24
Continuation of Study ............................................................................................... 24
Interdepartmental Transfer ...................................................................................... 25
Appeals ....................................................................................................................... 25
Student Conduct ...................................................................................................... 25
Academic Integrity and Discipline .......................................................................... 25
Examination Guidelines ......................................................................................... 27
<table>
<thead>
<tr>
<th>Contents</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual Property Rights</td>
<td>Joint Degree Programmes</td>
</tr>
<tr>
<td>Undergraduate Programmes</td>
<td>Undergraduate Programme</td>
</tr>
<tr>
<td>Course and Programme Registration</td>
<td>Postgraduate Programmes</td>
</tr>
<tr>
<td>Joint Programmes</td>
<td></td>
</tr>
<tr>
<td>English Language Courses</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Grades</td>
<td></td>
</tr>
<tr>
<td>Academic Standing</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Degree Requirements</td>
<td></td>
</tr>
<tr>
<td>Postgraduate Programmes</td>
<td></td>
</tr>
<tr>
<td>Full-time and Part-time Study</td>
<td></td>
</tr>
<tr>
<td>Duration of Study</td>
<td></td>
</tr>
<tr>
<td>Course Requirements</td>
<td></td>
</tr>
<tr>
<td>Postgraduate Grades</td>
<td></td>
</tr>
<tr>
<td>Academic Standing</td>
<td></td>
</tr>
<tr>
<td>Residence Requirements</td>
<td></td>
</tr>
<tr>
<td>MSc and MA Programmes</td>
<td></td>
</tr>
<tr>
<td>MBA Programme</td>
<td></td>
</tr>
<tr>
<td>MPhil Programmes</td>
<td></td>
</tr>
<tr>
<td>PhD Programmes</td>
<td></td>
</tr>
<tr>
<td>Conduct of Thesis Examinations</td>
<td></td>
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<tr>
<td>School of Science</td>
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<td>Department of Marketing</td>
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<td>School of Humanities and Social Science</td>
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<td>Division of Humanities</td>
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</tr>
<tr>
<td>Division of Social Science</td>
<td></td>
</tr>
</tbody>
</table>

**Joint Degree Programmes**

- Undergraduate Programme: 229
- Postgraduate Programmes: 231

**Undergraduate Course Descriptions**

- 234

**Postgraduate Course Descriptions**

- 311

**Academic Services**

- University Library: 382
- Language Centre: 383
- Centre of Computing Services and Telecommunications: 384
- Educational Technology Centre: 385
- Industrial Training Centre: 385

**Research Centre, Institutes and Central Research Facilities**

- Research Centre: 388
- Institute for Environmental Studies: 389
- Office of Contract and Grant Administration: 389
- Technology Transfer Centre: 390
- Biotechnology Research Institute: 390
- Hong Kong Telecom Institute of Information Technology: 391
- Materials Characterisation and Preparation Centre: 391
- Microelectronics Fabrication Centre: 392
- Sino Software Research Centre: 392

**Student Services**

- Counselling Service: 394
- Physical Education and Sports: 394
- Health Service: 394
- Residential Halls: 394
- Student Amenities: 395
- Student Activities: 395

**The University Ordinance**

- 396

**Statutes of the University**

- 409

**University Council**

- 416

**University Senate**

- 417

**Standing Committees of Senate**

- 419

**Advisory Committees**

- 432
THE UNIVERSITY

Introduction

The Hong Kong University of Science and Technology (HKUST) was incorpo-
rated in April 1988, and opened in October 1991, as a publicly funded technological
university dedicated to the advancement of learning and scholarship, with special
emphasis on research, postgraduate education, and close collaboration with business
and industry. It seeks to educate men and women who will contribute to Hong Kong's
economic and social well-being, and to promote research, development, and entrepre-
neurship in the Asia-Pacific region.

To accomplish these goals, HKUST stresses teaching - the dissemination of
knowledge, research - the creation of knowledge, and service - the application of
knowledge.

The University comprises four Schools. Three of the Schools - Science,
Engineering, and Business and Management - provide both undergraduate and post-
graduate education through to the doctorate. The School of Humanities and Social
Science offers postgraduate education to the doctoral level, and provides general
education for all undergraduates.

In addition, the University has set up interdisciplinary research institutes, the
Research Centre and the Technology Transfer Centre to facilitate collaboration among
the different schools and partnerships between the University and the public and private
sectors.

The medium of instruction is English. Undergraduate students are provided with
instruction in English language skills, as needed.

The Campus

The campus occupies a 60-hectare site of sweeping beauty on the northern end
of Clear Water Bay Peninsula at Tai Po Tsai. Situated on the slopes along the shore, the
campus grounds are terraced to afford buildings on all levels with unobstructed panoramic
views of the sea, looking east and northeast towards Port Shelter and the Sai Kung area.
The main academic complex is situated on the highest level of the slope, while student
residential halls, outdoor sports facilities, and other student amenities are close to the
water and the natural marina.

The campus is being built in three phases. Phase I was completed in July 1991
and has a capacity of 2,000 full-time equivalent (FTE) undergraduate and postgraduate
students. Phase II, to bring capacity to about 7,000 FTE students, was completed in
January 1993. Construction costs were $3.598 billion, of which the Royal Hong Kong
Jockey Club generously donated a total of $1.926 billion, and it was also responsible for
managing the overall construction project. The remaining cost was provided by the
Government of Hong Kong. With the completion of Phase III (contingent upon the
Government's approval of construction funds), the University will be able to accommodate
a student body of 10,000 FTE students and will have about 9.3 million square feet of indoor
academic space.
University and Polytechnic Grants Committee

The major source of financial support for the University is the Government of Hong Kong through the University and Polytechnic Grants Committee (UPGC) and its Research Grants Council (RGC). Student fees, other sources of research support and donations are also significant contributors to the University's budget.

University Organisation

At the head of The Hong Kong University of Science and Technology is the Chancellor, the Governor of Hong Kong, with the University Council as the supreme governing body. The University Senate is the supreme academic body, and has a number of standing committees.

Administratively, the Vice-Chancellor/President is the chief executive officer and the three principal branches of the University are Academic Affairs, Administration and Business, and Research and Development, each headed by a Pro-Vice-Chancellor.

Within the Academic Affairs Branch are the four schools which comprise the academic heartland of HKUST, each school being divided into departments or divisions. As well, there are a number of academic service units and research units located administratively within the branch.

The Administration and Business Branch is concerned with the non-academic administrative and financial operation of the University.

The Research and Development Branch focuses on research administration and, particularly, on undertaking contractual and applied research relevant to Hong Kong's technological and socio-economic development. This branch of HKUST is unique in Hong Kong's universities and demonstrates the strong research focus of the institution.

Further information on these units of the University, as well as the University Ordinance and the Statutes of the University which provide the legal basis for HKUST, is found elsewhere in the Calendar.

Academic Faculty

The University recruits worldwide for faculty who have achieved excellence in their respective fields and are highly respected as both teachers and researchers. They include both established academics and promising younger scholars who have demonstrated a high degree of professional competence. More than 85% have earned doctorates, pursued postdoctoral studies, or taught at the world's leading research universities.

These men and women care about Hong Kong, its people and its future. They have broad intellectual interests, and wish to work collaboratively with colleagues in other fields and interact with professionals in industry, commerce and the public services. Most importantly, they care about their students.
First-degree programmes presently offered, with the exception of Computer Engineering scheduled to begin Fall 1994, are:

### Postgraduate Programmes

The University offers postgraduate programmes leading to master's and doctoral degrees in all four Schools, as indicated below:

#### SCHOOL OF SCIENCE

<table>
<thead>
<tr>
<th>Programme Abbreviated Title Code</th>
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<tbody>
<tr>
<td>Bachelor of Science (BSc) Biochemistry BICH E420</td>
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<tr>
<td>Biology BIOL E430</td>
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<tr>
<td>Chemistry CHEM E440</td>
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<tr>
<td>Mathematics MATH E460</td>
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<tr>
<td>Physics PHYS E480</td>
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<tr>
<td>Applied Physics APHY E481</td>
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#### SCHOOL OF ENGINEERING

<table>
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<tr>
<th>Programme Abbreviated Title Code</th>
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<tr>
<td>Bachelor of Engineering (BEng) Chemical Engineering CENG E320</td>
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<tr>
<td>Civil and Structural Engineering CIVL E330</td>
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<tr>
<td>Computer Science COMP E340</td>
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<tr>
<td>Electrical and Electronic Engineering ELEC E350</td>
</tr>
<tr>
<td>Industrial Engineering INDE E360</td>
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<tr>
<td>Mechanical Engineering MECH E370</td>
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#### SCHOOL OF BUSINESS AND MANAGEMENT

<table>
<thead>
<tr>
<th>Programme Abbreviated Title Code</th>
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<tbody>
<tr>
<td>Bachelor of Business Administration (BBA) Accounting ACCT E220</td>
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<tr>
<td>Business Information Systems BINF E230</td>
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<tr>
<td>Economics ECON E240</td>
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<td>Finance FINA E250</td>
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<tr>
<td>Management MGMT E260</td>
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<tr>
<td>Marketing MARK E270</td>
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<tr>
<td>Bachelor of Science (BSc) Economics ECON E240</td>
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#### JOINT DEGREE PROGRAMME

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<tr>
<th>Programme Abbreviated Title Code</th>
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<tr>
<td>Bachelor of Engineering (BEng) Computer Engineering CPEG E380</td>
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The University

Postgraduate Programmes

The University offers postgraduate programmes leading to master's and doctoral degrees in all four Schools, as indicated below:

<table>
<thead>
<tr>
<th>Programme Abbreviated Title Code</th>
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<tbody>
<tr>
<td>Master of Science (MSc) Mathematics MATH M141</td>
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<tr>
<td>Physics PHYS M151</td>
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<tr>
<td>Master of Philosophy (MPhil) Biochemistry BICH M110</td>
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<tr>
<td>Biology BIOL M120</td>
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<tr>
<td>Chemistry CHEM M130</td>
</tr>
<tr>
<td>Mathematics MATH M140</td>
</tr>
<tr>
<td>Physics PHYS M150</td>
</tr>
<tr>
<td>Doctor of Philosophy (PhD) Biochemistry BICH D110</td>
</tr>
<tr>
<td>Biology BIOL D120</td>
</tr>
<tr>
<td>Chemistry CHEM D130</td>
</tr>
<tr>
<td>Mathematics MATH D140</td>
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<td>Physics PHYS D150</td>
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<table>
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<tr>
<th>Programme Abbreviated Title Code</th>
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<tbody>
<tr>
<td>Master of Science (MSc) Chemical Engineering CENG M211</td>
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<tr>
<td>Civil and Structural Engineering CIVL M221</td>
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<tr>
<td>Computer Science COMP M231</td>
</tr>
<tr>
<td>Electrical and Electronic Engineering ELEC M241</td>
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<tr>
<td>Industrial Engineering INDE M251</td>
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<tr>
<td>Mechanical Engineering MECH M261</td>
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<tr>
<td>Master of Philosophy (MPhil) Chemical Engineering CENG M210</td>
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<tr>
<td>Civil and Structural Engineering CIVL M220</td>
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<tr>
<td>Computer Science COMP M230</td>
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<td>Electrical and Electronic Engineering ELEC M240</td>
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<tr>
<td>Industrial Engineering INDE M250</td>
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<td>Mechanical Engineering MECH M260</td>
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</table>
The University

Doctor of Philosophy (PhD)
- Chemical Engineering
- Civil and Structural Engineering
- Computer Science
- Electrical and Electronic Engineering
- Industrial Engineering
- Mechanical Engineering

SCHOOL OF BUSINESS AND MANAGEMENT
Master of Business Administration (MBA)
- Accounting
- Business Information Systems
- Economics
- Finance
- Management
- Marketing

Doctor of Philosophy (PhD)
- Accounting
- Business Information Systems
- Economics
- Finance
- Management

SCHOOL OF HUMANITIES AND SOCIAL SCIENCE
Master of Philosophy (MPhil)
- Humanities
- Social Science

Master of Arts (MA)
- Humanities

Doctor of Philosophy (PhD)
- Humanities

JOINT DEGREE PROGRAMMES
- Interdisciplinary study and research is encouraged and collaborating departments offer programmes leading to joint degrees. Currently, these programmes are:
  - Master of Arts (MA) in Chinese Studies
  - Master of Science (MSc) in Biotechnology
  - and an MSc programme in Manufacturing Engineering is in preparation.

The Academic Year

The academic year of the University begins on 1 July and ends on 30 June the following year. It normally includes a Fall Semester commencing in early September and running for 15 weeks of classes and examinations, and a 15-week Spring Semester beginning after Chinese New Year. Immediately following the end of the 14th week there is a short study break followed by a week devoted to examinations. There is a one-week break in the Spring Semester around Easter. A Winter Session is held between the two semesters for special academic programmes, research symposia, and other activities. For most students, attendance is not required. A Summer Session bridges the end of the Spring Semester and the beginning of the following Fall Semester.

Important dates for the 1993-94 and 1994-95 academic years are found at the end of this Calendar.
Using state-of-the-art electronic equipment, students from the Department of Electrical & Electronic Engineering, guided by Dr Philip Chan (right), are engaged in design projects which range from portable plotters to self-guided miniature automobiles.
ADMISSION OF STUDENTS

To qualify for admission to the University, applicants must normally be at least 17 years of age by the first day of the academic year to which they are seeking admission, meet the general entrance requirements of the University and the requirements of the particular programme for which they are applying, and apply before the application deadline.

UNDERGRADUATE ADMISSION REQUIREMENTS

Entry to an undergraduate programme of study at the University requires prospective students to satisfy both general University and specific departmental entrance requirements.

General Requirements

To satisfy the general University requirements for 1994 entry, an applicant should have obtained:

(a) Hong Kong Certificate of Education Examination (HKCEE)

passes in at least seven subjects at the first and second attempts, with passes in at least five of these subjects at a single sitting, and

i) three of these subjects must be Mathematics, English Language, and either Chinese or an alternative language;

ii) for English Language (Syllabus B), the grade obtained must be D or above or equivalent, and

iii) the grade obtained must be C or above in at least two subjects.

(b) Hong Kong Advanced Level Examination (HKALE)

grade E or above in the same sitting in

either (1) one Advanced Level (AL) subject plus
(2) either Advanced Supplementary Level (AS) Chinese Language and Culture, or AS Liberal Studies; and
(3) two AS subjects;

or (1) two AL subjects plus
(2) either AS Chinese Language and Culture, or AS Liberal Studies;

AND

c a pass at Grade D or above in AS Use of English.

Alternatively, a pass at Grade E in AL Chinese Literature is acceptable in lieu of AS Chinese Language and Culture, in which case the student is required to have Grade E or above in:

either (1) two AL subjects (including Chinese Literature) and one AS subject;
or (2) AL Chinese Literature and 3 AS subjects.

For applicants who are using an alternative language, rather than Chinese, to satisfy the language requirements in the HKCEE, AS Liberal Studies or another AS subject may be used as a substitute for the Chinese Language and Culture requirement.

Passes in at least three subjects in HKALE and a pass at Grade D or above in the Use of English Examination are considered as equivalent to the new HKALE requirement in 1994 for applicants who are applying for admission to the University with HKALE results obtained prior to 1994.

Entrance Requirement Equivalents

Alternatively the general entrance requirements may be satisfied by obtaining one of the following qualifications:

(a) the General Certificate of Secondary Education, or the General Certificate of Education, with passes in at least seven subjects at the Ordinary Level including Mathematics, English Language, and a language other than English, and passes in 1 AL subject + 3 AS subjects or 2 AL subjects + 1 AS subject or, for candidates without AS subjects, passes in at least 3 AL subjects;

(b) at least one year's successful full-time study or equivalent in a bachelor's degree programme at an institution recognised by this University;

(c) a professional diploma, higher diploma or higher certificate from a polytechnic or recognised tertiary college in Hong Kong;

(d) an International Baccalaureate.

Notwithstanding the above, the University may recognise other qualifications from, or successful study at, an overseas institution for the purpose of satisfying the general entrance requirements. In assessing such qualifications, the University wishes to ensure that overseas applicants have an educational background which is equivalent to that required of local candidates. Proficiency in English will also be a consideration.

As an alternative to grade D or above in English Language (Syllabus B) of the Hong Kong Certificate of Education Examination, a satisfactory grade in one of the following examinations is acceptable:

(a) English Language (Syllabus A) of the Hong Kong Certificate of Education Examination - Grade B or above;

(b) English Language of the Hong Kong Higher Level Examination - Grade D or above;

(c) English Language of the General Certificate of Education Examination (Ordinary Level) - Grade C or above; and

(d) English Language of the General Certificate of Secondary Education - Grade C or above.
Admission of Students

Departmental Entrance Requirements

In addition to the general requirements, applicants must also satisfy entrance requirements for their desired programmes of study. These are specified in the departmental sections of the Calendar.

Requirements for Mature Applicants

Applicants who do not satisfy the general or departmental entrance requirements of the University but are aged 25 or over by the first day of the academic year to which admission is sought may be granted exemption from the entrance requirements of the University provided they can demonstrate aptitude and suitability for admission to a particular programme of study.

Advanced Standing

Departments may grant advanced standing to students for successful study completed elsewhere within the following guidelines:

(a) for programmes normally requiring three years of full-time study, a minimum of one year's full-time study at HKUST is required before a student is considered for award of the degree; and
(b) a minimum of 35 HKUST credits are required for graduation.

UNDERGRADUATE APPLICATIONS

Students may enter the University through two routes. Applicants who are seeking admission on the strength of their Hong Kong Advanced Level Examination results should apply via JUPAS, as described below. All others including applicants currently enrolled in full time or sandwich degree programmes in other UPGC-funded institutions should apply for direct admission.

Admission through JUPAS

In the Autumn of 1990 the "Joint University and Polytechnic Admissions System" (JUPAS) was introduced. This system enables applicants to apply on the strength of their HKALE results for admission to the undergraduate programmes of the following seven member institutions of JUPAS:

City Polytechnic of Hong Kong
Hong Kong Baptist College
Hong Kong Polytechnic
Lingnan College
The Chinese University of Hong Kong
The Hong Kong University of Science and Technology
The University of Hong Kong

For reference, the following are important dates for 1994 admission. JUPAS may make adjustments to the timetable.

1 November 1993 - Closing date for applications for admission.
26 November 1993 - Applicants receive checklists of their personal data and choice of study programmes.
15 December 1993 - Last day for applicants to report checklist errors, if any, to the JUPAS Office.
January to mid-June 1994 - Interviews and tests, where appropriate.
Late May 1994 - Announcement of HKAS Level UE examination results.
15 June 1994 - Last date for applicants to request IN PERSON changes of their choice of study programmes at the JUPAS Office.
Early July 1994 - Announcement of HKALE results.
1 August 1994 - Publication of results of the main round offer in newspapers.
1 - 3 August 1994 - Applicants to reply IN PERSON to offers in the main round at the JUPAS Office.
Mid August to September 1994 - Subsequent rounds of selection by individual institutions, if vacancies are still available. Applicants, if selected, receive letters direct from the institutions concerned.

Direct Admission

Applicants who are not eligible to apply for admission through JUPAS are welcome to apply directly to the University. Application forms are available from 1 October, 1993 for entry in September 1994.

For entry in September 1994, completed application forms should be returned to the University by 31 December, 1993 together with a copy of the bank pay-in-slip confirming payment of an application fee of HK$120 into the bank account of "The Hong Kong University of Science and Technology" through a branch of one of the following banks: Bank of China - Hong Kong Branch or Hang Seng Bank Ltd. The application form allows the applicant to select up to three degree programmes of study at the University. The selected programmes should be listed in order of preference. Subsequent changes are not normally permitted. Requests for change must be made by writing to the Admissions, Registration and Records Office.
POSTGRADUATE ADMISSION REQUIREMENTS

Applicants seeking admission to a postgraduate degree programme should have:

(a) obtained a first degree from this University or an approved institution, or obtained an approved equivalent qualification;
(b) satisfied the school and department concerned as to their fitness to pursue the postgraduate programme; and
(c) satisfied the school and department concerned as to their English language ability to undertake the postgraduate programme.

To be accepted directly as candidates for the PhD degree, applicants should normally have:

(a) obtained a master's degree from this University or an approved institution, or presented evidence of satisfactory work at the postgraduate level on a full-time basis for at least one year, or on a part-time basis for at least two years;
(b) satisfied the school and department concerned as to both their chosen subject of research and their fitness to undertake research into it; and
(c) satisfied such other requirements as may have been established by the school and department concerned, which may include qualifying examinations both written and oral.

POSTGRADUATE APPLICATIONS

Application for admission to the postgraduate programmes requires prospective students to satisfy the entrance requirements of both the University and the postgraduate programme selected.

Application for Admission

Application forms are available directly from:

Admissions, Registration and Records Office
The Hong Kong University of Science and Technology
Clear Water Bay
Kowloon
Hong Kong

The closing date for the return of the application forms is 15 March for admission in September of the same year, but late applications may be considered.

Applicants must submit the following documents:

(a) a completed application form, including a one-page statement on study plans and career goals;
(b) two letters of recommendation mailed directly to the Director of Admissions, Registration and Records;
(c) officially certified academic transcripts of undergraduate studies (and postgraduate studies, if any); and
(d) a copy of the bank pay-in slip confirming that the application fee of $120 has been paid into the bank account of "The Hong Kong University of Science and Technology" through a branch of one of the following banks: Bank of China - Hong Kong Branch or Hang Seng Bank Ltd.

For overseas applicants, if official transcripts are in a language other than English or Chinese, a certified translation into English must be provided. In lieu of the bank pay-in slip confirming payment of application fee, overseas applicants may submit a bank draft or certified bank cheque with the completed application form.

Selection Procedures

Selected applicants may be invited for interview. Successful applicants will receive an offer of admission via the Admissions, Registration and Records Office, and may be required to satisfy specified conditions. Candidates receiving an offer will be expected to accept or decline by a specified date.

STUDENTS FROM OVERSEAS

The University welcomes applications from overseas students who are seeking admission to full-time studies at the undergraduate or postgraduate level. Applicants should be aware, however, that competition for admission is such that only very well-qualified candidates will gain admission.

Details of the application procedure have been given previously. However, because of differences between the educational system in Hong Kong and those in other countries, students eligible to enter undergraduate programmes in their own countries may not be able to enter the first year at HKUST. Prospective overseas undergraduate students should first write to the Admissions, Registration and Records Office, providing full details of their educational qualifications so that an initial assessment may be made as to their entry qualifications.

If that assessment indicates that the requirements may be met, the appropriate application form will be sent to the prospective student. This should be returned to the Admissions, Registration and Records Office together with a bank draft to cover the application fee of $120. At that point the formal selection process will begin. Certified true copies of all degrees, diplomas, certificates and other qualifications held should be submitted with the application form. Applicants accepted for admission will be required to produce the original documents on arrival at the University.

Overseas students should carefully consider the financial aspects of their studies in Hong Kong before applying for admission. In 1994-95, fees will amount to $24,000 and accommodation in on-campus undergraduate and postgraduate halls will involve approximately $8,100 and $9,600 respectively per residential year (280 days). In addition monies will be needed for subsistence, textbooks, local travel, sports equipment, clothing, and
other personal needs. A total of at least $52,000 per academic year (9 months) is likely to be required for undergraduate study and $59,000 for postgraduate study.

Students from overseas must obtain a visa in order to study in Hong Kong. Applications should be made well in advance at a British Consulate or High Commission or Visa Office, or by writing directly to The Hong Kong Immigration Department, 2/F, Tower II, 7 Gloucester Road, Wanchai, Hong Kong. Applicants will be required to show sufficient financial resources to cover expenses for their period of study. Applicants must also nominate a sponsor who is resident in Hong Kong, aged over 21, to whom they are known personally. Postgraduate applicants who have difficulty in nominating a sponsor in Hong Kong may apply to the Admissions, Registration and Records Office for the University to act in this capacity.

ADMISSION ENQUIRIES

Students requiring copies of the undergraduate or postgraduate prospectus, application forms, advice or assistance on application procedures, choice of programmes, entrance requirements or other related matters are welcome to visit, telephone or write to the Admissions, Registration and Records Office (Room 1376), which is open Mondays to Fridays:

9 am - 12:30 pm
2 pm - 5 pm

and on Saturdays:

9 am - 12 noon

All enquiries should indicate the degree programme(s) of interest and be addressed to:

Director of Admissions, Registration and Records
The Hong Kong University of Science and Technology
Clear Water Bay
Kowloon
Hong Kong

Telephone No. : (852) 358 6622
Facsimile No. : (852) 358 0769

REGISTRATION, FEES AND FINANCIAL ASSISTANCE

This section deals with the registration process, tuition and other fees, and financial assistance available for students.

Registration

Registration is in two parts: programme registration and course registration. Programme registration confirms students' enrolment at the University and payment of tuition and other prescribed fees where appropriate. It also allows for application for hall residence and financial aid, as well as the acquisition of information about the University and student life. At course registration students and their academic departments select appropriate courses for the coming semester.

Fees

There are a variety of fees as described below. Except for caution money, fees are not refundable.

1. An application fee of $120 is charged for each direct application for admission in 1993-94 to the University, payable at the time of submission of the application form.

2. A fee of $250 is charged for an application made for admission in 1993-94 through the Joint University and Polytechnic Admissions System (JUPAS), collected by the JUPAS Office on behalf of the participating institutions.

3. The tuition fee for undergraduate students admitted for the academic year 1993-94 is $17,000 per annum. The fee may be paid at the beginning of the academic year at programme registration or in equal instalments for each semester.

4. The tuition fee for postgraduate students (except for those in the MBA programme) admitted for the academic year 1993-94 is $17,000 for full-time students and $4,250 per semester for part-time students. The fee may be paid at the beginning of the academic year at programme registration or in equal instalments for each semester.

5. The fee structure for full-time and part-time MBA students is described in the School of Business and Management section of the Calendar.

6. In addition, each new student is required to pay a deposit of $300 as caution money on first registration. Charges will be made against this deposit if there are any unpaid claims against the student, such as outstanding library dues. The balance will be transferred to the graduation fee, or refunded if the student leaves the University before graduation.

7. Students joining the Students' Union are required to pay entry fee and annual subscription. These fees will be set by the Union and collected by the University
on behalf of the Union. In 1993-94, the entry fee, applicable to students admitted for the first time, is $100 and the annual subscription is $100.

8. Students may be required to pay late charges for failure to complete certain University procedures by stipulated deadlines. These will include delays in paying tuition fees and completing registration procedures, overdue library books, etc. Late charges will be levied in accordance with the rules and regulations set by the respective offices.

9. The hall charges for 1993-94 are approximately $5,500 per person in double rooms in the undergraduate hall for a residential year of 280 days from around 1 September 1993 to 10 June 1994 and approximately $8,700 per person in the single air-conditioned rooms at the postgraduate hall. Hall charges are to be paid in two instalments and do not include the cost of meals.

10. Other small fees and charges:

<table>
<thead>
<tr>
<th>Fee Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transcript fee (first copy free)</td>
<td>$30</td>
</tr>
<tr>
<td>Replacement of Student ID Card (free if replaced after reasonable wear and tear)</td>
<td>$30</td>
</tr>
<tr>
<td>Application fee for retention of place (deferred entry)</td>
<td>$200</td>
</tr>
<tr>
<td>Graduation fee</td>
<td>$300</td>
</tr>
<tr>
<td>Late registration (waived at University's discretion)</td>
<td>$100</td>
</tr>
<tr>
<td>Testimonial fee</td>
<td>$10</td>
</tr>
</tbody>
</table>

Financial Assistance

The sources of financial support for students of the University include the following:

Government Grant and Loan Scheme

Full-time students at publicly funded tertiary institutions who have the right of abode in Hong Kong or have resided or have had their home in Hong Kong continuously for three complete years immediately prior to the commencement of their programme of study are eligible to apply for financial aid under a Government student finance scheme. The scheme is administered by the Government Student Financial Assistance Agency.

Financial assistance is offered in the form of grants and/or loans. Grants are given for tuition fee and academic expenses; loans are approved for living expenses. Awards are means-tested so that the amount awarded is related to family disposable income. Students are expected to repay their loans at an interest rate of 2.5% per annum within a specified period after graduation or upon leaving the University.

Application forms may be obtained from the Government Student Financial Assistance Agency at 9/F, National Mutual Centre, 151, Gloucester Road, Wanchai, Hong Kong, and from the Student Affairs Office of the University.

Students with financial difficulties are urged to apply for assistance under this scheme at the beginning of the academic year. Further details are available at the Student Affairs Office.

University Loans and Bursaries

Students with additional financial needs may apply for loans and bursaries administered by the University. In general, these funds are used to supplement, but not substitute for, Government financial assistance. Details of loans and bursaries are available at the Student Affairs Office.

Scholarships and Prizes

The University administers a number of scholarships and prizes on behalf of individual and corporate donors. Most are awarded to students, without application, on the strength of academic merit and the recommendations of a school or department. Other scholarships may have conditions specified by the donor. Further details are available at the Student Affairs Office.

Postgraduate Studentships

The University awards Postgraduate Studentships to full-time postgraduate students which can involve assisting in teaching and research. In 1993-94, these are at the rates of $9,500, $4,750 or $2,375 per month.
ACADEMIC REGULATIONS

The academic regulations define the structure of the programmes of study at the University and govern each student’s academic progress. All students are responsible for their individual conduct and for their adherence to the regulations.

This section of the Calendar is divided into three parts. The first describes regulations which apply to all students. The second and third deal with matters specific to undergraduate and postgraduate students respectively.

GENERAL

Each student is enrolled in a specific programme offered by an academic unit referred to as the student’s major department, and is subject to the requirements of both that department and the University. The term major department includes all academic departments, the two divisions in the School of Humanities and Social Science, and the units administering joint programmes. Exemptions from specific requirements are possible, but only in well justified circumstances. Written permission must be obtained from the major department.

An undergraduate programme requires six semesters of study, normally spread over three years. Examinations are taken at the end of each semester, and a grade is earned in each course in which the student is registered. In this way, credits are earned semester-by-semester towards the completion of degree requirements. Each credit carries equal weight, independent of the specific course or year of study.

Postgraduate programme requirements comprise semester course credits, thesis residency and special examinations. Master of Science, Arts, and Business Administration degrees (MSC, MA, and MBA) are earned primarily through course credits in taught programmes. The Master of Philosophy and Doctor of Philosophy degrees (MPhil and PhD) are earned through research programmes in which the primary activity is research leading to an acceptable thesis. These programmes may also include course credit requirements and special examinations.

Programme Terminology

The programme terminology used in this Calendar is based on the following standardised definitions:

1) Programme - An official degree programme recognised by UPGC (and JUPAS, as appropriate) and given a unique programme code; e.g. CHEM, BSc, E440.

2) Option - A programme "nested" within an official degree programme, which is handled within UST as if it were a separate, free-standing degree programme; e.g. MATH, BSc, Mathematical Sciences Option in Computer Science.

3) Stream - A programme variation identified in the Calendar, sometimes as a University-approved requirement and sometimes as a departmental recommendation.

4) Concentration - A defined grouping of elective courses identified in the Calendar, sometimes as a University-approved requirement and sometimes as a departmental recommendation.

Courses and Credits

The basic unit of instruction at the University is a course. Courses usually take place in either the Fall or Spring Semester, and each course has a specified credit value 0, 1, 2, 3, 4, etc. All courses are designated in the format of the following example:

CIVL 371 Geotechnical Engineering [3-1-3:4]

in which CIVL denotes the Department of Civil and Structural Engineering, 371 is the course number with the first digit denoting the usual programme year in which the course is taken:

0 = introductory
1 = year 1
2 = year 2
3 = year 3
4 = postgraduate courses
5 = special topic courses, seminars, independent studies, reading courses and master’s research
6 = doctoral seminars and research
7 = doctoral seminars and research

and the second and third digits follow a departmental code. Introductory courses (first digit in course code is 0) are designed for undergraduate students without an AL background in the subject area. A student admitted with an acceptable AL grade in the subject must replace such a course with an appropriate alternative.

The course vector [3-1-3:4] gives the number of instructional hours required and the course credits using the code

1st digit = lecture hours per week
2nd digit = tutorial, seminar or recitation hours per week
3rd digit = laboratory hours per week
4th digit = number of course credits

The credit value of a course depends on both the required scheduled hours of instruction and the additional non-scheduled hours of work expected of students. Normally one lecture hour per week equals one credit, one seminar hour per week equals one credit, and three laboratory hours per week equals one credit. As in the example, some sessions may be given less credit per hour if some scheduled hours such as tutorials reduce non-scheduled work by students.
Courses are offered by the following departments:

**SCHOOL OF SCIENCE**
- Biochemistry (BICH)
- Biology (BIOL)
- Chemistry (CHEM)
- Mathematics (MATH)
- Physics (PHYS)

**SCHOOL OF ENGINEERING**
- Chemical Engineering (CENG)
- Civil and Structural Engineering (CIVL)
- Computer Science (COMP)
- Electrical and Electronic Engineering (ELEC)
- Industrial Engineering (INDE)
- Mechanical Engineering (MECH)

**SCHOOL OF BUSINESS AND MANAGEMENT**
- Accounting (ACCT)
- Business Information Systems (BINF)
- Economics (ECON)
- Finance (FINA)
- Management (MGMT)
- Marketing (MARK)

**SCHOOL OF HUMANITIES AND SOCIAL SCIENCE**
- Division of Humanities (HUMA)
- Division of Social Science (SOSC)

**Registration**

Each student must enrol in an approved programme of study in each semester. This approval should be obtained from the student's major department during the period specified for course registration.

**Study Commitment**

Students admitted to a full-time programme of study are expected to study full-time for their degrees, and are cautioned that outside work commitments may impede their academic performance.

Unless prior permission from the Director of Admissions, Registration and Records is obtained, students are not permitted to register for another programme at this University or at another post-secondary institution. Student enrolment lists are compared with those of other post-secondary institutions from time to time. If students are found to be registered elsewhere, they will normally be required to discontinue their studies at this University.

**Course Prerequisites and Exclusions**

Permission of the department offering the course is an alternative to the stated prerequisites, and this is a requirement for all courses for which prerequisites are not stated. Unless an exemption is granted by the department in which the course is given, all prerequisite courses should have been passed (grade D or better, or P) before a student registers in a course. It is the students' responsibility to ensure that they have the necessary background to undertake a course, although their departmental advisors may provide assistance. In some cases, 'background' courses are identified in order to indicate the general level of desirable prior knowledge.

Students should also take care not to enrol in courses for which they have already obtained an equivalent qualification. These are denoted as "exclusions" in the course description. In such cases, any credits earned will not count towards degree requirements.

**Course Enrolment Changes**

The schedule for course registration includes a one-week "add-drop" period at the beginning of each semester. Changes made in this period will not be reflected in the student's record.

A student who wishes to withdraw from a course after the "add-drop" period may do so up to six weeks before the end of classes. Such late withdrawals may affect a student's academic progress and are entirely the student's responsibility, although advice must be sought from the student's major department. The Withdrawal without Penalty (W) grade will be recorded as the course grade. Withdrawals after the deadline will not be accepted. Special arrangements pertain to half-semester courses in the Master of Business Administration (MBA) programme.

**Course Auditor**

A student may register, with the permission of the course instructor, in a course as an auditor. Subject to satisfying requirements set at registration by the instructor, the course will be designated AU on the student's transcript. No course credit is given for audited courses.

**Course Grading**

Grades given in each course are based on student performance in the final examination, tests, essays and reports, presentations and other forms of classroom participation, assignments, and laboratory exercises, although not all these elements may be present in each course. A failing grade in the laboratory component, if any, of a course may result in a failure in the whole course. The instructor in each course will discuss the course grading scheme with the class in the first week of lectures.

**Final Examinations**

Final examinations are scheduled following the end of lectures after a short study break. Failure to take the examination as scheduled without prior permission for
exemption from the department offering the course results in automatic course failure although the student may appeal to the department within two weeks for special consideration, giving well-enunciated reasons. When a student is exempted from writing the regular final examination, the department may decide that the student (1) repeat the course, (2) take a special make-up examination for which a grade is assigned, (3) take a graded supplementary examination, or (4) be granted pass standing in the examination. In this last case the course grade is based on the grades obtained in the other course components excluding the final examination. Medical reasons, authenticated by a physician's certification that the student was unable to take the examination, will normally result in the selection of option (2), (3) or (4) above.

Grade Review
Grades will be posted in departments as soon as they become available. On posted grade lists, students are identified only by their student numbers. Individual grade reports are sent to students approximately four weeks after the end of each semester.

Grade Averages
Undergraduate course grades are defined on page 30 and postgraduate course grades on page 34.

A grade average (GA) is the average weighted grades obtained in a group of courses where each course is given a weight equal to its credit value. Courses graded P, I, IP, W, PP and AU are omitted from this calculation. All GA’s are reported using the closest letter grade.

There are three grade averages. The semester grade average (SGA) is the combined grade average covering all courses taken in both the semester and the session immediately following. The cumulative grade average (CGA) is based on all the courses taken by the student which are expected at the time of calculation to be applied towards the degree requirements in the current programme. At graduation, a graduation grade average (GGA) will be calculated from the courses that are presented for the award of a degree.

Continuation of Study
Students are admitted to a specific programme to commence study in a specific semester. Failure to enrol in the first or any subsequent semester results in automatic withdrawal from their programme of study and suspends registration at the University unless a formal Leave from Study has been obtained. Leave from Study is possible only on application to and with the approval of the student's major department.

Students who withdrew or were required to withdraw from the University may formally apply for direct admission following the procedures described earlier in the Calendar under ‘Admission of Students’ (page 8).

Interdepartmental Transfer
A student may change from one programme of study to another with the permission of the major department into which the student wish to transfer. If a transfer is approved, that department will determine which credits from the student's former programme apply to the new programme. Normally, the transfer will not be effected until the following semester.

Appeals
Requests for a variance to the academic regulations should be made in the first instance to the student's major department. Any subsequent appeals against a departmental decision must be made within two weeks of receiving notice of the decision. Such appeals should be well documented and addressed to the dean of the school in which the student is enrolled. The dean's decision is final.

Student Conduct
The University expects good conduct from all students, and actively discourages undesirable behaviour. Rules and regulations are formulated and enforced to ensure the effective operation of the University, and the well-being of students and staff.

Students should acquaint themselves with the University's policy on academic discipline, as described in the following section.

Academic Integrity and Discipline
Academic integrity is basic to the work of all students at the University, and for scholarly and scientific work generally. Central to academic integrity is the presentation of one's own work as one's own, the acknowledgement of others' work, and the truthful reporting of results obtained.

Academic Dishonesty
There are a number of ways in which the tenets of academic integrity may be violated. The offences below are by no means exhaustive and the determination of academic dishonesty will be based on the broader context of the students' possible intent to mislead an instructor or the University as to their academic achievement, status, or qualifications. "Students" as used here includes currently registered students as well as those who have graduated or left the University.
Academic Regulations

Plagiarism is defined as the presentation of work which actually originates from other sources as one's own, for credit in a course or programme of study or towards the fulfillment of degree requirements. It includes the presentation in theses, examinations, tests, term papers, and other assignments, of someone else's work without attribution, including the presentation of someone else's argument in one's own words without acknowledgement.

Cheating is defined as the unauthorised giving or receiving or utilising, or any attempt to do so, of information or assistance during a test or examination. Also included are the unauthorised receipt or conveyance, or the attempt to do so, of test or examination questions; giving or receiving assistance on an essay or assignment beyond what is approved by the instructor; impersonating someone else or causing or allowing oneself to be impersonated by someone else in writing or participating in a test or examination; the submission of any academic work containing a purported statement of fact, or reference to a source, which has been concocted; presenting for credit in any course or programme of study, without the permission of the instructor concerned, academic work for which credit has previously been obtained or is being sought in another course or programme of study in the University or elsewhere; and any other conduct designed to provide a misleading basis for judgement of the student's performance or academic standing.

Procedures in Case of Academic Dishonesty

If an instructor suspects that an act of academic dishonesty has been committed, he or she may choose in the first instance to discuss the matter privately with the student concerned to arrive informally at a mutually acceptable resolution. However, in cases when such agreement is not possible and in which the instructor has strong reasons to believe that a breach of academic integrity has occurred, the instructor may wish to begin a formal process of enquiry by calling a meeting with the student according to the procedures outlined below. If the offence relates to the activities of an academic department, division, centre or a similar unit, rather than a specific course, an appropriate member of the University staff arranges the meeting. In all cases, the student is informed of the purpose of the meeting in advance and the discussion is on record.

If, after the meeting, the instructor, or other appropriate individuals as noted, is satisfied that no academic dishonesty has been committed, no further action is taken. The decision is conveyed to the student. If the student admits the alleged offence, the instructor may recommend an appropriate sanction and the student is informed accordingly. A report is made to the student's major department. If, however, the student denies the charge, or disputes the sanction, or fails to attend the meeting, and the instructor decides that an act of academic dishonesty has been committed, the instructor forwards the case to the department head for further action.

Sanctions

The following sanctions may be imposed, singly or in combination, and will be noted in the student's file: verbal or written warning or reprimand; lower grade or failure on the assignment or test or examination, which may result in a lower course grade including failure in the course; make-up assignment or test or examination; a reduction of the final grade or a failure in the course as a penalty exclusive of any reduced grade; withdrawal of eligibility for future scholarships and other academic awards; ineligibility for honours upon graduation; suspension from the University for a set period or indefinitely; cancellation of academic standing or academic credits obtained thus far; withholding or rescinding a HKUST degree; any other sanctions, as deemed appropriate for certain offences.

Student Rights and Obligations

Students have the right to be informed that an academic offence is suspected, to defend themselves against the charges and present evidence, and to meet with the authority imposing a sanction for this latter purpose. They should be informed of the verdict, the sanction, and the appeal procedures and should also be advised to approach the Director of Student Affairs for advice and guidance.

An appeal may be made against either the verdict or the sanction(s) imposed. This must be made in writing within fourteen days of receiving the decision and should state the grounds on which it is made. Normally, appeals will be considered only on the grounds of procedural irregularity or new evidence.

In some cases appeal decisions can be appealed against. At each stage the student is informed if further appeal is possible and any conditions which may pertain.

Examination Guidelines

Examinees may be asked to show their identity cards for verification purposes. Normally, no examinees will be allowed to enter the examination room later than thirty minutes after the start of the examination, and no examinees will be permitted to leave the examination room within the first thirty minutes of the examination. An invigilator or examiner may waive this time limit under special circumstances, such as sickness.

Examinees must hand in their answer books on leaving the examination room. However, examinees may not be allowed to leave the examination room during the last fifteen minutes of the examination and must remain seated until all the examination answer books have been collected by an invigilator.

Examinees who fail to attend an examination without prior approval of the examiner will be deemed to have failed the examination. Examinees who are taken ill during the examination and have to leave the examination room are advised to proceed immediately to the Student Health Services on campus, if possible, or seek other appropriate medical assistance as soon as possible. Appeals for special consideration, for example, for medical reasons, are described elsewhere in the Calendar.

Examinees are not allowed to bring into or remove from the examination room any printed or written matter save with the express permission of an examiner or invigilator. Unless expressly permitted by the examiner, no books, paper, calculators, or any information storage and retrieval device will be allowed.

Examinees should write only on their answer books or on any supplementary answer books and sheets provided for the purpose and shall surrender all such materials in good order on leaving the examination room. Answers should be written on the right hand page only, with the left hand page used for rough work. The examiners may read only the right hand page material.
Academic Regulations

No conversation will be allowed during the examination and questions about the examination should be addressed to an invigilator. Any irregularity of conduct in the examination room will be reported and examinees causing disturbance in the examination room will be expelled from the examination room and may face disciplinary action.

In the event of cancellation of examinations as a result of Storm Warning Signal No. 8 or above being hoisted or Rainstorm Black Warning being issued, arrangements will be made for the examinations affected to be held as soon as practicable after the official examination period and candidates will be notified accordingly through public announcements, etc.

Examinees should be aware of the University's policy on academic discipline, as described elsewhere in the Calendar, and cannot claim innocence due to ignorance.

Intellectual Property Rights

The University has established policies with respect to intellectual property rights which apply, generally, to all faculty, staff and students. In particular, the provisions of the University patent policy are applicable to students and adherence thereto is a condition of continued enrolment.

Further information on the patent, copyright, software, and trade and service marks management policies may be obtained from the Office of the Pro-Vice-Chancellor for Research and Development. The University may make changes to these policies from time to time.

UNDERGRADUATE PROGRAMMES

Undergraduate degree programmes and designated programme options (hereafter referred to collectively as programmes) are composed of a structured set of courses which must be satisfactorily completed in order to satisfy degree requirements. Each programme contains courses in the field of major study and related areas, and in addition courses from all other schools. A minimum number of credits is required in each programme in the range from 100 to 105. Individual student programmes may exceed these minima owing to the choice of electives with higher-than-required credit value or enrolment in additional courses not required in the student’s programme.

Details of the various undergraduate programmes are found in the departmental entries in this Calendar. The programme requirements are presented in the semester-by-semester format which students are expected to follow. However, students who complete a particular course in a semester earlier than shown may substitute another course or take a reduced course load. Each student's semester course registration requires departmental approval.

Students must complete all of the requirements of all semesters in order to complete the degree requirements, and should make themselves familiar with the general and undergraduate University requirements, as well as those of their major department.

Course and Programme Registration

Course Designations

Courses designated as 'core courses' (C) must be taken in the semester indicated. In certain circumstances, and with the permission of the major department, those courses designated as 'required' (R) may be taken at other times. Elective (E) courses are selected by the student in the specified areas, subject to departmental approval and options exist as to when they may be taken. Some courses may not be allowed for elective credit. Unless stated otherwise, courses replacing specified ones will have the same course designation (C, R or E) as given to the course being replaced. Of the four Humanities and Social Science electives, at least one course in Humanities and one in Social Science are required. When a specific course is not identified, the course vector shown defines the minimum credit normally required.

Course Exemption

A course exemption may be granted if the student can produce evidence, such as a transcript and course syllabus, that a core or required course is equivalent in content to another course taken elsewhere, for which a satisfactory grade has been obtained. No credits will be given for the exempted course, and the student must take an approved alternative course.

Course Repeats

A failed course (grade F) cannot be credited towards a degree, and a failed core or required course must be repeated. The maximum number of repeats of a given course is one. Note that students may not repeat passed courses for upgrading purposes.

Deviations from Curriculum

Under exceptional circumstances, the department may consider a student's request to approve deviations from the specified curriculum. Students wishing to deviate from the specified semester programme, and while choosing elective courses, should pay close attention to the course descriptions found in the departmental entries in order to ensure that they have completed the prerequisite courses, if any, and are enrolled in the corequisite courses, if any.

Length of Study

It should be noted that special permission is required from the dean of the student’s school to extend a programme beyond six semesters. Students permitted to study beyond a sixth semester will register as full-time students, pay full fees, be subject to all university regulations, and be entitled to all normal student services. However, student housing will not be available to such students unless special permission has been obtained from the Director of Student Affairs. Registration is normally not possible beyond an eighth semester, although permitted leaves of absence will not count towards the limits on registration.
Joint Programmes

Students designated as pursuing a joint programme require the approval of their admission to the programme by the departments or schools jointly offering the programme. They have the same priority of access to the courses specified in their programme as do majors in those departments. Presently such joint programmes are the Computer Science and Business and Management options in Mathematical Sciences.

Other undergraduates may wish to follow the curriculum of such joint programmes but they have access to courses outside their major departments only after major and joint programme students have been accommodated. Their access cannot be assured.

All students completing joint programme requirements will be considered for the degree designation of that programme, whether or not they were so designated previously. The class of honours, however, must be agreeable to both departments and their schools. Otherwise, the degree will be awarded in the major department only.

English Language Courses

All undergraduate students entering the University will be assessed as to their English language proficiency. Those for whom English language support is deemed essential will be offered language classes. LANG 001 is a programme requirement for such students and will provide an integrated-skill course in language improvement during the Fall Semester. LANG 002 is a Spring Semester follow-up course for students who do not gain exemption at the end of LANG 001. LANG 003 is an intensive summer course which offers the opportunity for students not exempted after LANG 002 to complete their English language requirements. Students will not be able to continue into the second year of their studies unless an exemption has been gained.

Undergraduate Grades

Students receive a letter grade in each course in which they are enrolled. Grades range in equal increments from A+ to E/F, with E/F carrying zero credit. The grades D- and D+ are not used as course grades and are omitted from the following table.

<table>
<thead>
<tr>
<th>Letter Grades</th>
<th>Definitions</th>
<th>Other Designations</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>Excellent Performance</td>
<td>AU</td>
<td>Audited</td>
</tr>
<tr>
<td>A</td>
<td>Good Performance</td>
<td>I</td>
<td>Incomplete</td>
</tr>
<tr>
<td>B+</td>
<td>Satisfactory Performance</td>
<td>W</td>
<td>Withdrawal without Penalty</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>IP</td>
<td>In Progress</td>
</tr>
<tr>
<td>C+</td>
<td></td>
<td>PP</td>
<td>Permitted to Proceed</td>
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<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C-</td>
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</table>

A student receiving the Conditional Failure (E) grade has an opportunity to take a supplementary examination which will be scheduled approximately two weeks after the release of grades by departments. The supplementary examination grade will normally be D or F and, if the supplementary examination is not taken, the E grade is converted to F.

A failed course (grade F) cannot be credited towards a degree, and a failed core or required course must be repeated. The maximum number of repeats of a given course is one.

The Audited (AU) designation will be assigned when an auditing student has completed, to the satisfaction of the instructor, any conditions established at registration as an auditor. If the conditions are not met, the course will be deleted from the student's record.

An Incomplete (I) grade must be converted to a regular grade by the beginning of the next semester, otherwise it is converted to F. This grade is used when work is necessarily delayed through no fault of the student such as a medical problem or an equipment breakdown.

The Withdrawal without Penalty (W) grade is given when a student withdraws from a course after the "add-drop" period and prior to the prescribed deadline of six weeks before the end of classes.

The In Progress (IP) grade is used to indicate that a student has not gained exemption from LANG 001 or LANG 002 and will need to enrol in the follow-up course.

When progress on thesis or project work is satisfactory but not scheduled for completion at the end of a semester, the Permitted to Proceed (PP) grade is utilised.

Academic Standing

For the attainment of good academic standing at the end of each semester, an undergraduate student should have obtained a Semester Grade Average (SGA) of C- or
better, have obtained a passing grade (D or better) in all core courses, and have a Cumulative Grade Average (CGA) of C- or better. Students who fail to maintain good academic standing in two consecutive semesters will have their records reviewed and may be required to take academic leave and suspend their study.

Students required to take academic leave may apply to the Admissions, Registration and Records Office during their second semester of absence to end their leave and return to full-time study in the next semester. If leave is not ended at this time, the leave is converted to a required withdrawal from the University. If the required leave is ended, students' academic records continue as they were but conditions will be required for the attainment of good academic standing. Should these conditions not be met, students will be required to withdraw from the programme of study and shall not be eligible for re-admission.

Undergraduate Degree Requirements

The specific requirements for each degree are given in the departmental entries. All are based on a minimum requirement ranging from 100 to 105 credits with degree completion intended to take six academic semesters (three academic years). A grade of D or better (or P where appropriate) must be obtained in all courses used to satisfy degree requirements. All undergraduate programmes are honours programmes, with degrees classified according to the student's level of academic performance:

- First Class Honours
- Second Class Honours, Division I
- Second Class Honours, Division II
- Third Class Honours
- Pass

Students expecting to graduate in the current academic year must apply to the Admissions, Registration and Records Office. Please refer to the Important Dates section at the end of the Calendar for the deadline for application.

POSTGRADUATE PROGRAMMES

In addition to the general University regulations described in this section, specific departmental requirements are found in the departmental entries in the Calendar. In some cases, departmental regulations are more restrictive than those described here. Postgraduate students should make themselves familiar with the general and postgraduate University requirements, as well as those of their major department.

The Master of Science (MSc), Master of Arts (MA) and Master of Business Administration (MBA) degrees are basically course work degrees, although project work and a report may also be required. The Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) degrees are basically research degrees, although usually course work is also required.

Full-time and Part-time Study

Most postgraduate degrees are available on a part-time or full-time basis. The taught programmes leading to the MSc, MA and MBA degrees may be the most suitable for students interested in part-time study. The MPhil and PhD are research degrees, and students in some disciplines may be required to participate in research on a full-time basis.

Postgraduate students may apply to their department, prior to the beginning of any semester, for transfer from full-time to part-time status or from part-time to full-time status. When such a transfer is allowed, the remaining degree requirements will be determined.

Full-time students in taught programmes are expected to be in attendance during those semesters and sessions for which their programmes are scheduled. In many programmes, research students may be expected to be in attendance on a year-round basis. For part-time students, attendance shall be as above except on a part-time basis as defined by the requirements of their programmes.

Duration of Study

For full-time students, the normal periods for the completion of MSc, MA, and MPhil degrees are one and a half years, and two years for the MBA. For the PhD degree it is four years after the first degree with a reduction of one and a half years if a relevant Master's degree is earned prior to entering the PhD programme. Part-time students may expect to take about twice the time of full-time students. Students may apply for reductions to these periods.

The maximum time for degree completion is five years for the Master's degrees and eight years for a PhD degree (with a one and a half years' reduction in the circumstances noted in the preceding paragraph), and this holds whether or not the student is in continuous registration. The time limits for part-time study are the same as for full-time study.

Course Requirements

Credit requirements for postgraduate degrees apply only to course and project work, not to thesis research. For the MSc, MA, MPhil and PhD programmes, the normal full course load is 10 credits per semester, and the maximum part-time load is 6 credits per semester. Unless restricted by departmental regulations, a maximum of two undergraduate courses may be used for postgraduate degree credit, and these should be at the 300 level. Of the two, only one may be from the student's major department. For the corresponding MBA requirements, see the entry for the School of Business and Management.

For all postgraduate programmes, no course with a grade less than C may be counted towards a degree, and the average grade obtained in the courses used to satisfy degree requirements must at least be B. Only two courses in a degree programme may be retaken, and each may be repeated only once.
Postgraduate Grades

Students receive a letter grade in each course in which they are enrolled. Grades range in equal increments from A+ to F, with F carrying zero credit. The grades C- to D-, and E, are not used in postgraduate courses. The grades used are shown in the following table.

<table>
<thead>
<tr>
<th>Letter Grades</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>Excellent Performance</td>
</tr>
<tr>
<td>A</td>
<td>Good Performance</td>
</tr>
<tr>
<td>A-</td>
<td>Marginal Performance</td>
</tr>
<tr>
<td>B+</td>
<td>Failure</td>
</tr>
<tr>
<td>B</td>
<td>Pass, ungraded</td>
</tr>
<tr>
<td>C+</td>
<td>Audited</td>
</tr>
<tr>
<td>C</td>
<td>Incomplete</td>
</tr>
<tr>
<td>F</td>
<td>Withdrawal without Penalty</td>
</tr>
<tr>
<td>P</td>
<td>Permitted to Proceed</td>
</tr>
</tbody>
</table>

Other Designations Definitions

The Audited (AU) designation will be assigned when an auditing student has completed, to the satisfaction of the instructor, any conditions established at registration as an auditor. If the conditions are not met, the course will be deleted from the student’s record.

An Incomplete (I) grade must be converted to a regular grade at the beginning of the next semester, otherwise it is converted to F. This grade is used when work is necessarily delayed through no fault of the student, such as a medical problem or an equipment breakdown.

The Withdrawal without Penalty (W) grade is given when a student withdraws from a course after the “add-drop” period and prior to six weeks before the end of classes.

When progress on thesis or project work is satisfactory but not scheduled for completion at the end of a semester, the Permitted to Proceed (PP) grade is utilised.

Academic Standing

The academic standing of all postgraduate students is periodically reviewed by their departments. Unsatisfactory performance can result in students being denied the opportunity to continue their studies.

Residence Requirements

Normally, a full-time research student is required to be on campus full-time and consequently in such geographical proximity as to be able to participate fully in the University activities associated with the programme. Residence provides the student with an opportunity to become immersed in the intellectual environment of the University. Also included in residency are periods during which the student's research requires off-campus field or non-HKUST laboratory work.

Normally, the residence requirement for an MPhil degree is three full-time semesters and that for a PhD degree is eight. In many departments, the semester may include all or part of the subsequent session. A semester of residency of a part-time student counts as a one-half semester of residency. Students who have not completed their thesis work should continue their registration on a full or part-time basis, without interruption.

These residence requirements do not apply to taught postgraduate programmes which are defined by the semesters and sessions in which the programmes are scheduled.

MSc and MA Programmes

These are course work degrees for which students must fulfil a minimum credit requirement of 30. Students may also undertake a project as described in the departmental Calendar entries. Projects require the submission of a written report and carry credit, as specified by the department, to a maximum of nine. The reports will be read by two faculty members, one of whom is the supervisor, and are graded "Pass" or "Fail". A "Pass" grade may be denoted "Pass with Distinction" when appropriate.

MBA Programme

The requirements for the full-time and part-time MBA programme are described in the School of Business and Management section of the Calendar.

MPhil Programmes

In addition to course work requirements, if any, described in the departmental entries of this Calendar, MPhil students will undertake a programme of thesis research under the direction of a supervisor appointed by the department.
Each MPhil student is, on the commencement of study, assigned an interim supervisor. This supervisor works with the student to map out a tentative programme of study and research, and to identify a research supervisor. The research supervisor, when appointed, replaces the interim advisor.

MPhil research is conducted under the general supervision of a thesis committee of at least three faculty members, one of whom is the designated thesis supervisor and committee chairman.

When the thesis is ready for examination, to the satisfaction of both the student and the supervisor, the department head appoints an examination committee consisting of three faculty members. One is the supervisor and another is appointed as chairman. The committee examines the thesis and conducts an oral thesis examination. Theses are graded Pass or Fail. A Pass grade may be denoted Pass with Distinction when appropriate.

PhD Programmes

PhD programmes focus on original research by the student, but most also require course work. Doctoral students proceed from admission to the programme, to candidacy for the degree, and then to defence of the thesis. Each has a thesis supervisor who oversees the student's research. Candidacy is obtained by the successful completion of qualifying examinations specified by the department.

PhD research is conducted under the general supervision of a thesis committee of at least three faculty members, one of whom is the designated thesis supervisor.

The thesis examination committee is appointed by the Senate Committee on Postgraduate Studies on the recommendation of the department. The five-member examination committee is chaired by an individual from outside the school, and is appointed by the Committee on Postgraduate Studies upon recommendation by the dean. This person presides over the examination, but is not one of the five members who are: the thesis supervisor, two academic staff members from the department, one academic staff member from outside the department or discipline, and one additional member from outside the department. Theses will be graded Pass or Fail. A Pass grade may be denoted Pass with Distinction when appropriate.

Conduct of Thesis Examinations

A student wishing to appear before a thesis examination committee must so indicate to the major department at least six weeks before the examination, and have delivered to the department a sufficient number of examination copies at least four weeks before the examination. For a PhD thesis, the number of copies is six, and for the MPhil three.

The examination takes place in a single session and comprises three parts, the first two of which are open to all members of the University and to departmental guests, and the third closed to all but the student and the committee. The first part is an oral presentation by the student emphasising the major elements of the research and the results obtained. Next is an open question period, led by any external examiners present followed by other members of the examining committee, and ended by the thesis supervisor. Finally, others in attendance may also ask questions. During this portion of the examination, all questions are addressed via the chairman and any dialogue limited to the student and individual questioner. The third, and closed, part of the examination is reserved for a less formal examination of the student and thesis by the examining committee.

The thesis examination can have one of several results:
- Passed (or Passed with Distinction)
- Passed (or Passed with Distinction) with minor corrections
- Passed with major corrections
- Failed but may be resubmitted
- Failed

Minor corrections must be made to the satisfaction of the supervisor, but major corrections require the approval of the full examining committee, or a designated subcommittee. The result "Failed but may be resubmitted" requires that the entire examination process be repeated, including the re-establishment of an examination committee. At least six months must pass before re-submission of the thesis. A grade of "Failed" results in the automatic withdrawal of the student from the programme of study and terminates registration at the University.
Professor T.Y. Tsong (above) of the Department of Biochemistry is discussing with a research student and two scientists (right) the student's findings on protein structure and design.
SCHOOL OF SCIENCE

Dean: Leroy L. CHANG, BSc National Taiwan; MSc Univ of South Carolina; PhD Stanford (Professor of Physics)

The School of Science comprises five departments: Biochemistry, Biology, Chemistry, Mathematics and Physics. The School will enrol when fully established about one-quarter of the University's undergraduate and postgraduate students.

Each department offers the BSc degree. In keeping with the University's general philosophy of providing specialised training with a generalist outlook, undergraduates take more than one-third of their programme outside their major department, including at least 12 credits in the School of Humanities and Social Science.

All departments also offer postgraduate programmes leading to the research-based degrees of Master of Philosophy (MPhil) and Doctor of Philosophy (PhD). In addition, there are course-based Master of Science (MSc) programmes in Mathematics and Physics, and an MSc programme in Biotechnology begins in 1993.

DEPARTMENT OF BIOCHEMISTRY

Biochemistry is the study of biological molecules such as proteins, nucleic acids, lipids, etc which form the morphological structures represented by the cell and cellular organelles, provide machinery for the inheritance and expression of genetic information, and energise catalytic transformations essential to cellular growth and reproduction. The study of the nature of these molecules and their reactions has brought about rapid advances in the biological and medical sciences, and has furthermore enabled the development of biotechnological industries that are playing an increasingly important role in the global economy.

The Department of Biochemistry offers a comprehensive teaching and research programme in both basic and applied aspects of biochemistry. At the same time it maintains a close relationship with the Biotechnology Research Institute, because of the fundamental significance of biochemistry in that field.

Both the teaching and research laboratories in the Department of Biochemistry are equipped with advanced instrumentation. This equipment, serving biochemical and biotechnological studies, includes protein sequencer, oligonucleotide synthesizer, DNA sequencer, centrifugal partition chromatograph, and fermentation and cell culture facilities. In addition to departmental laboratories, faculty and students may utilise the extensive central facilities and computer network of the University.

Faculty

Professor and Head of Department:
J. Tze-Fei WONG, BA, PhD Toronto

Professor:
Tian-Yow TSONG, MSc, PhD Yale
(Director of Biotechnology Research Institute)

Senior Lecturers:
James A. HACKETT, BSc, PhD Dublin; PhD Australian National
Raymond S.C. WONG, Dip Hong Kong Baptist Coll; MSc, PhD South Dakota State

Lecturers:
Robell CHEN, BSc National Taiwan Normal; DSc Univ of Texas, Arlington
King-Chuen CHOW, BSc, MPhil Chinese Univ of Hong Kong; PhD Toronto
Xiao-Ming GAO, BA, BM Beijing Medical Univ; PhD Council for National Academic Awards, UK
Yi-Fan HAN, BS Shanghai First Medical Coll; MS Peking Union Medical Coll; PhD Medical Coll of Ohio
Robert K.M. KO, BSc, MPhil Chinese Univ of Hong Kong; PhD British Columbia
Peter H.Y. LAM, BSc Chinese Univ of Hong Kong; PhD Univ of Wisconsin, Madison
Wan-keung R. WONG, Dip Hong Kong Baptist Coll; MSc Regina; PhD British Columbia
Undergraduate Programme

The objective of the BSc programme in Biochemistry is to instruct students in the understanding of biochemical molecules and processes, and to provide training in the methodologies used in laboratory investigation. Accordingly, the programme emphasises both theory and experimentation.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in two AL subjects plus one AUAS subject. One of the AL subjects must be Chemistry, and one of the remaining AUAS subjects must be Biology.

The following semester-by-semester description of the undergraduate programme defines what students must complete to satisfy programme requirements, and the desirable times for taking particular courses. Student should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

<table>
<thead>
<tr>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall Semester</strong></td>
<td><strong>Spring Semester</strong></td>
</tr>
<tr>
<td>BICH 121 C Introduction to Biochemistry [3-0-0:3]</td>
<td>BIOL 202 R Animal Physiology [3-0-0:3]</td>
</tr>
<tr>
<td>CHEM 111 R Organic Chemistry I [3-0-0:3]</td>
<td>BIOL 206 R Microbiology [3-0-0:3]</td>
</tr>
<tr>
<td>(1) LANG 001 R Language Skills Enhancement I [0-3-1:0]</td>
<td>CHEM 242 R Analytical Separation and Instrumental Analysis [3-0-0:3]</td>
</tr>
<tr>
<td>(2) MATH 001 R Beginning Calculus [3-1-0:4]</td>
<td>or MATH 002 R Intermediate Calculus [3-1-0:4]</td>
</tr>
<tr>
<td>or PHYS 101 R General Physics I [3-0-0:3]</td>
<td>or PHYS 102 R General Physics II [3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>LANG 103 R Technical Communication [0-3-0:3]</td>
</tr>
<tr>
<td></td>
<td>FREE E Free Elective [3-0-0:3]</td>
</tr>
<tr>
<td><strong>Total</strong>: 17 credits</td>
<td><strong>Total</strong>: 18 credits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Spring Semester</strong></th>
<th><strong>Fall Semester</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>BICH 122 C Intermediary Metabolism [3-0-0:3]</td>
<td>BICH 303 C Immunochemistry [3-0-0:3]</td>
</tr>
<tr>
<td>BICH 172 C Introductory Biochemical Laboratory [0-0-0:6]</td>
<td>BICH 313 C Immunochemistry Laboratory [0-0-3:1]</td>
</tr>
<tr>
<td>BICH 182 C Biochemical Laboratory Techniques [1-0-0:1]</td>
<td>BICH 355 C Food Biochemistry [3-0-0:3]</td>
</tr>
<tr>
<td>BIOL 211 R General Genetics [3-1-0:4]</td>
<td>BICH 363 C Principles of Biotechnology [3-0-0:3]</td>
</tr>
<tr>
<td>CHEM 112 C Organic Chemistry II [3-0-0:3]</td>
<td>FREE E Free Elective [3-0-0:3]</td>
</tr>
<tr>
<td>CHEM 114 C Organic Chemistry Laboratory I [0-1-3:2]</td>
<td>H&amp;SS E Humanities and Social Science Elective [3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS E Humanities and Social Science Elective [3-0-0:3]</td>
<td>SB&amp;M E Business and Management Elective [3-0-0:3]</td>
</tr>
<tr>
<td>(3) MATH 006 Algebrat and Calculus II (optional) [3-1-0:4]</td>
<td><strong>Total</strong>: 19 credits</td>
</tr>
<tr>
<td><strong>Total</strong>: 18 credits</td>
<td><strong>Spring Semester</strong></td>
</tr>
<tr>
<td><strong>Total</strong>: 13 credits</td>
<td>BIOL 318 C Cell Membranes and Metabolic Regulation [3-0-0:3]</td>
</tr>
<tr>
<td>BIOL 366 C Biotechnology Seminar [0-0-0:4]</td>
<td>or BIOL 398 C Biochemical Research [0-1-0:4]</td>
</tr>
<tr>
<td>or BIOL 376 C Biochemistry of Diseases [3-0-0:3]</td>
<td>H&amp;SS E Humanities and Social Science Elective [3-0-0:3]</td>
</tr>
</tbody>
</table>
In fulfilling the degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. The passing standard in a graded course is C and the overall average must be B or above. In the final stage of the programme, students are required to submit theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Specific programme requirements are:

- at least one of the following courses:
  - BICH 363 Principles of Biotechnology: Pharmaceuticals, Environment and Energy [3-0-0-3]
  - BICH 376 Biochemistry of Diseases [3-0-0-3]
  - BICH 535 Food Biochemistry [3-0-0-3]
  - BICH 541 Immunochemistry [3-0-0-3]
  - BICH 561 Physical Biochemistry [3-0-0-3]

- BICH 551 Biochemical Instrumentation [0-0-4-3]
- BICH 601 Biochemistry Seminar I [0-1-0-1]
- BICH 602 Biochemistry Seminar II [0-1-0-1]
- BICH 699 MPhil Thesis Research; and presentation and oral defence of MPhil thesis.

Doctor of Philosophy (PhD) in Biochemistry

The purpose of the PhD programme in Biochemistry is to prepare students, through completion of a research project, to become independent scientists capable of the design, initiation and execution of original research. The duration of the programme normally ranges from four to eight years from the first degree, with a reduction of 18 months if a relevant master’s degree is earned prior to entering the PhD programme. Students with a first degree in an area other than their postgraduate programme may be required to take additional courses.

In fulfilling the degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. The passing standard in a graded course is C and the overall average must be B or above. Students are also required to pass a comprehensive/qualifying examination set by the Department. In the final stage of the programme, students must submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.
Specific programme requirements are:

- at least one of the following courses:
  - BICH 376 Biochemistry of Diseases [3-0-0:3]
  - BICH 535 Food Biochemistry [3-0-0:3]
  - BICH 541 Immunobiochemistry [3-0-0:3]
  - BICH 561 Physical Biochemistry [3-0-0:3]
  - BICH 551 Biochemical Instrumentation [0-0-4:3]
  - BICH 601 Biochemistry Seminar I [0-1-0:1]
  - BICH 602 Biochemistry Seminar II [0-1-0:1]
- at least six credits of course work outside of Biochemistry;
- comprehensive/qualifying examination;
- BICH 799 PhD Thesis Research; and
- presentation and defence of PhD thesis.

Faculty Research Interests

Professor J. Tze Fei WONG, Head of Department

coevolution of the genetic code, and pathways of amino acid biosynthesis; origin of genetic coding; evolution of codon usages; identity elements of transfer RNA; mechanisms of substrate recognition by aminoacyl-tRNA synthetases. Dextran-haemoglobin as an oxygen-delivering blood substitute; pharmacological actions and physical properties of covalent dextran-protein and dextran-drug conjugates.

Professor Tian Yow TSONG

Structural/Functional relationship of protein; calorimetric study of protein stability; kinetic investigation of protein folding; hydrophobic and hydrophilic contributions to protein stability using site-directed mutagenesis.

Dr James A. HACKETT, Senior Lecturer

Molecular cloning and analysis of genes of Salmonella typhimurium. Virulence function of, and vaccine development against Salmonella. Molecular genetics of Campylobacter and Selenomonas.

Dr Raymond S. C. WONG, Senior Lecturer

Improvement of edible oil through genetic manipulation of plant storage lipids; plant bioengineering with special emphasis on the nutritional aspects of Chinese vegetable crops (Brassica spp.). Use of microspores in plant strain isolation, tissue culture manipulation, mutagenesis, biochemical characterisation and transgenic plant development. Biosynthesis of plant storage lipids, proteins and secondary metabolites with respect to product development.

Dr Robell Huei-Hin CHEN, Lecturer


Dr King Chuen CHOW, Lecturer


Dr Xiao-Ming GAO, Lecturer

Structure and function of the class I molecules of major histocompatibility complex (MHC). Association between HLA-B27, a human class I MHC molecule, and seronegative arthritis (ankylosing spondylitis, Reiter's syndrome, juvenile arthritis, reactive arthritis). Immune tolerance and mechanisms of autoimmune. Vaccination against autoimmune diseases.

Dr Yi-Fan HAN, Lecturer

Cellular and molecular mechanisms of associative learning and memory. Neuropsychopharmacological research and development of memory enhancers and analgesics particularly from Chinese medicinal herbs. Role of protein phosphorylation and dephosphorylation in neuronal functions; and role of central neurotransmitters in acupuncture analgesia.

Dr Robert K. M. KO, Lecturer

Free radical-related mechanisms in tissue injuries, especially myocardial ischemia/reperfusion injury and carbon tetrachloride-induced hepatotoxicity; protection against such injuries by antioxidants; transition metal ions and hydroperoxide-mediated peroxidation of biological membrane lipids; age-related alterations in tissue antioxidant defence; antioxidant properties of traditional Chinese medicinals in relation to their anti-aging activities; isolation of active principle(s) from Chinese medicinals; fractionation of their pharmacologically active components; HPLC and centrifugal partition chromatography.
Dr Peter H. Y. LAM, Lecturer

Biochemistry and pharmacology of signal transduction processes involving calcium binding proteins, and the action of steroid hormones; development of monoclonal antibodies, and use of monoclonal antibodies in studies of protein structure and functions; protein expression in eukaryotic systems based on baculovirus and vaccinia vectors; use of synthetic and recombinant peptides in the development of therapeutic and diagnostic agents.

Dr Wan Keung R. WONG, Lecturer

Bacterial genetics; cloning and expression of genes in Escherichia coli and Saccharomyces cerevisiae; excretion of proteins from E coli; development of E coli systems for extracellular production of valuable proteins; production and reconstitution of recombinant cellulases for use in energy generation and cellulosic waste management; investigation and application of Pseudomonas as a recombinant host.

DEPARTMENT OF BIOLOGY

The study of biology covers a wide range of systems at all levels of organisation, ranging from molecules and cells to organisms and populations, both plants and animals. At HKUST, the biological research and teaching programmes reflect all levels, with emphasis on the molecular and cellular levels. Research areas within the Department include molecular biology and genetics, cell and developmental biology, plant and animal physiology, neurobiology, marine biology and environmental biology. The Department also contributes to the research and development programmes of the Biotechnology Research Institute and the Institute for Environmental Studies.

The Department of Biology is equipped with modern teaching facilities and state-of-the-art research instruments, including facilities for cell culture, molecular and cell biology, and modern microscopy as well as animal care facilities and a greenhouse for plant studies. Also, faculty and students may utilise the extensive central facilities and computer network of the University.

Faculty

Professor and Head of Department:
Madeline C. S. Wu, BSc National Taiwan; PhD Univ of Texas, Austin

Professors:
Donald C. Chang, BSc National Taiwan; MA, PhD Rice
Fu-Shiang Chia, BSc National Taiwan; MS, PhD Univ of Washington
Shain-dow Kung, BSc Chung-Hsing; MSc Guelph; PhD Toronto
(Pro-Vice-Chancellor for Academic Affairs)

Senior Lecturers:
Maria Li Lung, BSc Cornell; PhD Stanford
I-Hsun Ni, BSc, MSc National Taiwan; PhD British Columbia

Lecturers:
Robert N. Holdefer, BA Drake; MA, PhD Southern Illinois
Nancy Y. Y. Ip, BS Simmons Coll; PhD Harvard
Mun-fai Leung, BSc Northeastern; PhD Boston
Peiyuan Qian, BSc Qingdao Univ of Oceanology; MSc Xiamen; PhD Alberta
Karl Wah-Keung Tsim, BSc, MPhil Chinese Univ Hong Kong; PhD Cambridge
Kwong-Kee Wan, BSc, MSc Toronto; PhD Queen's Univ, Kingston
Yung-Hou Wong, BSc London; MPhil, PhD Cambridge

Affiliated:
Yuk-Shan Wong, BA Concordia; MSc, PhD McGill

Visiting Assistant Lecturer:
Yue-Ying Ren, BMedSc Nanking Medical Coll; MSc, PhD Univ of California, Los Angeles
## Undergraduate Programme

The three-year undergraduate programme leading to the Bachelor of Science degree provides basic training in the biological sciences through course work and laboratory studies. During the first two years of study, students take a set of core subjects in biology and biochemistry. Laboratory work associated with the core and some elective courses is also required. In their second and third years of study, students take a series of electives specialising in one of the following: (1) cell and molecular biology, (2) organisinal biology (3) marine biology or (4) environmental biology. Optional seminar courses designed to enhance students' communication skills, and research projects to train students in laboratory research are also provided.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in two AL subjects plus one AUS subject. One of the AL subjects must be Biology, and one of the remaining AL/AUS subjects must be Chemistry.

The following semester-by-semester description of the undergraduate curriculum defines what students must complete to satisfy programme requirements, and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

### First Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>Type</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 101</td>
<td>C</td>
<td>Biodiversity</td>
<td>3-0-3:4</td>
</tr>
<tr>
<td>BICH 121</td>
<td>R</td>
<td>Introduction to Biochemistry</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>BICH 172</td>
<td>R</td>
<td>Introductory Biochemical Laboratory</td>
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<td>SCIE</td>
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### Spring Semester

#### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>Type</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL 202</td>
<td>C</td>
<td>Animal Physiology</td>
<td>3-0-0:3</td>
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<tr>
<td>BIOL 206</td>
<td>C</td>
<td>Microbiology</td>
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<td>BIOL/BICH</td>
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<td>3-0-0:3</td>
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<td>COMP 101</td>
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<td>Computing Fundamentals</td>
<td>2-0-2:3</td>
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<td>SB&amp;M</td>
<td>E</td>
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### Second Year

#### Fall Semester

<table>
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<th>Course</th>
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</thead>
<tbody>
<tr>
<td>BIOL 211</td>
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<td>General Genetics</td>
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<tr>
<td>BIOL 225</td>
<td>C</td>
<td>Plant Biology</td>
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</tr>
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<td>E</td>
<td>Biology or Biochemistry Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>FREE</td>
<td>E</td>
<td>Free Elective</td>
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### Spring Semester

#### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>Type</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
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<td>Environmental Biology</td>
<td>3-1-0:4</td>
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<tr>
<td>BIOL 104</td>
<td>C</td>
<td>Cell Biology I</td>
<td>3-0-3:4</td>
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<td>BICH 122</td>
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<td>Intermediate Metabolism</td>
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<td>MGMT 111</td>
<td>R</td>
<td>Business Statistics</td>
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</tr>
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<td>FREE</td>
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### Third Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>Type</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL</td>
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<td>Biology Elective</td>
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<tr>
<td>BIOL</td>
<td>E</td>
<td>Biology Elective</td>
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<tr>
<td>ENGG</td>
<td>E</td>
<td>Engineering Elective</td>
<td>3-0-0:3</td>
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<td>FREE</td>
<td>E</td>
<td>Free Elective</td>
<td>3-0-0:3</td>
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<td>FREE</td>
<td>E</td>
<td>Free Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
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</table>

### Total Credits

- **First Year**: 15 credits
- **Second Year**: 17 credits
- **Third Year**: 18 credits

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50

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51
Spring Semester

<table>
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<tr>
<th>Course</th>
<th>Lectures</th>
<th>Credits</th>
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<td>BIOL 301, BIOL 302, BIOL 307, BIOL 309, BIOL 312, BIOL 313, BIOL 314, BIOL 316, BIOL 317, BIOL 319, BIOL 323, BIOL 324, BIOL 328, BIOL 338, BIOL 397, BIOL 398</td>
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A minimum of 100 credits is required for the BSc programme in Biology. A student's choice of electives may result in this minimum being exceeded.

Postgraduate Programmes and Research

The Department of Biology provides postgraduate training in basic and applied biology. In addition to taking advanced postgraduate courses, students will conduct research in:

- molecular biology and genetics of animals and plants
- cell and developmental biology
- plant physiology
- neurobiology
- environmental and marine biology

The first two areas broadly encompass molecular genetics, developmental biology, microbiology, molecular pharmacology and immunology, and genetic engineering in plants and animals. One project that the Department is focusing on is the delineation of the mechanisms of cell differentiation at the cellular and molecular levels. This work involves a number of departmental laboratories that study development, gene regulation, growth factors, signal transduction, ultrastructure, cell manipulation, and gene transfer. Research in some of these areas is an integral part of the activity of the University's Biotechnology Research Institute.

While neurobiology has its place in this "Decade of the Brain", a renewed interest in the study of plant physiology using modern approaches shows great promises in the coming years, particularly for technological applications.

Other areas of concern are environmental pollution and resource management, and conservation of marine wild life. These studies aim at improving the environment of Hong Kong, and the management of its marine resources.

The Department offers research-oriented programmes leading to the Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) degrees in Biology. The Department also participates in the Master of Science (MSc) programme in Biotechnology.

Qualified students with a bachelor's degree in biological sciences, chemical sciences, physical sciences, or engineering may apply for admission to the postgraduate degree programmes in the Department of Biology. Transcripts from the applicant's undergraduate institution and letters of recommendation from former instructors are required. Scores in the Graduate Record Examination (GRE), if available, should be submitted as supplementary information. Students lacking a sufficient background in biology may be accepted into the programme, but will be required to take remedial biology courses during the first year of their studies.

Master of Philosophy (MPhil) in Biology

The purpose of the MPhil degree is to train postgraduate students to conduct independent research in biological sciences. The duration of the programme normally takes two years of full-time studies to complete, and it can be extended for part-time studies. Students with a first degree in an area other than their postgraduate programme may be required to take additional courses.

In fulfilling the degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. The passing standard in a graded course is C and the overall average must be B or above. In the final stage of the programme, students are required to submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Specific programme requirements are:

- at least two four-credit postgraduate courses selected by students and approved by the postgraduate supervising committee;
- BIOL 611 Postgraduate Seminars I;
- BIOL 612 Postgraduate Seminars II;
- presentation of two seminars, one on the research proposal and one on research results;
- BIOL 699 MPhil Thesis Research;
- presentation and oral defence of the MPhil thesis.

Doctor of Philosophy (PhD) in Biology

The purpose of the PhD programme is to train students in original research in biological sciences, and to cultivate the independent and innovative thinking that is essential for a successful research career in either basic or applied biology. The
programme normally takes four years from the first degree to complete. Students with a first degree in an area other than their postgraduate programme may be required to take additional courses.

In fulfilling the degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. The passing standard in a graded course is C and the overall average must be B or above. Students must pass a comprehensive/qualifying examination set by the Department. In the final stage of the programme, students are required to submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Specific programme requirements are:

- BIOL 611 Postgraduate Seminars I;
- BIOL 612 Postgraduate Seminars II;
- three postgraduate courses for students starting with a first degree or two postgraduate courses for those who start the programme with a relevant MPhil or MSc degree;
- a comprehensive/qualifying examination;
- BIOL 799 PhD Thesis Research; and
- presentation and oral defence of the PhD thesis.

Faculty Research Interests

Professor Madeline C.S. WU, Head of Department

The regulatory mechanism that controls the initiation of chloroplast DNA replication and the molecular mechanism for sequestering heavy metal in *Chlamydomonas reinhardtii*. Broad range molecular and transformation studies of the marine macroalgae *Gracilaria*.

Professor Donald C. CHANG

Professor Chang's current research interests include: (i) development of improved technologies for gene transfer and cell fusion; (ii) applications of video microscopy, confocal laser microscopy, and rapid-freezing electron microscopy; and (iii) molecular mechanisms of cell development and cell differentiation.

Professor Fu-shiang CHIA

Professor Chia's research interest concerns gametogenesis, organogenesis, brooding behaviour, settlement, metamorphosis, and larval predation of marine invertebrates, with emphasis on: (i) isolation and identification of inducing substances for larval settlement, and (ii) neurobiology of the larval sensory receptors for the inducing substances.

Professor Shain-Dow KUNG, Pro-Vice-Chancellor for Academic Affairs

One area of research is the molecular evolution of chloroplast genomes. A second area of research involves the molecular mechanism of genetic tumours. The third area involves identification and analysis of the regulatory sequences of UV-B radiation inducible genes from UV-B sensitive and resistant soya bean cultivars and rice.

Dr Maria Li LUNG, Senior Lecturer

Primary research interest lies in the cause and prevention of cancer, particularly molecular studies to establish the relationship of Epstein-Barr virus (EBV) with a locally important tumour in Hong Kong, i.e., nasopharyngeal carcinoma (NPC) and the role of oncogenes, anti-oncogenes, and other genetic factors which may be involved in the development of lung cancer.

Dr I-Hsun NI, Senior Lecturer

Quantitative analysis in: (i) fisheries management and aquaculture, with the ultimate aim of increasing fish productivity in Hong Kong; (ii) marine environmental impact assessment, with particular interest in the interrelationship between biological components and environmental factors; (iii) comparative population dynamics of marine animals, by studying the life history patterns and strategies from vital statistics.

Dr Robert HOLDEFER, Lecturer

Primary research interest is the brain function of the neurotransmitters norepinephrine and 5-HT. By studying the postsynaptic effects of norepinephrine and 5-HT release in well-defined brain systems (e.g., the visual system) it is hoped that insights will be gained into the function of these monoamines in the brain, which will lead to more effective treatment of psychiatric disorders in man.

Dr Nancy IP, Lecturer

Major research interest is in molecular neurobiology. More specifically, the use of molecular approaches to study novel neurotrophic growth factors and their receptors, and the study of these growth factors and receptors in neuronal differentiation.
Dr Mun-Fai LEUNG, Lecturer

Primary interest is in the role of cytoskeleton during cell growth and differentiation. Current areas of research are (i) the production, purification and monitoring of taxol, an experimental therapeutic agent; (ii) the role of cytoskeleton in multidrug resistance of leukemia; (iii) the mechanism of action of immunosuppressive drugs, cyclosporin and FK506.

Dr Pei-Yuan QIAN, Lecturer

Current research focuses on: (i) environmental impact on reproductive strategies of marine invertebrates; (ii) larval development, behaviour, ontogeny, settlement, and post-larval mortality of marine invertebrates; (iii) marine pollution, particularly on ecotoxicology; and (iv) the evolution of life history strategies of marine invertebrates.

Dr Karl W.K. Tsim, Lecturer

The neuromuscular junction has been chosen as the model system to investigate the cellular and molecular events that lead to the formation of synapses during development and regeneration. Molecular genetic methods are used: (i) to study the regulation of agrin during development and regeneration of the neuromuscular junction, (ii) to isolate the receptor(s) for agrin on the muscle fibers, and (iii) to identify factors which regulate the expression of AChR and AChE at the developing neuromuscular junctions.

Dr Kwong-Kee WAN, Lecturer

Primary research interest lies in the structures and functions of receptors in cell signalling, particularly in growth and differentiation. Current research focuses on the mechanism of the action of the aromatic hydrocarbon receptor. The goal is to define the dual roles that this receptor plays in cellular metabolism and the generation of cytotoxicity.

Dr Yung-Hou WONG, Lecturer

Major research interests are in the delineation of the mechanisms of cell signalling. The functional specificity of different G proteins is studied with the use of recombinant DNA technologies. In addition, the role of G-proteins in the regulation of cell proliferation, differentiation and the development of drug tolerance is studied in cell cultures.

Dr Yuk-Shan WONG, Affiliated

Biochemical studies of heavy metal tolerance in plants, particularly on the biochemistry of Cd and Cu binding peptides; study on the application of free and immobilised micro-algae for wastewater treatment; application of mangrove ecosystems as a secondary treatment facility for industrial wastewater.
Laboratory for Laser-based Spectroscopy of the Department of Chemistry is equipped with advanced lasers and spectrometers for studying molecular structures and dynamics. The properties of new materials and the development of novel optical probe. (above)

Professor Nai-Teng Yu, Head of the Department, is checking the alignment of an experiment and technician Mr Kwok Tin-Ming (right) is adjusting a laser facility.
DEPARTMENT OF CHEMISTRY

Chemistry, a central science, explores the structures and properties of substances at a molecular level, and the reactions which both characterise the properties of these substances, and cause them to be converted into other substances. Classically, chemistry is subdivided into four mainstream areas: analytical, organic, inorganic and physical chemistry. As most modern chemical research and chemical technology embraces more than one of the above disciplines, it is departmental policy to present the science in this context where possible. Thus, teaching and research is structured in a modern, interdisciplinary fashion.

The Department's laboratories are located at the top level of the academic complex. Each laboratory has a fully networked computing system, and has all general facilities required for execution of carefully planned and integrated experiments. The laboratories course in organic chemistry include instruction in microscale techniques. Students are trained to use instruments on a "hands-on" mode wherever possible.

Departmental facilities include FTIR and UV-VIS spectrometers, two Kratos mass spectrometers; a high resolution GC/MS/MS/DS (model MS80RFAG) and a double-focusing MS/DS (model MS25RF), an NMR spectrometer, an excimer laser, capillary electrophoresis equipment, an Nd:YAG laser, an argon-ion laser, a krypton-ion laser, pico-second/femto-second Ti:Sapphire lasers, a mode-locked Nd:YLF laser and various spectrometers for Raman/resonance Raman, hyper-Raman, and micro-Raman spectroscopies. The Materials Characterisation and Preparation Centre, a University facility, contains state-of-the-art instrumentation including NMR (400MHz) and EPR spectrometers (9 Ir/2.7 kW magnet system), a spectrofluorimeter with an add-on anisotropic polarimeter and an epifluorescence microscope, single-crystal/powder X-ray diffractometers, a scanning tunnelling/atomic force microscope, a secondary ion mass spectrometer, a surface and microanalytical system (AES/XPS/UPS/ESCA), and other surface/film characterisation instruments. The Microelectronics Fabrication Centre provides excellent facilities for collaborative research and technology transfer related to chemical microolithography and the development of biomedical instrumentation. Computer capabilities include molecular graphics and modelling, quantum mechanical computation at ab initio and semi-empirical levels, and complex normal-mode calculations. Support facilities also include machine, electronic and glass-blowing shops, and a central stockroom for chemicals, including biochemical and organic solvents.

Faculty

Professor and Head of Department:
Nai-Teng YU, BS National Taiwan; MS New Mexico Highlands; PhD Massachusetts Inst of Tech

Professor:
Hiroyuki HIRAOKA, BA, MS, PhD Kyoto; MBA Golden Gate

Visiting Professor:
Leon H. ZALKOW, AS Armstrong Coll; BChE, PhD Georgia Inst of Tech

Undergraduate Programme

The three-year programme leading to the Bachelor of Science degree is designed to provide students with a strong theoretical and practical foundation in the mainstream areas of analytical, organic, inorganic, and physical chemistry. Students may choose a general programme tailored to their individual interests, or specialise in one area by taking additional advanced course work and participating in approved research projects. Students are also expected to take courses in other subjects outside the Chemistry Department. Though not required for graduation, students are encouraged to complete a research project.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in two AL subjects (Chemistry, and one of Biology, Physics, Pure Mathematics, or Applied Mathematics) plus one ALAS subject (Biology, Physics, Pure Mathematics, Applied Mathematics, or Mathematics and Statistics). Candidates are discouraged from using two Mathematics subjects to satisfy the requirements.

The following semester-by-semester description of the undergraduate programme defines what students must complete to satisfy programme requirements and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.
**School of Science**

**First Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
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<td>Inorganic Chemistry I</td>
<td>[3-0-0:3]</td>
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<td>Engineering Elective</td>
<td>[3-0-0:3]</td>
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<td>LANG 001</td>
<td>Language Skills Enhancement I</td>
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</tr>
<tr>
<td>MATH 001</td>
<td>Beginning Calculus</td>
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<td>SCIE</td>
<td>Science Elective</td>
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**Spring Semester**

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<thead>
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<th>Course Title</th>
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<tbody>
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<td>CHEM 114</td>
<td>Organic Chemistry Laboratory I</td>
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<td>CHEM 132</td>
<td>Inorganic Chemistry II</td>
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<td>[3-0-0:3]</td>
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<tr>
<td>MATH 002</td>
<td>Intermediate Calculus</td>
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**Second Year**

**Fall Semester**

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<th>Course Title</th>
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<tr>
<td>CHEM 221</td>
<td>Physical Chemistry I</td>
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<tr>
<td>CHEM 233</td>
<td>Synthetic Inorganic Chemistry</td>
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<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
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**Spring Semester**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 222</td>
<td>Physical Chemistry II</td>
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<tr>
<td>CHEM 226</td>
<td>Physical Chemistry Laboratory I</td>
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<td>CHEM 242</td>
<td>Analytical Separation and Instrumental Analysis</td>
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</tr>
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<td>Free Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>LANG 103</td>
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**17 credits**

**Third Year**

**Fall Semester**

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<th>Course Code</th>
<th>Course Title</th>
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<td>CHEM 325</td>
<td>Physical Chemistry Laboratory II</td>
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<td>Chemistry Elective</td>
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</tr>
<tr>
<td>CHEM</td>
<td>Chemistry Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
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**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHEM</td>
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<td>Free Elective</td>
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<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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</table>

**16 credits**

(1) Students exempted from this course by the Language Centre may take a Humanities and Social Science elective earlier than provided for in the programme.

(2) Students with an acceptable grade (D or better) in AL Pure Mathematics will replace this course with MATH 101.

(3) Students will choose a course offered by any department in the School of Science other than the Department of Chemistry.

(4) Students with an acceptable grade in MATH 101 will take a Non-Chemistry Science elective (4 credits).

(5) Excluding 100-level Chemistry courses.

(6) Students admitted in 1991-1992 will replace this course with CHEM 233.

A minimum of 100 credits is required for the BSc programme in Chemistry. A student's choice of electives may result in this minimum being exceeded.

**Postgraduate Programmes and Research**

The research interests of the academic staff of the Department of Chemistry can be grouped into five major areas: (i) laser-based molecular spectroscopy and photochemistry; (ii) innovative methods in organic and inorganic synthesis of biologically active compounds and advanced materials; (iii) novel techniques for surface chemistry and chemical analysis; (iv) natural products related to Chinese herbal medicine and (v) theoretical and computational chemistry. These interdisciplinary, pure and applied research programmes are not only relevant to Hong Kong but also have the highest international recognition and potential.
The Department of Chemistry offers programmes leading to the degrees of Master of Philosophy (MPhil) and Doctor of Philosophy (PhD). In addition, the Department participates in the Master of Science (MSc) programme in Biotechnology.

Qualified students with a bachelor's degree in chemistry, biochemistry, biology, mathematics, physics, chemical engineering or related disciplines may apply for admission to the postgraduate degree programmes in the Department of Chemistry. Transcripts from the applicant's undergraduate institution and letters of recommendation from former instructors are required. GRE or TOEFL scores, if available, should be submitted as supplementary information. Students lacking a sufficient background in chemistry may be accepted into a programme, but would be required to take undergraduate chemistry courses during the first year of their postgraduate studies.

Master of Philosophy (MPhil) in Chemistry

The programme is designed with flexibility in order that students may tailor their course selection according to their needs and interests. The requirements consist of approved course work and an original research thesis at the master's level. The duration of the programme normally ranges from 18 months to three years for full-time studies, and can be extended to five years for part-time studies. Students with a first degree in an area other than their postgraduate programme may be required to take additional courses.

In fulfilling the degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. The passing standard in a graded course is C and the overall average must be B or above. In the final stage of the programme, students are required to submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Specific programme requirements are:

- approved course work (if the student has an HKUST MPhil degree in Chemistry, no further course work is required. If the student enters the PhD programme possessing only a bachelor's degree, then the normal MPhil course work requirements must be fulfilled. Excellent students entering with master's degrees from other universities may have part or all of the course work requirements waived.);
- one credit in CHEM 600 Chemistry Seminar in each semester;
- a comprehensive/qualifying examination;
- two seminar presentations: one based on literature unrelated to the student's doctoral research and the second on the completed thesis;
- defence of an original research proposal before a departmental committee;
- an original research thesis: CHEM 799 PhD Thesis Research; and
- defence of the thesis before a University committee.

Doctor of Philosophy (PhD) in Chemistry

The duration of the programme normally ranges from four to eight years from the first degree, with a reduction of 18 months if a relevant master's degree is earned prior to entering the PhD programme. Students with a first degree in an area other than their postgraduate programme may be required to take additional courses.

In fulfilling the degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. The passing standard in a graded course is C and the overall average must be B or above. Students must pass a comprehensive/qualifying examination set by the Department. In the final stage of the programme, students are required to submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Specific programme requirements are:

- approved course work (if the student has an HKUST MPhil degree in Chemistry, no further course work is required. If the student enters the PhD programme possessing only a bachelor's degree, then the normal MPhil course work requirements must be fulfilled. Excellent students entering with master's degrees from other universities may have part or all of the course work requirements waived.);
- one credit in CHEM 600 Chemistry Seminar in each semester;
- a comprehensive/qualifying examination;
- two seminar presentations: one based on literature unrelated to the student's doctoral research and the second on the completed thesis;
- defence of an original research proposal before a departmental committee;
- an original research thesis: CHEM 799 PhD Thesis Research; and
- defence of the thesis before a University committee.

Faculty Career Activities and Research Interests

Professor Nai-Teng YU, Head of Department

Research focuses on development and applications of linear and nonlinear Raman spectroscopy. Innovative techniques include resonance Raman, resonance hyper-Raman, surface-enhanced Raman/hyper-Raman and near-IR excited FT-Raman and time-resolved Raman scattering. Biological applications include studies of metalloporphyrins/hemoproteins, eye lenses, vitamin B6, and model complexes. A near-infrared-Raman fiberoptic sensor is being developed for laser angioplasty and cardiovascular surgery.

Professor Hiroyuki HIRAOKA

The major research focus is the photochemistry and radiation chemistry of electronic materials of organic nature, with the objective of understanding the basic sciences involved when these materials are exposed to UV-light, pulsed laser photons, electron and ion beams under various conditions. On the basis of these findings, new applications of these materials are explored.
Dr Albert S. C. CHAN, Reader

Main research emphasis is placed on two areas: (1) homogeneous asymmetric catalysis for the production of fine chemicals and pharmaceutical products; and (2) homogeneous catalysis for the production of large volume, basic chemicals.

Dr Richard K. HAYNES, Reader

Research focuses on the development of new reagents and methods, largely based on carbanion chemistry, for the synthesis of natural products and their derivatives selected on the basis of medicinal and clinical importance, and on the development of new antimalarial drugs based on the Chinese herbal antimalarial qinghaosu. In collaboration with others within the Department, a systematic evaluation of the constituents of Chinese plants used in Chinese herbal remedies as part of a drug discovery design and development unit is also underway.

Dr Paul R. CARLIER, Lecturer

Research is concerned primarily with the development of new asymmetric reactions, and currently includes the asymmetric cyclo-addition of metal isocyanates and alkenes to give β-lactams, and new asymmetric addition methodology involving nitriles. Separate research concerns the development of new materials useful for imaging and optoelectronic applications.

Dr Chun-Tao CHE, Lecturer

Research focuses on biologically active compounds from medicinal plants and other natural sources, with special emphasis on the isolation and structural determination of secondary metabolites, and the development/application of separation methods and spectroscopic techniques, as well as a database for documentation of chemical/biological information.

Dr Wei-Min DAI, Lecturer

Synthetic organic and bioorganic chemistry, including particularly the development of novel synthetic methodology, synthesis of naturally occurring substances and biomedically interested molecules, chemical simulation of mechanism of drug action, and prodrug design and synthesis.

Dr Guochen JIA, Lecturer

Research involves the design, synthesis, and characterisation of inorganic and organometallic materials - either small molecules or macromolecules - with useful properties, particularly materials with electrical conducting, non-linear optical, and liquid crystalline properties, and also the design and synthesis of novel metal complexes that can be used for catalysis or biomedical applications.

Dr Wa-Hung LEUNG, Lecturer

Interests are in the field of synthetic inorganic and organometallic chemistry. A major focus is on metal complexes containing multiply-bonded ligands such as alkylidene and imido, and their applications in catalysis and materials synthesis. Efforts are also being made to prepare volatile molecular precursors, e.g. alkoxides, amides, phosphides, for chemical vapour deposition.

Dr Xiao-Yuan LI, Lecturer

Research is in the area of biophysical and bioinorganic chemistry, currently on the structure-dynamics-function relationships of biologically important transition metal complexes and organic chromophores. Research goals are approached from three directions: (1) synthesis of chemical analogues, (2) spectroscopic characterisation, and (3) quantum mechanical computation.

Dr Hui OU-YANG, Lecturer

Research interests are in theoretical studies of scanning tunnelling microscopy and electron transfer processes at electrodes; calculations of the electronic structures and energies of inorganic and organometallic clusters and polymers; and density-functional theory of atoms, molecules and solids.

Dr Terence See-Ming WAN, Lecturer

Research interests are in the following areas: (a) novel analytical techniques, such as capillary electrophoresis and tandem mass spectrometry, (b) chemical aspects of toxicology, including the characterisation of novel drug metabolites, (c) exploratory and mechanistic studies of cobalamin (vitamin B12) catalysed rearrangement reactions, and (d) environmental chemistry.

Dr Ian D. WILLIAMS, Lecturer

Investigation of structure-property relationships in advanced materials, especially with interesting optical and electrical properties, e.g. chiral compounds for nonlinear optics, organic semiconductors such as melanin and skin pigments, design of molecular ferroelectrics - compounds with electrical switching capability; aspects of chemical synthesis, molecular characterisation including single crystal X-ray diffraction, property measurements and theoretical modelling.
School of Science

Dr Yun-Dong WU, Lecturer

Computational studies of mechanisms and stereoselectivities of organic and biochemical reactions, design of organometallic catalysts for stereoselective organic reactions, conformational features and metal binding of macrocyclic compounds, mechanisms of anti-cancer drug actions and drug design; methods include quantum mechanics, molecular mechanics, and molecular dynamics.

Dr Shihe YANG, Lecturer

Interests lie at the physical-inorganic interface, including: structure, dynamics and photochemistry of isolated clusters; novel nanomaterials and thin films with optoelectronic applications; fullerene-metal derivatives, fullerene formation mechanisms and their endohedral chemistry. Modern state-of-art laser-based spectroscopic and mass spectroscopic methods are employed.

DEPARTMENT OF MATHEMATICS

Mathematics permeates almost every discipline of science and technology. Modern research mathematicians, including even those specialised in the purest of mathematics, find themselves sought after by computer companies, biotechnology institutions, and financial corporations. This takes them beyond their traditional careers as faculty members in universities and staff scientists in research laboratories. For those specialised in mathematical sciences or scientific computation, the opportunity for exciting careers in education, industry and government is even wider.

The faculty in the Department of Mathematics consists of two overlapping groups. Those in one group are interested in pure and applicable mathematics, and in the other in mathematical sciences and applications. The faculty in the first group are mathematicians. Whether their research activities be in pure mathematics or applicable mathematics, they are doing mathematics in the proper, narrow sense. They are mainly interested in the mathematical contents of the subject matter, and their work is judged mainly on mathematical merits. On the other hand, the faculty in the second group are mathematical scientists or engineers. They are usually not mathematicians in the narrow sense, and are mainly interested in the scientific content of the subject matter they are investigating. Their work is judged mainly by its contribution to science and engineering. The instructional programmes in the Department also reflect these interests of the faculty. The complementary interactions of the two groups are manifested, for example, in the programme of scientific computation, which is supported by both theoretical numerical analysts, and mathematical scientists.

It is evident that the two groups are quite different. However there are great advantages to combine these two groups of people in the same department. In a department which has a strong component of mathematical application, the mathematicians can uphold the integrity and traditional standards of the discipline and, for those mathematicians with a bent towards real world applications, the proximity with mathematically conversant scientists and engineers provides stimulus and inspiration for their explorations. On the other hand, it is also beneficial to mathematical scientists and engineers to be exposed continually to new mathematical ideas. It is very likely that new mathematical tools for solving various scientific and technological problems will be developed from these interactions and fermentations.

Faculty

Professor and Head of Department:
Din-Yu HSIEH, BSc National Taiwan; MSc Brown; PhD California Inst of Tech

Professors:
Grafton Wai-How HUI, BSc Beijing; PhD, DSc Southampton
Chung-Chun YANG, BSc National Taiwan; MSc, PhD Univ of Wisconsin, Madison

Adjunct Professors:
Wu-Chung HSIANG, BSc National Taiwan; PhD Princeton
James Sai-Wing WONG, BSc Baylor; PhD California Inst of Tech
School of Science

Visiting Professor:
Wing-Hung WONG, BA Univ of California, Berkeley; MSc, PhD Univ of Wisconsin, Madison

Readers:
John D. BUCKMASTER, BSc London; PhD Cornell
Ngai-Hang CHAN, BSc Chinese Univ of Hong Kong; PhD Maryland
Kunrui YU, BSc Univ of Sc & Tech of China; Dr rer nat Bonn

Visiting Senior Lecturer:
Der-Chen E. CHANG, BSc, MSc National Tsing Hua; MA, PhD Princeton

Lecturers:
Gopal K. BASAK, B.Stat, M.Stat Indian Statistical Inst; PhD Indiana
Jeffrey R. CHASNOV, BA Univ of California, Berkeley; MA, MPhil, PhD Columbia
Bei-Fang CHEN, BSc Huazhong Normal; MSc Huazhong Univ of Sc & Tech; MA, PhD State Univ of New York, Buffalo
Yik-Man CHIANG, BSc, PhD London
Kwai-Man FAN, BSc National Taiwan; MA Univ of California, Santa Barbara; PhD Purdue
Jimmy Chi-Hung FUNG, BSc Durham; PhD Cambridge
Walter G. GALL, MA, PhD State Univ of New York, Buffalo
Guo-Qiang GE, BSc Zhejiang; MA Wayne State; PhD Univ of California, Berkeley
Bi-Zhong HU, BSc Univ of Sc & Tech of China; MSc Academia Sinica; PhD State Univ of New York, Stony Brook
Ji-Shan HU, BA, MA Jiao Tong Univ, Shanghai; PhD Princeton
Ying Song HUANG, BSc Beijing; PhD Massachusetts Inst of Tech
Yue-Kuen KWOK, BSc Hong Kong; MSc, PhD Brown
Kin-Yin LI, BSc Univ of Washington; PhD Univ of California, Berkeley
Wei-Ping LI, BA Nankai; MSc, PhD Columbia
Shiu-Hong LUI, BSc, MSc Toronto; PhD Calif Inst of Tech
Jian-Min MAO, BSc East China; PhD Houston
Guo-Wu MENG, BSc Univ of Sc & Tech of China; MSc, PhD Brown
Mo MU, BSc Southeast; MSc, PhD Academia Sinica
Yuan-Wei QI, BA Beijing; MSc Academia Sinica; PhD Oxford
Tai-Man TANG, BSc Chinese Univ of Hong Kong; PhD Univ of California, Berkeley
Charles H. TONG, BSc Univ of California, Berkeley; MSc Univ of California, Davis; PhD Univ of California, Los Angeles
Allanus Hak-Man TSOI, BSc Univ of Washington; MSc Univ of Illinois, Urbana-Champaign; PhD Alberta
Xiao-Ping WANG, BSc, MSc Beijing, PhD New York
Man-Yu WONG, BA Hong Kong; MSc, PhD London
Li-Xin WU, BSc, MSc Fudan; PhD Univ of California, Los Angeles
Xiao-Ping XU, BSc Zhejiang Normal; MSc Xiame; PhD Rutgers
Min YAN, BSc Fudan; MSc, PhD Chicago

School of Science

Visiting Lecturer:
Yue-Fan DENG, BSc, MA, MPhil Nankai; PhD Columbia

Visiting Scholar:
De-Lin CHU, BSc, PhD Tsing Hua

Undergraduate Programmes

There are three categories of first-degree programmes in the Department of Mathematics: the programme in Pure Mathematics, the programme in Mathematical Sciences, and the programme in Scientific Computation. All courses of study lead to the Bachelor of Science degree in three years.

Generally speaking, students in the Pure Mathematics option are interested mainly in the mathematical contents of the subject matter, while students of Mathematical Sciences are more interested in the scientific content of the subject. The Mathematical Sciences option usually includes interdisciplinary study undertaken in conjunction with another department of the University. The Scientific Computation is also interdisciplinary and emphasises the study of large scale computational algorithms (that are reliable, accurate and economical) to solve complex problems in science and technology.

Students in all options are required to take classes in multivariable calculus and linear algebra in the first year. Students in Pure Mathematics and Mathematical Sciences are required to take a one-year course in real analysis during the second year of study. In addition, students in Pure Mathematics are required to study subjects in abstract algebra, differential geometry and topology plus three subjects at a more advanced level and selected subjects in physical sciences and engineering. For those pursuing a programme in Mathematical Sciences, three options (physical science, computer science, and business and management) have been designed. Students in Scientific Computation are required to undertake a nine-credit project in the third year of study.

Students pursuing the Mathematical Sciences options in computer science or in business and management should note the University Regulations governing joint programmes described on page 30.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in two AL subjects (Pure Mathematics and Physics) plus one AL/AS subject.

The following semester-by-semester description of the undergraduate programme defines what students must complete to satisfy programme requirements, and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.
**PURE MATHEMATICS OPTION**

**First Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>MATH 101 C</td>
<td>Multivariable Calculus</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>MATH 111 C</td>
<td>Linear Algebra</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>MATH 151 E</td>
<td>Differential Equations and Applications</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>COMP 101 E</td>
<td>Computing Fundamentals</td>
<td>[2-0-2:3]</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>LANG 001</td>
<td>Language Skills Enhancement I</td>
<td>[0-3-1:0]</td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
<td>18 credits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Semester</td>
<td>MATH 102 E</td>
<td>Introduction to Analysis</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>MATH 204 E</td>
<td>Complex Analysis</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>PHYS 121 R</td>
<td>Electricity and Magnetism</td>
<td>[3-0-3:4]</td>
</tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>19 credits</td>
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</tbody>
</table>

**Second Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>MATH 301 R</td>
<td>Real Analysis</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>MATH 311 R</td>
<td>Abstract Algebra I</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>MATH 321 R</td>
<td>Differential Geometry</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>FREE</td>
<td>Non-Mathematics Elective</td>
<td>[3-0-0:3]</td>
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<td></td>
<td></td>
<td></td>
<td>18 credits</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Semester</td>
<td>MATH 302 R</td>
<td>Integration Theory</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>MATH 312 R</td>
<td>Abstract Algebra II</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>MATH 323 R</td>
<td>Topology</td>
<td>[3-1-0:4]</td>
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<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>PHYS 124 R</td>
<td>Vibrations and Waves</td>
<td>[3-0-3:4]</td>
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<tr>
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<td></td>
<td>19 credits</td>
</tr>
</tbody>
</table>

A minimum of 101 credits is required for the Pure Mathematics Option. A student's choice of electives may result in this minimum being exceeded.

**MATHEMATICAL SCIENCES OPTION IN PHYSICAL SCIENCE**

**First Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>MATH 101 C</td>
<td>Multivariable Calculus</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>MATH 111 C</td>
<td>Linear Algebra</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td>COMP 101 E</td>
<td>Computing Fundamentals</td>
<td>[2-0-2:3]</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>LANG 001</td>
<td>Language Skills Enhancement I</td>
<td>[0-3-1:0]</td>
</tr>
<tr>
<td></td>
<td>PHYS 121 R</td>
<td>Electricity and Magnetism</td>
<td>[3-0-3:4]</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>18 credits</td>
</tr>
</tbody>
</table>

(1) The course shown is recommended, but may be replaced by a suitable elective as approved by the Department.
(2) Students may be exempted from this course by the Language Centre.
(3) Any elective course may be chosen, except a course in the Department of Mathematics.
### School of Science

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 102</td>
<td>Introduction to Analysis</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Differential Equations and Applications</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>COMP 102</td>
<td>Computer Fundamentals and Programming</td>
<td>3-0-2:4</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHYS 124</td>
<td>Vibrations and Waves</td>
<td>3-0-3:4</td>
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19 credits

#### Fall Semester

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MATH 301</td>
<td>Real Analysis</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 351</td>
<td>Functions of a Complex Variable and Applications</td>
<td>3-1-0:4</td>
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<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHSC</td>
<td>Physical Science</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHSC</td>
<td>Physical Science</td>
<td>3-0-0:3</td>
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17 credits

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 302</td>
<td>Integration Theory</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 352</td>
<td>Applied Partial Differential Equations</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHSC</td>
<td>Physical Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>3-0-0:3</td>
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17 credits

#### Third Year

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>MATH</td>
<td>Mathematics Elective</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHSC</td>
<td>Physical Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHSC</td>
<td>Physical Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
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</table>

16 credits

### School of Science

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH</td>
<td>Mathematics Elective</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHSC</td>
<td>Physical Science Elective</td>
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</tbody>
</table>

14 credits

(1) The course shown is recommended, but may be replaced by a suitable elective as approved by the Department.

(2) Students may be exempted from this course by the Language Centre.

(3) The course identified as Physical Science (PHSC) will be selected in consultation with the student's academic advisor.

A minimum of 101 credits is required for the Mathematical Sciences Option in Physical Science. A student's choice of electives may result in this minimum being exceeded.

In the Mathematical Science Option in Physical Science, besides the required courses, PHYS 121 and PHYS 124, the Department recommends that students take the following courses depending on their area of concentration:

Physics: PHYS 221, PHYS 223, PHYS 224, PHYS 234, PHYS 321 and PHYS 331.

Applied Mechanics: PHYS 221, MECH 101, MECH 121, MECH 131, MECH 221, MECH 231, MECH 242 and MECH 331.

### MATHEMATICAL SCIENCES OPTION IN COMPUTER SCIENCE

#### First Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 101</td>
<td>Multivariable Calculus</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 132</td>
<td>Discrete Structures</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>COMP 102</td>
<td>Computer Fundamentals and Programming</td>
<td>3-0-2:4</td>
</tr>
<tr>
<td>COMP 111</td>
<td>Software Tools</td>
<td>2-0-2:3</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>LANG 001</td>
<td>Language Skills Enhancement I</td>
<td>0-3-1:0</td>
</tr>
</tbody>
</table>

18 credits
### School of Science

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 102</td>
<td>Introduction to Analysis</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>MATH 111</td>
<td>Linear Algebra</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>COMP 106</td>
<td>C Programming</td>
<td>[1-0-2:2]</td>
</tr>
<tr>
<td>COMP 171</td>
<td>Data Structures and Algorithms</td>
<td>[3-0-1:3]</td>
</tr>
<tr>
<td>COMP 180</td>
<td>Computer Organisation</td>
<td>[3-0-1:3]</td>
</tr>
</tbody>
</table>

**16 credits**

#### Fall Semester

**Second Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 231</td>
<td>Numerical Analysis</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>MATH 301</td>
<td>Real Analysis</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>COMP E</td>
<td>Computer Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE E</td>
<td>Free Elective</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>H&amp;SS E</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
</tbody>
</table>

**18 credits**

#### Spring Semester

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<tr>
<th>Course Code</th>
<th>Course Name</th>
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</thead>
<tbody>
<tr>
<td>MATH 302</td>
<td>Integration Theory</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>MATH 311</td>
<td>Abstract Algebra I</td>
<td>[3-1-0:4]</td>
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<tr>
<td>COMP E</td>
<td>Computer Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE E</td>
<td>Free Elective</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>SB&amp;M E</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
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</table>

**18 credits**

#### Fall Semester

**Third Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MATH E</td>
<td>Mathematics Elective</td>
<td>[3-1-0:4]</td>
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<tr>
<td>COMP E</td>
<td>Computer Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE E</td>
<td>Free Elective</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>H&amp;SS E</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>SB&amp;M E</td>
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**17 credits**

### School of Science

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MATH E</td>
<td>Mathematics Elective</td>
<td>[3-1-0:4]</td>
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<tr>
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<td>Computer Science Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>FREE E</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
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<td>H&amp;SS E</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
</tbody>
</table>

**13 credits**

1. Students may be exempted from this course by the Language Centre.
2. The course shown is recommended, but can be replaced by a suitable elective as approved by the Department.

A minimum of 100 credits is required for the Mathematical Science Option in Computer Science. A student's choice of electives may result in this minimum being exceeded.

In the Mathematical Science Option in Computer Science, besides the required courses, COMP 102, COMP 106, COMP 111, COMP 171 and COMP 180, the Department recommends that students take the following courses in Computer Science depending on their area of concentration:

- Artificial Intelligence: COMP 221, COMP 271, COMP 321 and one additional course in Computer Science.
- Computer Systems: COMP 251, COMP 252, COMP 271 and one additional course in Computer Science.
- Data and Knowledge Base Management: COMP 231, COMP 271, COMP 331 and one additional course in Computer Science.

### MATHEMATICAL SCIENCES OPTION IN BUSINESS AND MANAGEMENT

#### First Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 101</td>
<td>Multivariable Calculus</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>MATH 111</td>
<td>Linear Algebra</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>ACCT 101</td>
<td>Financial Accounting</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td>ECON 111</td>
<td>Microeconomics</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>H&amp;SS E</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>LANG 001</td>
<td>Language Skills Enhancement I</td>
<td>[0-3-1:0]</td>
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**18 credits**
## School of Science

### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 102</td>
<td>Introduction to Analysis</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>MATH 244</td>
<td>Applied Statistics</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>ACCT 122</td>
<td>Managerial Accounting</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td>ECON 112</td>
<td>Macroeconomics</td>
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19 credits

### Second Year

#### Fall Semester

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 301</td>
<td>Real Analysis</td>
<td>[3-1-0:4]</td>
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<tr>
<td>MATH</td>
<td>Mathematics Elective</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
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</table>

17 credits

#### Spring Semester

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>MATH 302</td>
<td>Integration Theory</td>
<td>[3-1-0:4]</td>
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<tr>
<td>MATH</td>
<td>Mathematics Elective</td>
<td>[3-1-0:4]</td>
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<tr>
<td>ENGG</td>
<td>Engineering Elective</td>
<td>[3-0-0:3]</td>
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<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
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</table>

17 credits

### Third Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH</td>
<td>Mathematics Elective</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
</tbody>
</table>

17 credits

(1) Students entering with a grade of B or above in AL Economics will take ECON 191; those with a grade of C in AL Economics, or C or above in AL Mathematics will take ECON 111. All other students will take ECON 110.

(2) Students may be exempted from this course by the Language Centre.

(3) The course shown is recommended, but can be replaced by a suitable elective as approved by the Department.

A minimum of 101 credits is required for the Mathematical Science Option in Business and Management. A student's choice of electives may result in this minimum being exceeded.

In the Mathematical Science Option in Business and Management, besides the required courses, ACCT 101, ACCT 122, ECON 111 and ECON 112, the Department recommends that students take the following courses in Business and Management depending on their area of concentration:

- **Accounting:** ACCT 201, ACCT 202, ACCT 321, FINA 111, and one additional course in Accounting.
- **Business Information System:** BINF 101, BINF 223, and two additional courses in Business and Management.
- **Economics:** ECON 213, ECON 215, and three additional courses in Economics.
- **Finance:** FINA 111, FINA 221, and two more courses in Finance.
- **Management Operations:** MGMT 251, MGMT 261, MGMT 321, and two additional courses in Management Science/Operations and Technology Management.
- **Organisation and Management:** MGMT 251, MGMT 321, and two additional courses in Human Resource Management/Organisational Behaviour and Management, and one other course in Business and Management.
- **Marketing:** MARK 212, MARK 222, MARK 242, and MARK 321.
## SCIENTIFIC COMPUTATION OPTION

### First Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 101</td>
<td>C Multivariable Calculus</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 111</td>
<td>C Linear Algebra</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>COMP 102</td>
<td>R Computer Fundamentals and Programming</td>
<td>3-0-2:4</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>LANG 001</td>
<td>E Language Skill Enhancement I</td>
<td>0-3-1:0</td>
</tr>
<tr>
<td>PHYS 121</td>
<td>R Electricity and Magnetism</td>
<td>3-0-3:4</td>
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</table>

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 102</td>
<td>E Introduction to Analysis</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 151</td>
<td>E Differential Equations and Applications</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>COMP 106</td>
<td>E C Programming</td>
<td>1-0-2:2</td>
</tr>
<tr>
<td>COMP 171</td>
<td>R Data Structures and Algorithms</td>
<td>3-0-1:3</td>
</tr>
<tr>
<td>COMP 180</td>
<td>E Computer Organisation</td>
<td>3-0-1:3</td>
</tr>
</tbody>
</table>

19 credits

### Second Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MATH 231</td>
<td>R Numerical Analysis</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 301</td>
<td>R Real Analysis</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 351</td>
<td>E Functions of a Complex Variable and Applications</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>PHYS 124</td>
<td>R Vibrations and Waves</td>
<td>3-0-3:4</td>
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<tr>
<td>SB&amp;M</td>
<td>E Business and Management Elective</td>
<td>3-0-0:3</td>
</tr>
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19 credits

**Spring Semester**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 333</td>
<td>R Introduction to Scientific Computation</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 355</td>
<td>E Applied Partial Differential Equations</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>COMP 271</td>
<td>E Design and Analysis of Algorithms</td>
<td>3-1-0:3</td>
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<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
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</tr>
<tr>
<td>FREE</td>
<td>E Elective related to MATH 395/396</td>
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18 credits

### Third Year

**Fall Semester**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 321</td>
<td>R Differential Geometry</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 331</td>
<td>E Numerical Solutions of Partial Differential Equations</td>
<td>3-1-0:4</td>
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<tr>
<td>MATH 395</td>
<td>R Scientific Computation Project I</td>
<td>0-0-9:3</td>
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<td>E Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
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<td>E Elective related to MATH 395/396</td>
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17 credits

**Spring Semester**

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<th>Course Title</th>
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</tr>
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<tbody>
<tr>
<td>MATH 335</td>
<td>E Applications of Mathematical Software</td>
<td>3-1-0:4</td>
</tr>
<tr>
<td>MATH 396</td>
<td>R Scientific Computation Project II</td>
<td>0-0-18:6</td>
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<td>E Humanities and Social Science Elective</td>
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<tr>
<td>SB&amp;M</td>
<td>E Business and Management Elective</td>
<td>3-0-0:3</td>
</tr>
</tbody>
</table>

16 credits

(1) Students may be exempted from this course by the Language Centre.

(2) The course shown is recommended, but can be replaced by a suitable elective as approved by the Department.

(3) Course to be chosen in fluid mechanics, solid mechanics, theoretical physics, theoretical chemistry, statistics, etc.

A minimum of 105 credits is required for the Scientific Computation Option. A student's choice of electives may result in this minimum being exceeded.

### Postgraduate Programmes and Research

Major research areas planned include almost all the major pure and applied mathematical branches, but presently four major areas of research are being emphasised: analysis, algebra and geometry, scientific computation, and fluid mechanics.

1. **Analysis**
   - Includes harmonic analysis, real analysis, complex analysis, functional analysis, differential equations and other related fields, with emphasis on complex analysis.
   - Most activities in applicable mathematics are in the area of analysis or related to analysis. The study of theoretical science and engineering relies heavily on applied analysis.
2. **Algebra and geometry**

Includes number theory, Lie theory, algebraic and geometric topology, algebraic geometry. Interactions between various areas are emphasised. Current research includes linear forms in p-adic logarithms and the applications, self-dual codes and lattices, Lie algebras and vertex operator algebras, algebraic K-theory, intersection homology, low dimensional topology, group actions on manifolds, stratified spaces, stable vector bundles over algebraic surfaces and Donaldson theory, fundamental groups of algebraic varieties, and knot theory.

3. **Scientific computation**

Over the past two decades, scientific computation has become an independent approach to studying science and technology, complementing the long-established theoretical and experimental approaches. With the advent of parallel computers and development of new algorithms, it will play an even more important role in future. Scientific computation in the Mathematics Department means not only large scale computation of solutions to problems in science, engineering and business and management but also developing algorithms that are reliable, accurate and economical. Current research areas include shock-capturing schemes, parallel algorithms, symbolic computation, numerical linear algebra, numerical solutions to elliptic and hyperbolic partial differential equations, and computational quantum mechanics. There are also joint research projects with other departments in the University and other institutions in and outside Hong Kong.

4. **Fluid mechanics**

Fluid mechanics is the study of the motion of liquids and gases with direct application to industry and environmental research. It is particularly rich in nonlinear problems and is a major source of ideas and techniques in applied mathematics. Current research areas include two-phase flow, water wave motion, fluid dynamics of typhoon, high speed flow, bubble dynamics, flow instability, bifurcation, chaos and turbulence.

**Master of Science (MSc) in Mathematics**

The MSc programme emphasises course work to strengthen students' general background in mathematics and mathematical sciences. It can be a terminal degree or a preliminary degree leading to the PhD, and it requires research leading to a thesis as well as a course programme. The duration of the programme normally ranges from 18 months to three years for full-time studies, and may be extended to five years for part-time studies. Students with a first degree in an area other than mathematics may be required to take additional courses.

In the final stage of the programme, students are required to submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Specific programme requirements are:

- **Courses:** 24 credits in mathematics or related fields; of which at least 18 are mathematics courses at the postgraduate level.
- **Research:** An approved MSc thesis; and presentation and oral defence of the thesis.

The passing standard in a graded course is C and the overall average obtained must be B or above.

**Doctor of Philosophy (PhD) in Mathematics**

The aim of the PhD degree programme is to prepare students to become research scholars either in an academic or industrial environment. The programme, besides providing broad background in mathematics and mathematical sciences, aims to enable students to do independent and original research. Students have three options from which to choose their major concentration: pure mathematics, applicable mathematics, and mathematical sciences. A doctoral thesis representing an original contribution to the field is a requirement for the degree. The duration of the programme normally ranges from four to eight years from the first degree, with a reduction of 18 months if a relevant master's degree is earned prior to entering the PhD programme. Students with a first degree in an area other than mathematics may be required to take additional courses.

In fulfilling the degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. They are also encouraged to teach a course at the undergraduate level. The passing standard in a graded course is C and the overall average must be B or above. Students must pass a comprehensive/
qualifying examination as specified below. In the final stage of the programme, students are required to submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Specific programme requirements are:

Courses: 36 credits in mathematics or related fields, of which at least 24 credits are mathematics courses at the postgraduate level. For students from other institutions with an MSc or MPhil degree, up to 18 credits can be transferred to fulfil the credit requirements, subject to departmental approval.

Candidacy examinations:

1. Pure Mathematics

To become PhD candidates, students must first pass an oral qualifying examination (normally no later than by the end of the second year) on two of the three subject areas: analysis, algebra, and geometry; and then at a later date, another oral examination on a major area excluding the two areas in the first oral examination.

2. Mathematical Sciences and Applicable Mathematics

To become PhD candidates, students must submit a thesis proposal, and pass an oral examination on the thesis proposal and two minor subjects. For mathematical sciences students, one of the minor subjects should be in theoretical mathematics. For applicable mathematics students, one of the minor subjects should be in science. The oral examination should normally take place by the first half of the third year.

Thesis:

Original research work and its successful presentation and defence before a thesis examination committee.

Faculty Research Interests

Professor Din-Yu HSIEH, Head of Department

Waves and stability, asymptotic methods, two-phase flows.

Professor Grafton Wai-How HUI

Theoretical and computational fluid dynamics; nonlinear water wave theory; nonlinear partial differential equations.

Professor Chung-Chun YANG

Complex analysis, value-distribution theory.

Professor Wu-Chung HSIANG, Adjunct Professor

Algebraic topology, differential topology, algebraic K-theory.

Professor James Sai-Wing WONG, Adjunct Professor

Ordinary differential equations.

Professor Wing-Hung WONG, Visiting Professor

Statistical computation, image restoration, semiparametric models, sliced regression.

Dr John D. BUCKMASTER, Reader

Combustion theory, fluid dynamics, asymptotics.

Dr Ngai-Hang CHAN, Reader

Time series, spatial statistics, econometrics, asymptotic inference.

Dr Kunrui YU, Reader

Transcendental number theory, diophantine approximations.

Dr Der-Chen E. CHANG, Visiting Senior Lecturer

Fourier Analysis on Euclidean spaces, and several complex variables.
Dr Gopal K. BASAK, Lecturer

Dr Jeffrey R. CHASNOV, Lecturer
Numerical simulation of turbulent flow; homogeneous turbulence; stably-stratified flows; rotating fluids; convection; large-eddy simulation; parallel computation.

Dr Bei-Fang CHEN, Lecturer
Discrete mathematics, combinatories, probability.

Dr Yik-Man CHIANG, Lecturer
Ordinary differential equation in the Complex plane, geometric function theory.

Dr Kwai-Man FAN, Lecturer
Algebraic geometry.

Dr Jimmy Chi-Hung FUNG, Lecturer
Computational fluid dynamics, turbulence, environmental studies.

Dr Walter G. GALL, Lecturer
Bifurcation, scientific computation.

Dr Guo-Qiang GE, Lecturer
Algorithms, number theory.

Dr Bi-Zhong HU, Lecturer
Compact polyhedra with nonpositive curvature.

Dr Ji-Shan HU, Lecturer
Applied analysis.

Dr Jing-Song HUANG, Lecturer
Representation theory, Lie theory.

Dr Yue-Kuen KWOK, Lecturer
Computational fluid dynamics, numerical analysis, geophysics.

Dr Kin-Yin LI, Lecturer
Complex function theory, Hilbert space operator theory, functional analysis.

Dr Wei-Ping LI, Lecturer
Algebraic geometry.

Dr Shiu-Hong LUI, Lecturer
Bifurcation theory, numerical analysis.

Dr Jian-Min MAO, Lecturer
Nonlinear dynamics, chaotic behaviour, Hamiltonian bifurcation theory; mathematical physics; scientific computation.

Dr Guo-Wu MENG, Lecturer
Algebraic topology, differential topology.

Dr Mo MU, Lecturer
Numerical analysis, parallel computing, numerical solution to PDEs, numerical linear algebra, mathematical software.
Dr Yuan-Wei QI, Lecturer
Differential equations, scientific computation.

Dr Tai-Man TANG, Lecturer
Partial differential equations, functional analysis.

Dr Charles H. TONG, Lecturer
Numerical linear algebra, numerical methods for partial differential equations, parallel numerical algorithms, scientific computing in general.

Dr Allanus Hak-Man TSOI, Lecturer
Stochastic analysis, stochastic differential geometry.

Dr Xiao-Ping WANG, Lecturer
Nonlinear partial differential equations, computational and applied mathematics.

Dr Man-Yu WONG, Lecturer
Statistical inference, generalised linear model, biological statistics, medical statistics.

Dr Li-Xin Wu, Lecturer
Numerical analysis, computational fluid dynamics.

Dr Xiao-Ping XU, Lecturer
Self-dual codes and lattices, Lie algebras and vertex operator algebras.

Dr Min YAN, Lecturer
Algebraic topology, geometric topology.

Dr Yue-Fan DENG, Visiting Lecturer
3D parallel fluid dynamics computation, parallel computational electromagnetics, number theory problems.

Dr Delin CHU, Visiting Scholar
Parallel algorithms, computational fluid dynamics.
Dr Philip Sou (Right) and a research student (above) of the Department of Physics are operating a molecular beam epitaxy (MBE) system to fabricate high quality semiconductor quantum structures for semiconductor and photonics research. This and several other highly sophisticated thin film deposition systems are housed in the Zheng Ge Ru Thin Film Physics Laboratory.
DEPARTMENT OF PHYSICS

Physics is the science that deals at the most fundamental level with matter and energy, their interactions, and their transformation. Thus it provides the foundation for many other sciences and for engineering.

The Department of Physics is concentrating its resources in interdisciplinary and applied fields with potential relevance to technological industry. Despite the applied physics emphasis, the Department has a strong offering of core subjects in the fundamental fields of physics. Undergraduates are permitted to select areas of concentration in traditional as well as applied subjects of physics.

Current and planned faculty and postgraduate research focuses on optical, condensed matter and statistical physics, and includes the physics of lasers, solid state, mesoscopic systems, devices, materials, thin films, surfaces, interfaces, liquid crystals and polymers.

A number of central service facilities and interdisciplinary research institutes provide support for the Department's research programmes. Particularly relevant to Physics are the centres for Materials Characterisation and Preparation, Microelectronic Fabrication, and Computing Services and Telecommunications, and the research institutes for Information Technology, Advanced Materials and Microsystems. State-of-the-art facilities for large scale and intensive scientific computations available include optical-fibre distributed networks, various workstations, and access to supercomputers. The acquisition of a massively parallel processing (MPP) computer is in progress. The Department has in-house laboratories for laser physics, photonics, new thin-film materials, surface/interface studies, solid state properties, polymers and liquid crystals, x-ray optics, semiconductor clusters, and non-linear dynamics.

The Zheng Ge Ru Foundation, the Joyce M. Kuok Foundation, and the Shun Hing Education and Charity Fund Limited each made a donation recently to the University to establish three new laboratories: the Zheng Ge Ru Thin Film Physics Laboratory, the Joyce M. Kuok Laser and Photonics Laboratory, and the William Mong Semiconductor Clusters Laboratory. These facilities, which form a nucleus for HKUST’s Advanced Materials Research Institute and are housed in Physics, are open to students for training and research.

Faculty

Professor and Head of Department:
Nelson CUE, BS FEAT; PhD Univ of Washington

Professors:
David J. BARBER, BS, PhD Bristol
(Director of the Materials Characterisation and Preparation Centre)
Leroy L. CHANG, BS National Taiwan; MS South Carolina; PhD Stanford
(Dean of Science)

Undergraduate Programmes

Two three-year Bachelor of Science degree programmes are offered. The BSc programme in Physics prepares students for a science-related career, such as teaching in secondary schools, or sales and technical support in the technology sector, or for further studies in Physics and related subjects. The BSc programme in Applied Physics, with options in Computational Physics, Laser and Optical Physics, and Materials Physics, is intended for students with interest in the more applied areas of Physics. Upon graduation, they could enter employment in the government and private sectors or pursue postgraduate studies.

The first-year courses are common to both degree programmes. Certain mathematics and computer science subjects are highly recommended for all students. These include ordinary differential equations, partial differential equations, linear algebra and matrix theory, complex variables and modern algebra, data structure, and numerical methods for digital computation.

Peter N. DOBSON, Jr, BS Massachusetts Inst of Tech; PhD Maryland
(Director of Planning and Co-ordination)
Michael M. LOY, BS, PhD Univ of California, Berkeley
George K.L. WONG, BS, PhD Univ of California, Berkeley
Chia-Wei WOO, BS Georgetown Coll; MS, PhD Washington Univ
(Vice-Chancellor and President)

Senior Lecturers:
Kwok-Kwong FUNG, BS Cornell; MS, PhD Bristol
Wei-Kun GE, BS Beijing; PhD Univ of Manchester Inst of Sc and Tech

Lecturers:
Michael S. ALTMAN, BA Pennsylvania; ScM, PhD Brown
Ting CHEN, BS Zhejiang; MS, PhD Univ of California, Los Angeles
Sidney C. KAN, BS Chinese Univ of Hong Kong; PhD California Inst of Tech
Pak-Wo LEUNG, BSc Hong Kong; PhD Cornell
Tai-Kai NG, BSc Hong Kong; PhD Northwestern
Philip Lam-Kong SOU, BS Jinan; MS, PhD Univ of Illinois, Chicago
Kwok-Yip SZETO, BA(Eng) Toronto; MA State Univ of New York, Stony Brook;
PhD Massachusetts Inst of Tech
Wing-Yim TAM, BS Chinese Univ of Hong Kong; PhD Univ of California, Santa
Barbara
Xiang-Rong WANG, BA Wuhan; MA, PhD Rochester
Kam-Sing WONG, BSc London; DPhil Oxford
Michael Kwok-Yee WONG, BSc Hong Kong; MS, PhD Univ of California, Los
Angeles
Rong-Fu XIAO, BS Chongqing; PhD Utah
Xiao YAN, BS Beijing; PhD Pennsylvania
Zhi-Yu YANG, BS Fudan; PhD Purdue
Kwong-Mow YOO, BS Malaya; MS Nebraska; PhD City Univ of New York
For admission, in addition to the general entrance requirements of the University, acceptable grades are required in two AL subjects (Physics and Pure Mathematics) plus one AL/AS subject.

The following semester-by-semester description of the undergraduate programme defines what students must complete to satisfy programme requirements, and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

Curriculum for BSc Degree in Physics

First Year

Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 121</td>
<td>Electricity and Magnetism</td>
<td>3-0-3</td>
</tr>
<tr>
<td>COMP 101</td>
<td>Computing Fundamentals</td>
<td>2-0-2</td>
</tr>
<tr>
<td>ELEC 101</td>
<td>Basic Electronics</td>
<td>3-1-4</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-3</td>
</tr>
<tr>
<td>LANG 001</td>
<td>Language Skill Enhancement I</td>
<td>0-3-1</td>
</tr>
<tr>
<td>MATH 101</td>
<td>Multivariable Calculus</td>
<td>3-1-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 credits</td>
</tr>
</tbody>
</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 124</td>
<td>Vibrations and Waves</td>
<td>3-0-3</td>
</tr>
<tr>
<td>PHYS 126</td>
<td>Phenomena of Microphysics</td>
<td>3-0-0</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>Physical Chemistry: Fundamentals and Applications</td>
<td>3-0-0</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>MATH 111</td>
<td>Linear Algebra</td>
<td>3-1-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17 credits</td>
</tr>
</tbody>
</table>

Second Year

Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 221</td>
<td>Intermediate Classical Mechanics</td>
<td>4-0-0</td>
</tr>
<tr>
<td>PHYS 223</td>
<td>Intermediate Electricity and Magnetism I</td>
<td>3-0-0</td>
</tr>
<tr>
<td>PHYS 241</td>
<td>Optics</td>
<td>3-0-3</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Differential Equations and Applications</td>
<td>3-1-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 credits</td>
</tr>
</tbody>
</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 231</td>
<td>Elementary Quantum Mechanics I</td>
<td>4-0-0</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>MATH 231</td>
<td>Numerical Analysis</td>
<td>3-1-0</td>
</tr>
<tr>
<td>OR</td>
<td>PHYS 214 R Mathematical Methods in Physics</td>
<td>4-0-4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17 credits</td>
</tr>
</tbody>
</table>

Third Year

Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 311</td>
<td>Advanced Experimental Physics</td>
<td>2-0-6</td>
</tr>
<tr>
<td>PHYS 321</td>
<td>Thermodynamics and Statistical Physics</td>
<td>4-0-0</td>
</tr>
<tr>
<td>PHYS 398</td>
<td>Independent Study Project</td>
<td>0-2-6</td>
</tr>
<tr>
<td>(2)</td>
<td>PHYS E Physics Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>E Business and Management Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 credits</td>
</tr>
</tbody>
</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 331</td>
<td>Elementary Quantum Mechanics II</td>
<td>4-0-0</td>
</tr>
<tr>
<td>(3)</td>
<td>PHYS E Physics Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>FREE</td>
<td>E Free Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>E Business and Management Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13 credits</td>
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</tbody>
</table>

A minimum of 101 credits is required for the BSc programme in Physics. A student's choice of electives may result in this minimum being exceeded.
Curriculum for BSc Degree in Applied Physics

**First Year**

Students follow the first year curriculum of the BSc Physics programme.

### Computational Physics Option

#### Second Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>PHYS 221</td>
<td>Intermediate Classical Mechanics</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td></td>
<td>PHYS 223</td>
<td>Intermediate Electricity and Magnetism I</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>COMP 102</td>
<td>Computer Fundamentals and Programming</td>
<td>3-0-2:4</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>MATH 151</td>
<td>Differential Equations and Applications</td>
<td>3-1-0-4</td>
</tr>
</tbody>
</table>

**Total Credits: 18**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Semester</td>
<td>PHYS 214</td>
<td>Mathematical Methods in Physics</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td></td>
<td>PHYS 224</td>
<td>Intermediate Electricity and Magnetism II</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>PHYS 234</td>
<td>Elementary Quantum Mechanics I</td>
<td>4-0-0-4</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>MATH 231</td>
<td>Numerical Analysis</td>
<td>3-1-0-4</td>
</tr>
</tbody>
</table>

**Total Credits: 18**

#### Third Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>PHYS 321</td>
<td>Thermodynamics and Statistical Physics</td>
<td>4-0-0-4</td>
</tr>
<tr>
<td></td>
<td>PHYS 381</td>
<td>Computational Physics I</td>
<td>3-0-3-4</td>
</tr>
<tr>
<td></td>
<td>PHYS 395</td>
<td>Physics Elective</td>
<td>3-0-3-3</td>
</tr>
<tr>
<td></td>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>3-0-0-3</td>
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**Total Credits: 14**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Semester</td>
<td>PHYS 224</td>
<td>Intermediate Electricity and Magnetism II</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>PHYS 234</td>
<td>Elementary Quantum Mechanics I</td>
<td>4-0-0-4</td>
</tr>
<tr>
<td></td>
<td>PHYS 242</td>
<td>Fibre Optics</td>
<td>3-0-3-4</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>MATH 231</td>
<td>Numerical Analysis</td>
<td>3-1-0-4</td>
</tr>
<tr>
<td></td>
<td>OR</td>
<td>PHYS 214 Mathematical Methods in Physics</td>
<td>4-0-0-4</td>
</tr>
</tbody>
</table>

**Total Credits: 18**

A minimum of 102 credits is required for the BSc programme in Applied Physics (Computational Physics Option). A student's choice of electives may result in this minimum being exceeded.

**Laser and Optical Physics Option**

#### Second Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>PHYS 381</td>
<td>Intermediate Classical Mechanics</td>
<td>4-0-0-4</td>
</tr>
<tr>
<td></td>
<td>PHYS 382</td>
<td>Intermediate Electricity and Magnetism I</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>COMP 102</td>
<td>Computer Science Elective</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>FREE</td>
<td>Free Elective</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>3-0-0-3</td>
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</table>

**Total Credits: 17**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring Semester</td>
<td>PHYS 321</td>
<td>Thermodynamics and Statistical Physics</td>
<td>4-0-0-4</td>
</tr>
<tr>
<td></td>
<td>PHYS 381</td>
<td>Computational Physics I</td>
<td>3-0-3-4</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td></td>
<td>MATH 231</td>
<td>Numerical Analysis</td>
<td>3-1-0-4</td>
</tr>
</tbody>
</table>

**Total Credits: 18**

(1) A course selected from PHYS 335, 351, 361, and 398.

A minimum of 102 credits is required for the BSc programme in Applied Physics (Computational Physics Option). A student's choice of electives may result in this minimum being exceeded.
### School of Science

#### Third Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 311</td>
<td>Advanced Experimental Physics</td>
<td>[2-0-6:4]</td>
</tr>
<tr>
<td>PHYS 321</td>
<td>Thermodynamics and Statistical Physics</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>PHYS 335</td>
<td>Quantum and Optical Electronics</td>
<td>[3-0-3:3]</td>
</tr>
<tr>
<td>PHYS 398</td>
<td>Independent Study Project</td>
<td>[0-2-6:4]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-3:3]</td>
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</table>

10 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 321</td>
<td>Thermodynamics and Statistical Physics</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>PHYS 351</td>
<td>Structure and Properties of Materials</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>PHYS 361</td>
<td>Microcharacterisation</td>
<td>[2-0-3:3]</td>
</tr>
<tr>
<td>PHYS 398</td>
<td>Independent Study Project</td>
<td>[0-2-6:4]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-3:3]</td>
</tr>
</tbody>
</table>

17 credits

### School of Science

#### Second Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 221</td>
<td>Intermediate Classical Mechanics</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>PHYS 223</td>
<td>Intermediate Electricity and Magnetism I</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>PHYS 241</td>
<td>Optics</td>
<td>[3-0-3:4]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Differential Equations and Applications</td>
<td>[3-1-0:4]</td>
</tr>
</tbody>
</table>

18 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 222</td>
<td>Continuum Physics</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>PHYS 234</td>
<td>Elementary Quantum Mechanics I</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>PHYS 250</td>
<td>Introduction to Materials Science</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science</td>
<td>[3-0-0:3]</td>
</tr>
</tbody>
</table>

17 credits

### School of Science

#### Postgraduate Programmes and Research

As a fundamental science, physics presents major challenges to the human mind and the principles of physics serve as a foundation for engineering and other sciences. The new technologies that physics has spawned are so ingrained in our civilisation that their scientific origins are often overlooked. The discoveries of the principles of solid-state transistors which led to the miniaturisation of electronic devices, of atomic hyperfine structure and superconductivity which made possible nuclear magnetic resonance (NMR) imaging, and of the laser which underpins present-day communication technology are but a few examples. In addition to directly generating technological innovation, physics also indirectly supports progress throughout society by providing tools with which people in other fields create innovations.

The postgraduate Physics programme aims to provide students with a solid grounding in broad areas of physics principles and techniques, an ambience for creative and innovative activities, and opportunities for cross- and inter-disciplinary research.

Of all the branches in physics, optical physics and condensed matter physics (CMP) have the greatest impact on our daily lives. It is thus natural that the Department places emphasis on these fields. The research programmes include both experimental and theoretical aspects of linear and nonlinear optics, low-dimensional systems, mesoscopic systems, new materials, microstructured and nanostructured devices, and surfaces and...
School of Science

interfaces. A programme of regular visiting faculty and scholars in other specialties helps ensure breadth.

The Department of Physics offers postgraduate programmes leading to the degrees of Master of Science (MSc), Master of Philosophy (MPhil) and Doctor of Philosophy (PhD).

Applicants for postgraduate programmes in Physics are expected to hold a BSc degree in Physics from a college or university of recognised standing. Selection for admission will be based on academic records and available results of standardised tests in physics, proficiency in the English language, a one-page essay on reasons for pursuing postgraduate study, two letters of reference, and a personal interview at the discretion of the Department.

Master of Science (MSc) in Physics

The MSc programme emphasises course work to strengthen students' general background knowledge in physics. It prepares students for careers in teaching or for advanced work in industry. The duration of the programme normally ranges from 18 months to three years for full-time studies, and can be extended to five years for part-time studies. Students with a first degree in an area other than their postgraduate programme may be required to take additional courses.

In fulfilling degree requirements, students are expected to attend and present seminars, undertake course work and complete an assigned project. The minimum number of credits to fulfill the degree requirements is 30. The passing standard in a graded course is C and the overall average must be B or above.

Students are normally expected to satisfactorily complete the following:

<table>
<thead>
<tr>
<th>Year</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>PHYS 511</td>
<td>Mathematical Methods in Physics</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 513</td>
<td>Classical Mechanics</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 520</td>
<td>Classical Electrodynamics I</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 521</td>
<td>Classical Electrodynamics II</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 525</td>
<td>Quantum Mechanics I</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 531</td>
<td>Statistical Mechanics I</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 2</td>
<td>PHYS 526</td>
<td>Quantum Mechanics II</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>Year 2</td>
<td>PHYS 591</td>
<td>Solid State Physics I</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 2</td>
<td>PHYS 592</td>
<td>Solid State Physics II</td>
<td>3-0-0:3</td>
</tr>
</tbody>
</table>

School of Science

- and one of the following groups:

Theoretical Stream

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 532</td>
<td>Statistical Mechanics II</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHYS 594</td>
<td>Theory of Many-Particle Systems</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>PHYS 681</td>
<td>Special Topics</td>
<td>1-4 credits</td>
</tr>
</tbody>
</table>

Experimental Stream

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 540</td>
<td>Projects in Experimental Physics</td>
<td>0-1-6:3</td>
</tr>
<tr>
<td>PHYS 681</td>
<td>Special Topics</td>
<td>1-4 credits</td>
</tr>
<tr>
<td>PHYS 5xx</td>
<td>Any other course at 500 level</td>
<td></td>
</tr>
</tbody>
</table>

Master of Philosophy (MPhil) in Physics

The MPhil is a research degree and the programme is designed to prepare students for teaching, for further postgraduate studies, or for advanced work in industry. The duration of the programme normally ranges from 18 months to three years for full-time studies, and can be extended to five years for part-time studies. Students with a first degree in an area other than their postgraduate programme may be required to take additional courses. After one year, students registered in the MPhil programme may apply to transfer to the PhD programme.

In fulfilling degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. The minimum requirement in a graded course is C and the overall average must be B or above. In the final stage of the programme, students are required to submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Students are normally expected to satisfactorily complete the following:

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1</td>
<td>PHYS 511</td>
<td>Mathematical Methods in Physics</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 513</td>
<td>Classical Mechanics</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 520</td>
<td>Classical Electrodynamics I</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 521</td>
<td>Classical Electrodynamics II</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 525</td>
<td>Quantum Mechanics I</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>Year 1</td>
<td>PHYS 531</td>
<td>Statistical Mechanics I</td>
<td>3-0-0:3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2</td>
<td>PHYS 526</td>
<td>Quantum Mechanics II</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>Year 2</td>
<td>PHYS 591</td>
<td>Solid State Physics I</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>Year 2</td>
<td>PHYS 592</td>
<td>Solid State Physics II</td>
<td>3-0-0:3</td>
</tr>
</tbody>
</table>
School of Science

- and one of the following groups:

**Theoretical Stream**
- PHYS 532 Statistical Mechanics II  
- PHYS 594 Theory of Many-Particle Systems  

**Experimental Stream**
- PHYS 540 Projects in Experimental Physics  
- PHYS 681 Special Topics  

- PHYS 600 Physics Seminars for two semesters
- PHYS 699 MPhil Thesis Research
- presentation and oral defence of the MPhil thesis

**Doctor of Philosophy (PhD) in Physics**

The PhD degree is conferred primarily in recognition of breadth of scholarship, depth of research, and power to investigate problems independently and efficiently. The duration of the programme normally ranges from four to eight years from the first degree, with a reduction of 18 months if a relevant master's degree is earned prior to entering the PhD programme. Students with a first degree in an area other than their postgraduate programme may be required to take additional courses.

In fulfilling degree requirements, students are expected to attend and present seminars, undertake course work and conduct thesis research. The passing standard in a graded course is C and the overall average must be B or above. Students must pass a comprehensive/qualifying examination set by the Department.

In the final stage of the programme, students are required to submit their theses to the Department and, subsequently, to present and defend them. Any student who has performed unsatisfactorily will be asked to re-submit the thesis as recommended by the examination committee. The result of the second attempt of the thesis defence will be either Pass or Fail.

Students are normally expected to satisfactorily complete the following:

- **In Year 1**
  - PHYS 511 Mathematical Methods in Physics  
  - PHYS 513 Classical Mechanics  
  - PHYS 520 Classical Electrodynamics I  
  - PHYS 521 Classical Electrodynamics II  
  - PHYS 525 Quantum Mechanics I  
  - PHYS 531 Statistical Mechanics I  

- **In Year 2**
  - PHYS 526 Quantum Mechanics II  

- and one of the following groups:

**Theoretical Stream**
- PHYS 532 Statistical Mechanics II  
- PHYS 594 Theory of Many-Particle Systems  

**Experimental Stream**
- PHYS 540 Projects in Experimental Physics  
- PHYS 681 Special Topics  

- gain admission to PhD candidacy by:
  i) completing satisfactorily a departmental qualifying examination;
  ii) completing three semesters of full-time study; and
  iii) achieving a satisfactory academic record.

- PHYS 600 Physics Seminars for two semesters
- PHYS 799 Doctoral Thesis Research
- presentation and oral defence of the PhD thesis

**Faculty Research Interests**

Professor Nelson CUE, Head of Department

Atomic collisions in solids; x-ray optics and microscopy; production and properties of clusters; spectroscopy of atoms, molecules and nuclei; radiation effects.

Professor David J. BARBER, 
Director of Materials Characterisation and Preparation Centre

Physics of materials; materials processing and characterisation; electron microscopy; phase transitions; deformation micromechanisms; sol-gel-derived thin films; ferroelectric oxides; electrochromic organics.

Professor Leroy L. CHANG, Dean of Science

Semiconductor physics, materials and devices; low dimensional electron systems; quantum heterostructures.

Professor Peter N. DOBSON, Director of Planning and Co-ordination

Theory of elementary particles and their interactions at high energy.
Professor Michael M. LOY

Nonlinear optical propagation effects, two-photon coherent transients, nonlinear optical studies of surfaces, state-selective studies of molecule-surface interactions; recent work involves desorption of molecules from surfaces induced by femtosecond laser pulses.

Professor George K. L. WONG

Nonlinear optics; nonlinear optical properties of liquid crystals, polymers, and Langmuir-Blodgett films; optical and transport properties of semiconductors; molecular beam epitaxy (MBE) of narrow band gap semiconductors; and electron-hole drops in semiconductors.

Professor Chia-Wei WOO, Vice-Chancellor and President

Quantum many-body theory; statistical mechanics; low temperature physics; surface physics; liquid crystals.

Dr Kwok-Kwong FUNG, Senior Lecturer

Transmission electron microscopy (TEM) and convergent beam electron diffraction (CBED); microstructure, defects and phase transitions in crystalline materials.

Dr Wei-Kun GE, Senior Lecturer

Semiconductor physics: optical spectroscopy; point defects; quantum wells and superlattices; lattice dynamics; non-linear optical properties; material characterisation; device-related material problems.

Dr Michael S. ALTMAN, Lecturer

Surface physics; low-energy electron microscopy (LEEM); scanning tunnelling/atomic force microscopy (STM/AFM).

Dr Ting CHEN, Lecturer

Scanning probe microscopy studies of surfaces, surface absorbates, clusters, nanoscale structures and collective excitations on surfaces.

Dr Sidney C. KAN, Lecturer

Sensors/devices in electronics, photonics, and optoelectronics; high speed characteristics and nonlinear transport in semiconductor devices; double barrier resonant tunnelling structures and quantum well lasers.

Dr Pak-Wo LEUNG, Lecturer

Computational condensed matter physics: including classical Monte Carlo simulations of two-dimensional systems, quantum Monte Carlo simulations of helium films, and exact diagonalisation of quantum spin systems.

Dr Tai-Kai NG, Lecturer

Theoretical condensed matter physics and statistical physics: including Fermi liquid theory, mesoscopic systems and quantum transport, density functional theory, high-Tc superconductors and quantum-spin systems.

Dr lam-Keong SOU, Lecturer

Molecular beam epitaxial (MBE) growth and characterisation of II-VI variable band gap semiconductor alloys; infrared laser devices; transport properties; structural study of Delta doping and Hetero-interfaces.

Dr Kwok-Yip SZETO, Lecturer

Growth phenomenon; quasicrystal and amorphous structure; frustrated spin systems; berry phase; magnetotransport; genetic algorithms and nonlinear forecasting.

Dr Wing-Yim TAM, Lecturer

Non-linear dynamics, chaos, fractals, pattern formations, and complex systems.

Dr Xiang-Rong WANG, Lecturer

Kinetic aggregation and fractal physics; mesoscopic physics in the variable range hopping regime; molecular dynamics of liquids and the study of electrode-electrolyte interface; statistical physics of disordered system.
School of Science

Dr Kam-Sing WONG, Lecturer

Ultrafast lasers; time-resolved spectroscopy; light scattering in a random medium; semiconductor and polymer physics.

Dr Michael Kwok-Yee WONG, Lecturer

Physics of complex and disordered systems; neural networks; combinatorial optimisation; spin glasses; interface growth and corrosion; neurocomputing approach to telecommunication network management.

Dr Rong-Fu XIAO, Lecturer

Thin film and bulk single crystal growth; Monte Carlo and molecular dynamic simulation of crystal growth and the related surface phenomena; physics of materials.

Dr Xiao YAN, Lecturer

Transport and magnetic properties in materials of unconventional forms such as magnetic multilayers and magnetic particles in conducting or superconducting arrays; interfacial structure of multilayers and its effects on bulk properties; synchrotron radiation and new x-ray optics.

Dr Zhi-Yu YANG, Lecturer

II-VI semiconductor quantum structures: in-situ optical diagnostic study of molecular beam epitaxial growth, optical and electrical properties, and theoretical study of electronic band structure.

Dr Kwong-Mow YOO, Lecturer

Ultrashort pulse and terawatt laser; ultrafast detection technologies; ultrafast phenomena; nonlinear optics; light scattering in random and biological media; imaging; novel photonic devices; laser application in medicine and agriculture; x-ray optics, generation, and spectroscopy.

SCHOOL OF ENGINEERING

Dean: H. K. CHANG, BS National Taiwan; MS Stanford; PhD Northwestern
(Professor of Chemical Engineering)

Associate Dean: Frederick H. LOCHOVSKY, BASc, MSc, PhD Toronto
(Professor of Computer Science)

The School of Engineering is the largest of the four schools. When fully established, it will enrol 40% of the University's undergraduates and approximately 35% of the postgraduates, and comprise six departments:

- Chemical Engineering
- Civil and Structural Engineering
- Computer Science
- Electrical and Electronic Engineering
- Industrial Engineering
- Mechanical Engineering

These six departments are being phased in over a period of three years, with Chemical Engineering and Industrial Engineering, the last two, beginning both undergraduate and postgraduate programmes in 1993. In addition, an interdisciplinary programme in Computer Engineering will be established in 1994.

The undergraduate curricula in the School of Engineering are broad-based with special attention given to laboratory skills, computer applications, and design techniques. While undergraduate students in Engineering will take courses offered by their major departments, they are also required to take at least 36 credits of courses offered by other departments in the University. This mix of courses will provide the student with an integrated and modern view of the discipline. Together, these reflect the fundamental facts that the mission of engineering is to produce and synthesise, and that engineering practice must be compatible with economic realities and the social environment. In keeping with the philosophy of providing specialist training with a generalist outlook, engineering undergraduate students take at least 12 credits in Humanities and Social Science, and elective courses in both the School of Science and the School of Business and Management. To complement academic training, the Industrial Training Programme offers structured training in a simulated industrial environment, which helps students satisfy the training requirements of the professional engineering bodies.

Research and postgraduate education form a fundamental component of the School's mission. While supervised research is the backbone of the training for students pursuing MPhil and PhD degrees, all postgraduate students are required to undertake some course work.

Each department in the School of Engineering is established with state-of-the-art laboratory and computing facilities for both teaching and research purposes. These facilities are supported by the University's central facilities, including the Library, the computer network, the Materials Characterisation and Preparation Centre, and the Microelectronics Fabrication Centre.
DEPARTMENT OF CHEMICAL ENGINEERING

Chemical engineering is a discipline in which the principles of the mathematical, physical and natural sciences are used to solve problems in applied chemistry. Chemical engineers design, develop, and optimise processes and plants, operate them, manage personnel and capital, and conduct the research necessary for new developments. They supply us with petroleum products, plastics, agricultural chemicals, household products, pharmaceuticals, electronic and advanced materials, photographic materials, chemical and biological compounds, various food and other products.

The Department of Chemical Engineering at HKUST offers four degrees: Bachelor of Engineering (BEng), Master of Science (BSc), Master of Philosophy (MPhil) and Doctor of Philosophy (PhD).

Faculty

Professor and Head of Department:
P. L. YUE, BEng, PhD McGill

Professor:
H.K. CHANG, BS National Taiwan; MS Stanford; PhD Northwestern
(Dean of Engineering)

Reader:
Chi-Ming CHAN, BS Minnesota; MS, PhD California Inst of Tech

Lecturers:
Chak K. CHAN, BS Univ of Texas, Austin; PhD California Inst of Tech
Ping GAO, BSc Dalian; PhD Cambridge
Tze-Man KO, BE Cooper Union; PhD Univ of Wisconsin, Madison
Yongli MI, BS Heifer; PhD Syracuse

Undergraduate Programme

At the undergraduate level, a three-year curriculum has been designed to prepare students for employment in industry after graduation, or for pursuing postgraduate study. Graduates of chemical engineering will have acquired a broad range of knowledge in chemical engineering fundamentals such as thermodynamics, transport phenomena, reactor design and process control; applied mathematical and computer skills in simulation, control and artificial intelligence; and the necessary skills for effective communication. They will be well-prepared to pursue a professional career in traditional areas of chemical, petroleum and pharmaceutical industries as well as emerging areas of environmental engineering, biotechnology and solid-state processing. Within each area, career options include research and development, process and plant design, technical management, sales and marketing, and customer technical service. Chemical engineers also play an increasingly important role in business and policy planning. Many chemical engineering graduates also choose to pursue advanced studies in science and engineering as well as business, law and medicine.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in either (1) two AL subjects (Chemistry, and one of Physics or Pure Mathematics) and two AS subjects (Biology and one of Applied Mathematics, or Mathematics and Statistics) or (2) three AL subjects (Physics, Pure Mathematics, and Chemistry).

The following semester-by-semester description of the undergraduate programme defines what courses the students must complete to satisfy programme requirements and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

The second- and third-year programmes are provisional and subject to the approval of the Senate.

**Fall Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 101</td>
<td>Chemical Process Principles</td>
<td>[3-1-0-3]</td>
</tr>
<tr>
<td>CENG 103</td>
<td>Products and Processes</td>
<td>[2-1-0-2]</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Organic Chemistry</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>COMP 102</td>
<td>Computer Fundamentals and Programming</td>
<td>[3-0-2-4]</td>
</tr>
<tr>
<td>LANG 001</td>
<td>Language Skills Enhancement</td>
<td>[0-3-1-0]</td>
</tr>
<tr>
<td>MATH 101</td>
<td>Multivariable Calculus</td>
<td>[3-1-0-4]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 credits</td>
</tr>
</tbody>
</table>

**Spring Semester**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 131</td>
<td>Chemical Engineering Thermodynamics</td>
<td>[3-1-0-3]</td>
</tr>
<tr>
<td>CENG 141</td>
<td>Process Fluid Mechanics</td>
<td>[3-1-0-3]</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>Physical Chemistry: Fundamentals and Applications</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Differential Equations and Applications</td>
<td>[3-1-0-4]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 credits</td>
</tr>
</tbody>
</table>
### Second Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 211</td>
<td>C Reaction and Reactor Engineering</td>
<td>[3-1-0-3]</td>
</tr>
<tr>
<td>CENG 221</td>
<td>C Separation Processes</td>
<td>[3-1-0-3]</td>
</tr>
<tr>
<td>CENG 241</td>
<td>C Heat and Mass Transfer</td>
<td>[3-1-0-3]</td>
</tr>
<tr>
<td>CENG 297</td>
<td>C Chemical Engineering Laboratory I</td>
<td>[0-1-6-3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>E Business and Management Elective</td>
<td>[3-0-0-3]</td>
</tr>
</tbody>
</table>

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 201</td>
<td>C Process Dynamics and Control</td>
<td>[3-0-1-3]</td>
</tr>
<tr>
<td>CENG 202</td>
<td>C Process Design and Integration</td>
<td>[2-0-2-3]</td>
</tr>
<tr>
<td>CENG 298</td>
<td>C Chemical Engineering Laboratory II</td>
<td>[0-1-6-3]</td>
</tr>
<tr>
<td>ELEC 101</td>
<td>R Basic Electronics</td>
<td>[3-1-3-4]</td>
</tr>
<tr>
<td>MATH 152</td>
<td>R Applied Linear Algebra and Differential Equations</td>
<td>[3-1-0-4]</td>
</tr>
</tbody>
</table>

18 credits

### Third Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 303</td>
<td>C Plant Design and Economics</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>CENG 361</td>
<td>C Biochemical Engineering I</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>CENG 371</td>
<td>C Environmental Control I</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>CENG 398</td>
<td>C Investigation Project</td>
<td>[0-1-6-3]</td>
</tr>
<tr>
<td>(2) CENG</td>
<td>E Chemical Engineering Elective</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
<td>[3-0-0-3]</td>
</tr>
</tbody>
</table>

18 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CENG 350</td>
<td>C Advanced Materials: Properties and Processing</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>CENG 397</td>
<td>C Design Project</td>
<td>[0-1-2-6]</td>
</tr>
<tr>
<td>(2) CENG</td>
<td>E Chemical Engineering Elective</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>E Business and Management Elective</td>
<td>[3-0-0-3]</td>
</tr>
</tbody>
</table>

18 credits

---

1. Students exempted from this course by the Language Centre may replace it with a Humanities and Social Science Elective.

2. Chemical Engineering Electives:

   - CENG 301 Process Optimisation and Advanced Control [3-0-0-3]
   - CENG 311 Advanced Reactor Design [3-0-0-3]
   - CENG 321 Advanced Separation Processes [3-0-0-3]
   - CENG 341 Advanced Transport Phenomena [3-0-0-3]
   - CENG 362 Biochemical Engineering II [3-0-0-3]
   - CENG 372 Environmental Control II [3-0-0-3]
   - CENG 373 Environmental Management [3-0-0-3]
   - CENG 381 Mathematical Methods in Chemical Engineering [3-0-0-3]

A minimum of 103 credits is required for the BEng programme in Chemical Engineering. A student's choice of electives may result in this minimum being exceeded. Students will undertake appropriate industrial training required for professional qualification.

### Postgraduate Programmes and Research

The objectives of the postgraduate programmes are to attain an in-depth understanding of advanced subject matters in fundamental chemical engineering topics; exercise intellectual curiosity in probing frontier chemical engineering subjects; develop the ability of independent pursuit of new knowledge, both basic and applied; and engage in research that is at the cutting edge of this and related disciplines.

The postgraduate programmes commence in Fall 1993 and emphasise academic excellence and industrial relevance. Wherever possible, the programmes will be set within the context of local industrial needs and potential for the creation of demand for new technology. The Department will be an active participant in the MSc Biotechnology programme.

The Department plans research and associated postgraduate programmes in the following areas:

#### Advanced Materials

Over the last three decades, many "high-technology" industries have evolved from mechanical-based to chemical-based manufacturing. Examples may be seen in home entertainment, data storage and manipulation, telecommunications, high-performance polymers, advanced ceramics and composites. Chemical engineers have actively participated in researches that have made these advances possible. Research in the department will focus on polymers, polymer blends and polymer composites and thin-film materials.
Bioprocess Engineering

Major bioengineering research programmes will evolve within the context of the Biotechnology Research Institute, addressing interdisciplinary problems that are of significance for the development of the biotechnological sector of industry in Hong Kong and China. The Department plans to have projects in downstream processing and product recovery, cell engineering, and biosensors.

Environmental Engineering

Hong Kong is a densely populated urban city where encounter of air, water, municipal and industrial pollution is a fact of life for its residents. Research programmes at HKUST aim at developing appropriate technologies for improving the environmental quality in Hong Kong, as well as fundamental studies of generic phenomena and innovative methods for environmental protection. Research will follow several directions, namely, emerging technologies, advanced oxidation, air pollution studies, and waste minimisation and resources recovery.

Modelling and Computing

The computer's ability to handle complex mathematics and to permit the exhaustive solution of detailed models allows chemical engineers to model process physics and chemistry from the molecular scale to the plant scale, to construct models that incorporate all relevant phenomena of a process, and to design, control and optimise more on the basis of computer predictions and less on empiricism. A considerable part of the research activities in modelling will be linked with other research in the Department.

In addition, there will be a transputer controlled rig for undergraduate and postgraduate project work, and for demonstrations to local industries on the feasibility and desirability of advanced control. Another area of research will be concerned with the use of artificial intelligence techniques for process design, operation and control, including knowledge-based systems and neural networks.

Master of Science (MSc) in Chemical Engineering

This programme is for students who wish to acquire an in-depth understanding of a particular area of chemical engineering while strengthening their overall knowledge in chemical engineering at an advanced level. The MSc is a taught degree which normally requires one and a half years of full-time studies. Students are required to complete at least 30 credits of course work, of which six credits are for a project. The supervisor may be a faculty member in Chemical Engineering or co-opted from industry to supervise approved industrial projects. Part-time MSc students may undertake, as their projects, in-depth case studies or investigations as approved by the Department.

Master of Philosophy (MPhil) in Chemical Engineering

The MPhil is a research degree and students are required to complete 15 credits of postgraduate course work. In addition, students must complete a thesis in order to demonstrate their competence in engineering research. If the student participates in an industrial project and writes a thesis on a work-related topic, the thesis will be supervised jointly by a faculty member of the Department and a representative from the participating company. The MPhil degree normally takes one and a half years, but the time required depends on the individual's undergraduate background.

Doctor of Philosophy (PhD) in Chemical Engineering

The PhD degree is awarded upon the successful completion of a programme of advanced study which includes a minimum of 15 credits of postgraduate subjects, 10 in the student's major field, five in a minor field, and a doctoral thesis on significant original research or development work. Students entering with a master's or equivalent degree in engineering or a related subject area may be granted a partial waiver of the PhD requirements. The programme usually takes a minimum of three years of full-time studies beyond the bachelor's degree, or a minimum of two years beyond the master's degree.

After a student enters the PhD programme, a doctoral committee will be established to supervise the programme of study and the thesis. To become a doctoral candidate, the student must pass a qualifying examination within the first and a half years of PhD studies. The qualifying examination is both oral and written. The written part, which covers undergraduate and first-year postgraduate material, evaluates the student's preparation for postgraduate study in chemical engineering. An oral examination is then given by the doctoral committee after the student passes the written examination. The purpose of the oral examination is to establish the student's ability to formulate and conduct original research in the chosen discipline.

Faculty Research Interests

Professor Po-Lock YUE, Head of Department

Detoxification of hazardous waste and wastewater by advanced oxidation, catalytic wet air oxidation and biological oxidation. Waste minimisation and resources recovery. Applied catalysis, photocatalysis and novel reactor engineering. Knowledge based systems for the design, operation and control of process industries, neural network and applications of artificial intelligence.

Professor H. K. CHANG, Dean of Engineering

Biological transport phenomena; biofluid mechanics; monitoring of respiratory and hemodynamic parameters in critical core.
Dr Chi-Ming CHAN, Reader


Dr Chak-Keung CHAN, Lecturer

Aerosol physics and chemistry. Emission control and fate predictions of particulate pollutants; microcontamination control in ultraclean facilities; powder synthesis via novel aerosol reaction engineering. Air pollution control and instrumentations.

Dr Ping GAO, Lecturer

Diffusion in polymers and processing of ultra high molecular weight polyethylene (UHMWPE). Low temperature processing for precision extrusion of high impact strength UHMWPE materials. Application of oscillatory flow in baffled tube to reaction and liquid/liquid mixing.

Dr Tze-Man KO, Lecturer

Structure-property relationships of solid-state polymers and polymeric composites; expert systems in polymer processing; polymers in microelectronics and information storage such as photoresists, encapsulation and magnetic recording materials; plasma etching and deposition; advanced materials characterisation techniques including XPS, FTIR, SEM and TEM.

Dr Yongli MI, Lecturer


Civil and structural engineers are primarily responsible for the planning, design, and construction of infrastructure. This includes major buildings, bridges, dams, pipelines, sewage and water treatment works, and various transport systems and facilities. In order to provide workable, durable, and affordable solutions to societies' infrastructure needs, civil engineers must develop an understanding of the physical laws that govern the actions of nature and its environmental forces, and the behaviour of natural and man-made materials. It is not surprising therefore that the basic research on the mechanics of solids and fluids was initially conducted by civil engineers working on solutions to practical problems. The importance of a sound knowledge base of these subjects is likely to increase in future as civil engineers are called upon to build in more hostile and delicate environments, to handle new materials, and to preserve natural resources.

As society evolves, the solutions to civil engineering problems are no longer exclusively technical issues. Instead, they require consideration of demographic trends, human aspirations, laws of supply and demand, and in general, social, economic, and political factors. The civil engineers of the future will have to develop a better appreciation and understanding of these subjects to assume their rightful place in society.

The problems civil engineers face in the next century are likely to be increasingly complex. They should be viewed, however, as a new challenge and an opportunity to play a leadership role in shaping the future of society, improving the quality of life and protecting the environment. To respond to this challenge, civil engineers will need a solid knowledge of the physical sciences, and an understanding of human and social behaviour, familiarity with new methodologies and evolving technologies, and a continued eagerness to explore new areas and apply the latest research results. Research efforts should be closely related to the interest and the needs of society. In this way the results will be more practical, the work itself will be more exciting and rewarding, and the contribution to mankind will be more meaningful. The civil and structural engineering programme at HKUST aims at giving students the technical skills, intellectual inspiration and appreciation of human factors to meet the challenges facing the modern-day civil engineers.

Faculty

Professor and Head of Department:
C.K. SHEN, BS National Taiwan; MS New Hampshire; PhD Univ of California, Berkeley

Professors:
Thomas E. STELSON, BS, MS, DSc Carnegie Inst of Tech
(Pro-Vice-Chancellor for Research and Development)
Tse-Yung Paul CHANG, BS National Taiwan; MS, PhD Univ of California, Berkeley
Howard Ju-Chang HUANG, BS National Taiwan; MS, PhD Univ of Texas, Austin
Adjunct Professor:
Leon Ru-Liang WANG, BS National Cheng-Kung; MS Univ of Illinois, Urbana-Champaign; ScD Massachusetts Inst of Tech

Visiting Professor:
Gerhard William HEINKE, BASc, MASc Toronto; PhD McMaster

Senior Lecturer:
Neil C. MICKLEBOROUGH, DIP.CE. Hobart Tech Coll; M.ENG Carleton; PhD Tasmania

Lecturers:
Chun-Man CHAN, BASc, MSc Massachusetts Inst of Tech; PhD Waterloo
Mark J. DAVIDSON, BASc, PhD Univ of Canterbury, Christchurch
Mohamed S. GHIDAOUI, BEng, MASc, PhD Toronto
Jun-Shang KUANG, BASc South China Inst of Tech and Hong Kong; PhD Cambridge
Kin-Man LEE, BESc, PhD Western Ontario
Xiang-Song LI, BS Tsing Hua; MS, PhD Univ of California, Davis
Irene Man-Chi LO, BASc National Taiwan; MSc, PhD Univ of Texas, Austin
Duncan A. MCINNIS, BASc, MSc Calgary; PhD Toronto
David G. WAREHAM, BASc, MASc Waterloo; PhD British Columbia

Research Associate:
Guangyu SHI, BS, MS Dalian Tech; PhD Georgia Inst of Tech

Undergraduate Programme

The civil and structural engineering programme strikes a balance between the short-term gains possible with a practice-oriented curriculum and the long-term benefits of acquiring problem solving skills important for self-directed learning. Instead of teaching primarily how to solve work-aday problems, the Department emphasises the fundamentals of science and engineering that provide a disciplined approach for solving the characteristic problems of the profession, both current and anticipated. The curriculum concentrates primarily on the required core courses in the civil and structural engineering programme. These courses are intended to (1) show how the various sub-specialties are inter-related and thereby provide an integrated view of the civil engineering profession; and (2) introduce various aspects of civil engineering and show how they are related to broader social, political and economic issues. During the third year of their study, students are given the choice of concentrating on one of two "streams": Civil and Structural Engineering; or Civil and Environmental Engineering.

The minimum total credit requirement for the BEng in Civil and Structural Engineering is 104. All students are required to complete 5 credits of approved third-year senior project under the supervision of a qualified advisor from either the University or industry. In order to broaden the horizon of undergraduate students and in keeping with the University's policy of providing specialist training with a generalist outlook, all engineering students are required to take at least 36 credits outside their major department including 12 credits in humanities and social science, and 6 credits each in the Schools of Science and in Business and Management.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in either (1) two AL subjects (Pure Mathematics and Physics) and two AS subjects or (2) three AL subjects (Pure Mathematics, Physics, and one other AL subject).

The following semester-by-semester description of the undergraduate programme defines what courses students must complete to satisfy programme requirements and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 101</td>
<td>C</td>
<td>Civil Engineering and Society</td>
</tr>
<tr>
<td>CIVL 102</td>
<td>R</td>
<td>Surveying</td>
</tr>
<tr>
<td>CIVL 113</td>
<td>C</td>
<td>Statics and Dynamics</td>
</tr>
<tr>
<td>COMP 102</td>
<td>R</td>
<td>Computer Fundamentals and Programming</td>
</tr>
<tr>
<td>H&amp;SS E</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
</tr>
<tr>
<td>LANG 001</td>
<td>C</td>
<td>Language Skills Enhancement I</td>
</tr>
<tr>
<td>MATH 101</td>
<td>C</td>
<td>Multivariable Calculus</td>
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</table>

18 credits

Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 111</td>
<td>C</td>
<td>Construction Materials</td>
</tr>
<tr>
<td>CIVL 112</td>
<td>C</td>
<td>Mechanics of Materials</td>
</tr>
<tr>
<td>CIVL 141</td>
<td>R</td>
<td>Environmental Systems</td>
</tr>
<tr>
<td>CIVL 103</td>
<td>R</td>
<td>Surveying Camp</td>
</tr>
<tr>
<td>MATH E</td>
<td>E</td>
<td>Mathematics Elective</td>
</tr>
<tr>
<td>MECH 182</td>
<td>R</td>
<td>Experimental Methods</td>
</tr>
</tbody>
</table>

17 credits
School of Engineering

(1) Students exempted from this course by the Language Centre may replace it with a Humanities and Social Science course.

(2) This is a one week residential field camp held during the Winter Session.

Second Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>CIVL 231</td>
<td>Structural Theory and Design I</td>
<td>[3-1-1:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 251</td>
<td>Fluid Mechanics I</td>
<td>[3-0-3:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 261</td>
<td>Traffic and Transportation Engineering</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 271</td>
<td>Geotechnical Engineering I</td>
<td>[3-1-2:3]</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>MATH</td>
<td>Mathematics Elective</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>19 credits</td>
</tr>
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</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 202</td>
<td>Construction Engineering</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td>CIVL 232</td>
<td>Structural Theory and Design II</td>
<td>[3-1-1:3]</td>
</tr>
<tr>
<td>CIVL 242</td>
<td>Water Pollution Control</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td>CIVL 252</td>
<td>Fluid Mechanics II</td>
<td>[3-0-3:3]</td>
</tr>
<tr>
<td>CIVL 272</td>
<td>Geotechnical Engineering II</td>
<td>[3-1-2:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 credits</td>
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Civil and Structural Engineering Stream:

Third Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>CIVL 334</td>
<td>Structural Theory and Design IIIA</td>
<td>[3-2-0:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 335</td>
<td>Structural Theory and Design IIIB</td>
<td>[3-2-0:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 372</td>
<td>Geotechnical Engineering III</td>
<td>[3-2-0:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 397</td>
<td>Civil Engineering Project I</td>
<td>[0-0-5:2]</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>17 credits</td>
</tr>
</tbody>
</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 398</td>
<td>Civil Engineering Project II</td>
<td>[0-0-9:3]</td>
</tr>
<tr>
<td>CIVL</td>
<td>Civil Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>CIVL</td>
<td>Civil Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
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<td>15 credits</td>
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</tbody>
</table>

A minimum of 104 credits is required for the Civil and Structural Engineering stream. A student's choice of electives may result in this minimum being exceeded.

Civil and Environmental Engineering Stream:

Third Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall Semester</td>
<td>CIVL 343</td>
<td>Air Atmospheric Pollution: Processes and Control</td>
<td>[3-0-1:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 344</td>
<td>Solid Waste Management</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 351</td>
<td>Environmental Hydraulics and Hydrology</td>
<td>[3-2-0:3]</td>
</tr>
<tr>
<td></td>
<td>CIVL 397</td>
<td>Civil Engineering Project I</td>
<td>[0-0-5:2]</td>
</tr>
<tr>
<td></td>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>17 credits</td>
</tr>
</tbody>
</table>

Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 398</td>
<td>Civil Engineering Project II</td>
<td>[0-0-9:3]</td>
</tr>
<tr>
<td>CIVL</td>
<td>Civil Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>CIVL</td>
<td>Civil Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 credits</td>
</tr>
</tbody>
</table>

A minimum of 104 credits is required for the Civil and Environmental Engineering stream. A student's choice of electives may result in this minimum being exceeded.
Postgraduate Programmes

The postgraduate programmes in civil and structural engineering aim at training students to solve problems in civil and structural engineering by enlarging and deepening their knowledge base as well as encouraging the intellectual pursuit of creative ideas to improve human and natural environments.

The announced and planned projects in Hong Kong for airport construction, port facility expansion, improved road systems, pollution control, and urban re-development demand the work of large teams of civil and structural engineers in the next decade. As the practice of civil and structural engineering itself develops rapidly, the leaders of these teams are likely to be those who have broad-based and in-depth knowledge of the discipline as well as a good grasp of new design concepts and technologies. Postgraduate training develops such potentials and offers excellent opportunities for students who wish to become future leaders in this profession. Students engaging in postgraduate studies in civil and structural engineering may concentrate on structural, environmental, geotechnical, water resources, transportation, construction engineering or infrastructure development. In addition, doctoral students may also concentrate on applied mechanics and materials science.

The postgraduate programmes lead to the degrees of Master of Science (MSc), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD) in Civil and Structural Engineering. The master's degree programmes focus on strengthening students' knowledge in certain areas of civil and structural engineering and exposing them to the issues involved in the conception, design, construction, maintenance, and use of structures and facilities. The PhD programme aims at developing the skills needed to identify issues related to civil and structural engineering and the ability to formulate and propose solutions to a problem in an independent manner. In addition to the above programmes, the Department also participates in the Master of Science (MSc) programme in Biotechnology.

Applicants for admission to the postgraduate programmes are required to have completed, by the time they enrol in HKUST, a bachelor's degree or equivalent in civil engineering or a related engineering field. Students must demonstrate a sound training in physical sciences and mathematics and a good knowledge of basic engineering skills, including the use of computers. Deficiencies must be made up concurrently with postgraduate work if students are otherwise deemed admissible to a postgraduate programme on account of their overall preparation.

In addition to satisfying the University requirements for postgraduate degrees, all students admitted to postgraduate studies in the Department of Civil and Structural Engineering must complete departmental programme requirements as summarised below.

Master of Science (MSc) in Civil and Structural Engineering

This programme is for students who intend to pursue a career involving engineering practice along with management responsibilities. The MSc is a taught degree which normally requires one and a half years of full-time study. Each student is required to complete at least 30 credits of approved subject work. Six of the credits must be a project under the supervision of an advisor from either the University or industry.

Master of Philosophy (MPhil) in Civil and Structural Engineering

To be considered for admission, applicants must have completed a bachelor's degree in Civil Engineering with at least second class honours from a university, or an equivalent qualification from another tertiary institution. In exceptional cases applicants submitting evidence of other academic and professional qualifications may be considered.

The MPhil programme requires completion of at least 15 credits of course work, and all MPhil students are required to attend regularly departmental seminars in their areas of interest. Each student must present at least one seminar summarising the major results of his/her thesis research. The candidate will normally conduct thesis research on campus although the advisor may permit a candidate to spend a period in the field, within another institution, or elsewhere away from the University. Candidates will present theses for examination no earlier than one and a half years and no later than five years from the date of first enrolment for the degree.

On completion of the programme of study and research, the student shall submit a thesis demonstrating competence in engineering research. The work described must have been substantially completed subsequent to enrolment for the degree, and the thesis must be written in English, reach a satisfactory standard of expression and presentation, and consist of an account of the student's own research. The student may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or some other similar award.

Doctor of Philosophy (PhD) in Civil and Structural Engineering

To be considered for admission, applicants must have completed either a master's degree (or equivalent) in Civil Engineering (or in a related field), or a bachelor's degree in Civil Engineering with first class honours, or equivalent qualification, from a university or other tertiary institution. In exceptional cases applicants submitting evidence of other academic and professional qualifications may be considered.

The PhD programme requires completion of at least 30 credits of course work, 20 in the student's major area and 10 in a minor field. Students with a master's degree may be granted advanced standing of up to 15 credits. In general, PhD students are expected to maintain a B+ average in their course work.

All PhD students are required to attend regularly Departmental seminars in their areas of interest. At least two seminars must be presented by all PhD students during the course of their programmes. Ideally an early seminar should be on the initial work or proposed area of research. In any case, one last seminar must be presented just before
the final PhD defence. The seminar should cover the completed work and should summarise the major results of the thesis research.

Each PhD student will normally commence qualifying and comprehensive examinations within 18 months of initial registration. The examinations are both written and oral. The written examination, which covers undergraduate and first-year postgraduate civil engineering materials, evaluates the student's comprehension of scientific and engineering principles and engineering synthesis, and the student's preparation for postgraduate study. Prior to undertaking the examinations, each PhD student will have prepared a written thesis research proposal, and will orally present and defend it. In addition, the student will answer questions of a general civil engineering nature and questions relevant to the proposed research.

Following the examinations, the examination committee will recommend that the student has passed and is a candidate for the degree; or the student should undertake further study or courses to rectify deficiencies uncovered in the examination but may continue with the research component without another written or oral examination, and upon successful completion of these further studies, the student will automatically become a candidate for the degree; or the student should undertake further studies and must repeat the written and/or oral component at a later date; or the student has failed and must withdraw from the PhD programme.

The candidate will normally conduct the thesis research on campus, although the advisor may permit a candidate to spend a period in the field, within another institution, or elsewhere away from the University.

On completion of the programme of study and research, the student shall submit a thesis demonstrating competence in engineering research. The work described must have been substantially completed subsequent to enrolment for the degree, and the thesis must be written in English, reach a satisfactory standard of expression and presentation, and consist of an account of the students' own research. The student may not submit as the main content of the thesis any work or material which has previously been submitted for a university degree or some other similar award.

A candidate holding only a first degree will normally present the thesis for examination no earlier than four years and no later than eight years from the date of first enrolment for the degree. For students holding a master's degree prior to entering the PhD programme, the time to complete the PhD programme will normally be between two and a half years and six and a half years. Candidates may apply for reductions to these periods.

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**Faculty Research Interests**

**Professor Chih-Kang SHEN, Head of Department**

Geotechnical engineering; soil-structure interaction; ground modification; laboratory characterisation of geotechnical material.

**Professor Thomas E. STELSON, Pro-Vice-Chancellor for Research and Development**

Energy and environmental systems; transportation; construction and infrastructure development.

**Professor Tse-Yung Paul CHANG**

Structural analysis; finite element methods, computational mechanics; parallel computation and expert systems.

**Professor Howard Ju-Chang HUANG**

Water and wastewater treatment; industrial and hazardous waste disposal; lake aeration/circulation for eutrophication control; removal of trace contaminants from drinking water; accelerated sediment stabilisation in aquatic systems; and A/O and UASB biological treatment optimisation.

**Professor Leon Ru-Liang WANG, Adjunct Professor**

Structural and earthquake engineering; civil infrastructure systems (CIS); lifeline earthquake engineering; buried pipelines and structures; structural dynamics; structural analysis and design.

**Professor Gary W. HEINKE, Visiting Professor**

Environmental engineering; physical-chemical water and wastewater treatment; municipal urban infrastructure rehabilitation; public health and sanitation in developing countries.

**Dr Neil C. MICKLEBOROUGH, Senior Lecturer**

Dynamic behaviour of structures and offshore platforms; load-balancing design techniques for partially prestressed concrete members; creep buckling of slender reinforced and prestressed concrete columns.
Dr Chun-Man CHAN, Lecturer

Structural design optimisation of tall buildings; computer automated design of structures; structural steel design; wind effects on buildings; stiffness and vibration control of structures; rehabilitation of structures.

Dr Mark J. DAVIDSON, Lecturer

Environmental hydraulics; atmospheric plume dispersion; ocean outfall plume dispersion; environmental wind tunnel modelling.

Dr Mohamed S. GHIDAoui, Lecturer

Numerical, mathematical and physical modelling of open and closed conduits; groundwater flow; advection and dispersion phenomena; multiphase flows; sediment transport; and nonlinear dynamical systems.

Dr Jun-Shang KUANG, Lecturer

Reinforced concrete structures; shear in reinforced concrete members; punching shear of concrete slabs; fracture mechanics of concrete and damage theory; tall building structures; active structural control; design for earthquake resistance.

Dr Kin-Man LEE, Lecturer

Numerical modelling in geotechnical engineering and its application to field problems; tunnelling in soft ground; soil structure interaction; constitutive relationship for geological material; applications of geosynthesis in engineering problems.

Dr Xiang-Song LI, Lecturer

Soil dynamics and earthquake engineering; constitutive modelling of engineering materials; numerical analysis; instrumentation, control, and signal processing for structural and geotechnical experiments.

Dr Irene Man-Chi LO, Lecturer

Hazardous waste management; clay liners for waste disposal facilities; remediation of contaminated soil; subsurface fate and transport of pollutants; mathematical modelling of treatment processes, water quality and groundwater pollution.
An image analysis method has been developed by a team led by Professor Roland Chin of the Department of Computer Science to automate the counting and sizing of brain cells, for application in disciplines such as neurology, neuropathology and neuroscience. The 1:9000 magnified image of the results of this computer processing of electron microscope images is being viewed by a research student (right).
DEPARTMENT OF COMPUTER SCIENCE

Computer science is the discipline that studies the structure, function, and applications of computers. The programmes of the Department of Computer Science are dedicated to educate students in the areas of foundations of computer science, artificial intelligence, computer engineering, data and knowledge base systems, and software engineering, so that they may become effective practitioners and researchers.

Through the efforts of researchers and engineers in the last five decades, computers have evolved from large, slow, and very specialised systems to small, fast, and ordinary tools that are part of virtually everyone's life. For example, the computing power of ENIAC, the first electronic computer which weighed 40 tons, cannot come close to that of the calculators that our school children carry today. This phenomenal improvement in computing power over the years has been accompanied by an equally phenomenal decrease in cost. The ubiquitous nature of computers in the workplace now is making computing power a requirement for all professionals in industrial societies. When computer technology is applied with a thorough understanding of computer science, business can compete successfully in the emerging global marketplace.

Traditional computer science research covers hardware, the physical components of computer systems, and software, the logical instructions to the computer for problem-solving. Computer Science programmes at HKUST cover both but emphasise software. This emphasis is consistent with a world-wide trend of increasing importance of computer software in various applications and in research.

The Department offers a full range of courses to meet the needs of its own students and students from other departments at the University. It has programmes that lead to the BEng, MPhil, MSc, and PhD degrees. Aside from taking a number of required computer science courses, students are generally encouraged to design individual study plans that are tailored to their own interests.

Faculty

Professor and Head of Department:
Vincent Y.S. SHEN, BS National Taiwan; MA, PhD Princeton

Professors:
Roland T. CHIN, BS, PhD Missouri-Columbia
Frederick H. LOCHOVSKY, BSc, MSc, PhD Toronto
(Associate Dean of Engineering)

Reader:
Samuel T. CHANSON, BSc Hong Kong; MSc, PhD Univ of California, Berkeley
(Associate Head of Department)

Visiting Reader:
Shmuel ZAKS, BSc, MSc Technion; PhD Univ of Illinois, Urbana-Champaign

Senior Lecturers:
Amelia C.W. FONG LOCHOVSKY, BSc Toronto; MSc, MA, PhD Princeton
Michael KAMINSKI, MSc Moscow State; PhD Hebrew Univ of Jerusalem
Ting-Chuen PONG, BS Univ of Wisconsin, Eau Claire; MS, PhD Virginia Polytech Inst and State Univ
Helen C. SHEN, BMath, PhD Waterloo; MSc Toronto

Lecturers:
Ishfaq AHMAD, BSc Univ of Eng & Tech, Pakistan; MS, PhD Syracuse
George BACIU, BMath, MSc, PhD Waterloo
Lewis H.M. CHAU, BSc Chinese Univ of Hong Kong; MSc Univ of Alabama, Birmingham; PhD Univ of California, Los Angeles
Siu-Wing CHENG, BSc Hong Kong; PhD Minnesota
Scott C. DEERWATER, BS, MS, PhD Purdue
Pamela A. DREW, BA, MS, PhD Univ of Colorado, Boulder
Mordecai J. GOLIN, BSc Hebrew Univ of Jerusalem; MA, PhD Princeton
James W. GRAY, III, BS, MS, PhD Maryland
Mounir HAMDI, BS Southwestern Louisiana; MS, PhD Pittsburgh
Babak HAMIDZADEH, BS, MS, PhD Minnesota
Andrew B. HORNER, BMus Boston Univ; MS Univ of Tennessee, Knoxville; PhD Univ of Illinois, Urbana-Champaign
Kamalakar KARLAPALEM, BSc Bombay; MS, Indian Statistical Inst; MS Indian Inst of Tech; PhD Georgia Inst of Tech
Alex KEAN, BSc, MSc Acadia, PhD British Columbia
Chung-Mong LEE, BSc, MSc, PhD Minnesota
Qing LI, BE Hunan; MSc, PhD Univ of Southern California
Jogesh K. MUPPALA, BE Osmania; MS Southwestern Louisiana; PhD Duke
Avi C. NAIMAN, BSc Framingham State Coll; MSc, PhD Toronto
Tin-Fook NGAI, BSc(EE) Hong Kong; MS Pennsylvania State; PhD Stanford
Man-Chi PONG, BSc(Eng), MPhil Hong Kong; MSc Univ of California, Los Angeles; PhD Univ of Kent, Canterbury
Pankaj ROHATGI, BTech Indian Institute of Tech; MS Cornell
Chung-Dak SHUM, BS, MS Washington Univ; PhD Univ of California, Los Angeles
Michael D. STIBER, BS Washington Univ; MS, PhD Univ of California, Los Angeles
Dekai WU, BS Univ of Calif, San Diego; PhD Univ of California, Berkeley
Beat WUTHRICH, BS Berne Neufeld; MS, PhD Swiss Federal Institute of Tech
Dit-Yan YEUNG, BSc(Eng), MPhil Hong Kong; MS, PhD Univ of Southern California
## Undergraduate Programme

All Engineering undergraduates are required to take a series of courses which provide them with basic engineering theories, concepts, and practices. Classes in the basic sciences and mathematics also form part of the curriculum. Introductions to the theories and applications of computers are given in the second year. In the third year, students may specialise in one of the major concentrations such as foundations of computer science, artificial intelligence, computer engineering, data and knowledge base management, or software engineering. Alternatively, students may choose to remain in a general programme with a course of study tailored to their own interests. A final year project is required under the supervision of an academic advisor.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in either two AL subjects (including Pure Mathematics) and two AS subjects, or three AL subjects (including Pure Mathematics).

The following semester-by-semester description of the undergraduate programme defines what courses students must complete to satisfy programme requirements and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

### First Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 111</td>
<td>C</td>
<td>Software Tools [2-0-2:3]</td>
</tr>
<tr>
<td>ELEC 101</td>
<td>R</td>
<td>Basic Electronics [3-1-3:4]</td>
</tr>
<tr>
<td>(1) LANG 001</td>
<td></td>
<td>Language Skills Enhancement I [0-3-1:0]</td>
</tr>
<tr>
<td>MATH 132</td>
<td>R</td>
<td>Discrete Structures [3-1-0:4]</td>
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15 credits

#### Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>COMP 106</td>
<td>C</td>
<td>C Programming [1-0-2:2]</td>
</tr>
<tr>
<td>COMP 171</td>
<td>C</td>
<td>Data Structures and Algorithms [3-0-1:3]</td>
</tr>
<tr>
<td>COMP 180</td>
<td>C</td>
<td>Computer Organisation [3-0-1:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective [3-0-0:3]</td>
</tr>
<tr>
<td>MATH 111</td>
<td>R</td>
<td>Linear Algebra [3-1-0:4]</td>
</tr>
<tr>
<td>MECH 182</td>
<td>R</td>
<td>Experimental Methods [1-2-4:3]</td>
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18 credits

### Second Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
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<th>Title</th>
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<tr>
<td>COMP 251</td>
<td>C</td>
<td>Principles of Programming Languages [3-0-1:3]</td>
</tr>
<tr>
<td>COMP 271</td>
<td>C</td>
<td>Design and Analysis of Algorithms [3-1-0:3]</td>
</tr>
<tr>
<td>(-)</td>
<td></td>
<td>Humanities and Social Science Elective [3-0-0:3]</td>
</tr>
<tr>
<td>MATH 244</td>
<td>R</td>
<td>Applied Statistics [3-1-0:4]</td>
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17 credits

#### Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 211</td>
<td>R</td>
<td>Introduction to Software Engineering [2-0-1:2]</td>
</tr>
<tr>
<td>COMP 221</td>
<td>R</td>
<td>Fundamentals of Artificial Intelligence I [3-1-0:3]</td>
</tr>
<tr>
<td>COMP 231</td>
<td>R</td>
<td>Database Management Systems [3-0-1:3]</td>
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<tr>
<td>(2) COMP</td>
<td></td>
<td>Computer Science Elective [3-0-0:3]</td>
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<tr>
<td>LANG 103</td>
<td>R</td>
<td>Technical Communication [0-3-0:3]</td>
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<tr>
<td>(3) SB&amp;M</td>
<td>E</td>
<td>Business and Management Elective [3-0-0:3]</td>
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</table>

17 credits

### Third Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Title</th>
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<tbody>
<tr>
<td>COMP 371</td>
<td>C</td>
<td>Theory of Computation [3-1-0:3]</td>
</tr>
<tr>
<td>COMP 397</td>
<td>R</td>
<td>Final Year Project I [0-0-3:1]</td>
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<tr>
<td>(2) COMP</td>
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<td>Computer Science Elective [2-0-0:2]</td>
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<tr>
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<td>Computer Science Elective [3-0-0:3]</td>
</tr>
<tr>
<td>(3) FREE</td>
<td>E</td>
<td>Free Elective [3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective [3-0-0:3]</td>
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</table>

15 credits

#### Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 398</td>
<td>R</td>
<td>Final Year Project II [0-0-9:3]</td>
</tr>
<tr>
<td>(2) COMP</td>
<td></td>
<td>Computer Science Elective [3-0-0:3]</td>
</tr>
<tr>
<td>(2) COMP</td>
<td></td>
<td>Computer Science Elective [3-0-0:3]</td>
</tr>
<tr>
<td>(3) FREE</td>
<td>E</td>
<td>Free Elective [3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective [3-0-0:3]</td>
</tr>
<tr>
<td>(3) SB&amp;M</td>
<td>E</td>
<td>Business and Management Elective [3-0-0:3]</td>
</tr>
</tbody>
</table>

18 credits

(1) Students exempted from this course by the Language Centre may replace it with a Humanities and Social Science elective.
A minimum of 100 credits is required for the BEng programme in Computer Science. A student’s choice of electives may result in this minimum being exceeded. At least six credits must be earned in elective courses in Computer Science, 300-level or higher.

Postgraduate Programmes and Research

Research

The Department of Computer Science has established several research areas that are relevant to the needs of society. The emphasis is software, since the cost of software is the major factor driving the cost of most computer applications, a better understanding of any aspect of software may have profound influence on its production, and the education system in Hong Kong is particularly suitable in producing young people qualified to pursue careers in computer software. Brief descriptions of these areas are given below; additional research areas will be established as the Department matures.

The Foundation of Computer Science area includes the study of the theory of computation, and the design and analysis of algorithms. Research in theory seeks to uncover and explain the structures underlying computational processes, as well as to model the difficulties encountered when one tries to understand them. Research in algorithms seeks to identify common characteristics in different applications and to develop efficient approaches to solve them. Artificial Intelligence (AI) concerns how computers can be made to exhibit intelligent behaviour in performing tasks which traditionally have been best done by humans. These tasks include reasoning (deductive, inductive, and common-sense), speech recognition and language understanding, vision, learning, planning, and motion control. Computer Engineering research studies the analysis, design, and implementation of computer systems. The goal is to identify effective methods to build systems that meet customers’ requirements. Topics under investigation are computer architecture and organisation, fault-tolerant computing, operating systems, parallel and distributed computing, and real-time systems. Other topics that involve both computer and electrical engineering include computer communication and networking, and VLSI design. The computer engineering programme is designed to prepare students for research in the areas described above, as well as to provide solutions to Hong Kong’s needs in the design and analysis of computer systems, communications networks, and systems software. Data and Knowledge Management area covers techniques on data and knowledge representation, utilisation, and integration, in order to effectively support the emerging data- and knowledge-intensive applications. Software Engineering area is concerned with the design, development, testing, and maintenance of software systems, especially those that are large and complex. The goal is to identify the methods and tools that can be used by software engineers to produce high-quality systems at low cost.

Students must also demonstrate a sufficient command of English.

Applicants are required to submit academic transcripts of undergraduate studies (and beyond, if applicable), two letters of recommendation, a one-page statement of purpose for postgraduate study, and a completed application form for admission.

In addition to satisfying the University requirements for postgraduate degrees, all students admitted to postgraduate studies in the Department of Computer Science must complete departmental programme requirements as detailed below.

Postgraduate programmes in the Department are administered by a Postgraduate Studies Committee. The programme of study must be approved by the Committee and may include courses offered by other departments at HKUST. Normally, a student must take at least one course in each of the four research areas of the Department, and at least one of these four must be in Foundations of Computer Science. One of the required courses may be exempted if a student has taken an equivalent advanced level course. A student whose formal computer science background is deemed inadequate may be admitted on a provisional basis and additional courses may be required.

In addition to the traditional areas of research in computer science, students are encouraged to choose applications from other research areas in science, engineering, business, social science, and the humanities.

Master of Science (MSc) and Master of Philosophy (MPhil) in Computer Science

The MSc and MPhil programmes focus on strengthening students’ knowledge in certain areas of computer science and on exposing them to the issues involved in the...
Development of scientific, educational, and commercial applications of computer systems. Holders of these degrees are qualified to be technical leaders in industrial research or development organisations. This level of advanced education is already in great demand in most industrial societies at this time, as many multinational companies require their technical employees to hold master's degrees.

Requirements for the MSc Degree in Computer Science

For full-time students, the normal length of time for the completion of the MSc degree is one and a half years. The number of required credits for an MSc is 30. There are two approaches to earning an MSc degree: by coursework-and-project, or by coursework alone.

The Coursework-and-Project Option:

A student must complete at least eight postgraduate courses (24 credits), a computer science project (four credits), and the seminar course (one credit) for two semesters. The final project report will be read by two faculty members, one of whom is the supervisor, and is graded Pass or Fail. A Pass grade may be denoted as Pass with Distinction when appropriate.

The Course-Only Option:

A student must complete at least nine postgraduate courses (27 credits), and the seminar course (one credit) for three semesters.

Requirements for the MPhil Degree in Computer Science

For full-time students, the normal length of time for the completion of the MPhil degree is one and a half years. A student must complete at least five postgraduate courses (15 credits) and the seminar course for two semesters. In addition, the students must conduct research and submit and successfully defend a master's thesis.

Doctor of Philosophy (PhD) in Computer Science

The PhD programme aims at developing skills needed to identify issues related to a practical application, to formulate an original research problem that addresses some of the issues, and to create independently an effective computer solution. This degree is normally required for people planning a career in academia. It is also an excellent qualification for leadership positions in research organisations in industry. Successful careers in these organisations often lead to high-level management positions in high-tech companies.

Requirements for the PhD Degree in Computer Science

1. Course Requirement

All students in the PhD programme must show a basic breadth of knowledge of the field. Each PhD student must demonstrate competence in the following core computer science areas: (a) computer organisation; (b) programming languages and compilers; (c) principles of systems software; (d) design and analysis of algorithms; (e) theory of computation. Competence in these areas is appraised during the admission process. Students with deficiencies may be admitted on condition that they take a set of remedial courses and obtain at least B in these courses.

Each PhD student must satisfy a course requirement including at least five approved postgraduate courses (worth 15 credits) and the seminar course for two semesters. Normally, a PhD student is required to take at least one course in each of the four established research areas of the Department, including one from the student's research area and one from Foundations of Computer Science. A minimum grade of at least B and an overall average of B+ must be obtained.

The course requirement may be satisfied in part by courses taken at other recognised institutions and the PhD student is expected to satisfy the course requirement during the first year of study.

2. Qualifying Requirement

The qualifying requirement consists of a written examination in the students' research area supplemented, if specified, by an oral component, and a written oral examination in a second area. This latter requirement may be waived for students who have taken either (a) an advanced course in the second area of computer science and obtained at least B+ or (b) an approved, advanced postgraduate course outside computer science and obtained a satisfactory grade.

A PhD student must fulfill the qualifying requirement within the second year of study. A second chance will be given to students who fail to qualify on their first attempt. The examinations are conducted twice a year, usually before the beginning of the Fall and Spring Semesters.

3. Thesis Proposal

Each PhD candidate is required to submit and defend a thesis proposal preferably within one year after satisfying the qualifying requirement.


Each PhD candidate must submit and defend a thesis describing significant original research completed at HKUST.
Faculty Career Activities and Research Interests

Professor Vincent Y. SHEN, Head of Department

Professor Shen has taught at Purdue University and served as a research manager at the Microelectronics and Computer Technology Corp. in the US. He has also held visiting positions at National Tsing Hua University and IBM. His research interests are software engineering and software design environments.

Professor Roland T. CHIN, Professor

Professor Chin has taught at the University of Wisconsin, Madison and was Associate Chairman of the Department of Electrical and Computer Engineering from 1986 to 1990. He received the US Presidential Young Investigator's award in 1984. His research interests are digital signal processing, image analysis, pattern recognition, and computer vision.

Professor Frederick H. LOCHOVSKY, Associate Dean of Engineering

Professor Lochovsky has taught at the University of Toronto and directed its database and office systems research group. He was also Associate Director of the Computer System Research Institute there and a Visiting Scientist at IBM Research Laboratory. His research interests are information systems design, database design, human-computer interaction, and knowledge representation for organisational support systems.

Dr Samuel T. CHANSON, Reader, Associate Head of Department

Dr Chanson has taught at Purdue University and the University of British Columbia. He was Professor and Director of the Distributed Systems Research Group there before joining HKUST. His research interests include artificial intelligence, image processing and pattern recognition.

Dr Shmuel ZAKS, Visiting Reader

Dr Zaks has taught at the Technion-Israel Institute of Technology since 1979. He also held visiting positions at the MIT Laboratory for Computer Science, Carleton University, IBM Thomas J Watson Research Center, University of Helsinki, INRIA, IBM Zurich Research Center, and Aarhus University. His research is concentrated in the area of distributed computing, with an emphasis on the design and analysis of distributed algorithms.

Dr George BACIU, Lecturer

Dr Baciu has been a research staff member of the Computer Graphics Laboratory at University of Waterloo. His research interests are scientific visualisation, computer graphics, analytical graph-theoretic and computational dynamics of physical systems, entropy optimisation, and symbolic computation.
Dr Hau-Ming Lewis CHAU, Lecturer

Dr Chau was a researcher at IBM before joining HKUST. He has also taught at the Extension of the University of California at Berkeley. His research interests are logic programming, knowledge base systems, and artificial intelligence.

Dr Siu-Wing CHENG, Lecturer

Dr Cheng came to HKUST from the University of Minnesota. His research interests are computational geometry, design and analysis of algorithms, and data structures.

Dr Scott C. DEERWESTER, Lecturer

Dr Deerwester has taught at Colgate University and the University of Chicago. His research interests are information retrieval, distributed information system architecture, and multilingual computing.

Dr Pamela A. DREW, Lecturer

Dr Drew was a member of the technical staff at the research laboratories of US WEST Advanced Technologies. Her research interests are heterogeneous and distributed database systems, advanced transaction management algorithms, object-oriented systems and languages, semantic data modelling, DBMS support for engineering environments, and information technologies.

Dr Mordecai J. GOLIN, Lecturer

Dr Golin was a researcher in the Algorithms project at INRIA-Rocquencourt, Paris. He has also been a visiting researcher at the Max-Planck Institute für Informatik. His research interests include the theory, design and application of algorithms, computational geometry, and combinatorics.

Dr James W. GRAY, III, Lecturer

Dr Gray was a researcher at the US Naval Research Laboratory in Washington, DC. His research interests are computer security, cryptographic protocols, formal methods in software engineering, and connectionist models in computing.

Dr Mounir HAMDI, Lecturer

Dr Hamdi came to HKUST from the University of Pittsburgh. His main research interests are in the design and analysis of parallel computer architectures and parallel algorithms, distributed computing, communication networks, and optical computing.

Dr Babak HAMIDZADEH, Lecturer

Dr Hamidzadeh joined HKUST from the University of Minnesota. His research interests are real-time operating systems, real-time databases, parallelising compilers, parallel database systems, knowledge discovery in databases, high-performance computer architectures, performance analysis, and artificial intelligence.

Dr Andrew B. HORNER, Lecturer

Dr Horner came to HKUST from the University of Illinois, Urbana-Champaign. He also holds a music degree, which involved work in the MIT Media Lab's Experimental Music Studio. His research interests are computer music, genetic algorithms and artificial life, scientific visualisation with sound, speech recognition, multimedia computing, and human-computer interaction.

Dr Kamalakar KARLAPALEM, Lecturer

Dr Karlapalem came to HKUST from Georgia Institute of Technology. His research interests are distributed database systems, database design, semantic data modelling and knowledge representation, applications of database technology, and cooperative problem solving.

Dr Alex KEAN, Lecturer

Dr Kean came from the University of British Columbia. His research interests are abductive, deductive and inductive reasoning, distributed reasoning, diagnostic reasoning, theorem proving, constraint satisfaction problems, belief revision, knowledge based systems, knowledge representation, and decision support systems.

Dr Chung-Mong LEE, Lecturer

Dr Lee was an associate research staff member at the National University of Singapore from 1989 to 1992. He was the recipient of Digital Equipment Corporation's Alpha Innovator's Award in 1993. His research interests include computer vision, image processing, neural networks, and robotics.
Dr Qing Li, Lecturer

Dr Li has taught at the Australian National University. His research interests are semantic data models and object-oriented databases, distributed and multiple database architectures, schema evolution and integration techniques, knowledge management and expert database systems, applied machine-learning and knowledge-mining techniques, and advanced data/knowledge base applications.

Dr Jogesh K. Muppala, Lecturer

Dr Muppala was a member of the technical staff at the Software Productivity Consortium in Virginia. His research interests are performance and dependability modelling, fault-tolerant computing, Petri nets, flexible manufacturing systems, and distributed systems.

Dr Avi C. Naiman, Lecturer

Dr Naiman has been a post-doctoral fellow in the Center for Visual Science at the University of Rochester. His research interests are computer graphics, digital typography, visual psychophysics, display modelling, electronic documents, and human-computer interaction.

Dr Tin-Fook Ngai, Lecturer

Before joining HKUST, Dr Ngai was a member of the technical staff at Hewlett-Packard Laboratories. As a member of the high performance fortran forum, Dr Ngai participated in the definition of high performance fortran for data-parallel programming. His research interests are parallel processing (architectures, OS supports, compilers and languages), computer architectures, compilers, distributed computing, and VLSI.

Dr Man-Chi Pong, Lecturer

Dr Pong was affiliated with the University of Hong Kong, the University of California at Los Angeles, the University of Edinburgh, the University of Kent, and the Institute of Software of the Chinese Academy of Sciences. He was a technical project manager at Citibank in Hong Kong before joining HKUST. His research interests are software tools, Chinese computing, and multimedia communication.

Dr Pankaj Rohatgi, Lecturer

Dr Rohatgi came from Cornell University. His research interests are automata and formal languages, structural complexity theory, and probabilistic algorithms.

Dr Chung-Dak Shum, Lecturer

Before joining HKUST, Dr Shum was a Principal Engineer from 1989 to 1992 at NCR/Teradata in California. His research interests include query processing, parallel database systems, and performance modelling and analysis.

Dr Michael D. Stiber, Lecturer

Dr Stiber came from the University of California at Los Angeles. His research focuses on understanding how animals' nervous systems perform the computations necessary for them to live in an unpredictable world. He has been actively collaborating with researchers in the neurosciences, and has been applying concepts from the field of nonlinear dynamics to simulations of biological neural networks.

Dr Dekai Wu, Lecturer

Dr Wu was a postdoctoral fellow at the University of Toronto. His research interests include probabilistic natural language learning, machine translation, and knowledge representation.

Dr Beat Wüthrich, Lecturer

Dr Wüthrich was a researcher in knowledge-based systems at the European Computer-Industry Research Center in Munich. His research interests are knowledge base systems, deductive databases, logic programming, query languages of information systems, uncertainty management, and machine learning.

Dr Dit-Yan Yeung, Lecturer

Dr Yeung has taught at the Illinois Institute of Technology. His primary research interests are neurocomputing (or artificial neural networks) and pattern recognition. Other research interests include Chinese computing, machine learning, robotics, speech recognition, and telecommunications.
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

As a classical discipline, electrical engineering can be defined simply as the theories and methods to generate, transmit, receive, modulate, control, and utilise electromagnetic waves and energy. However, electrical and electronic engineering has evolved into an exciting “high tech” discipline which covers a wide spectrum of modern technologies such as analogue and digital circuits, semiconductor devices and materials, optoelectronics, microelectronics, microprocessor and electronic memory devices, signal processing and communication, control and expert systems, computer networks, electromagnetic waves and telecommunication, energy systems and power distribution. Advances in electrical and electronic engineering in the past decade have influence most aspects of our lives, and will continue to do so in this decade and into the next century. In particular, for young people entering the work force, electronic engineering provides new and exciting employment opportunities.

Electrical and Electronic Engineering at HKUST aims to provide its students with a sound practical and analytical education, thus equipping them to become effective and productive electronic engineers in a highly technological society. The Department offers a full range of courses to meet the needs of its students in programmes leading to BEng, MSc, MPhil and PhD degrees.

The Department provides modern equipment and laboratories to facilitate the research activities of faculty and students including ample numbers of microcomputers and computer workstations. These are connected to a state-of-the-art computer network so that all users can access the central computing resources of the University. The Department also houses teaching and research laboratories for semiconductor device characterisation, ICCAD design and VLSI test, microprocessor and microcomputer applications, digital signal processing, electro-optics, photonics, and information systems. Faculty and students may also utilise the extensive central facilities of the University. In particular, students in microelectronics will be major users of the Microelectronics Fabrication Centre, which will be equipped with a full line of processing equipment for the fabrication of semiconductor devices and integrated circuits. Similarly, students interested in IC design and CAD/CAM will be able to utilise the CAD/CAM Laboratory, equipped with the latest computing workstations, graphics input and output devices and application software.

Faculty

Professor and Head of Department:
Peter W. CHEUNG, BS Oregon State; MS Puget Sound; PhD Univ of Washington

Professors:
Donald A. GEORGE, BEng McGill; MS Stanford; ScD Massachusetts Inst of Tech (Associate Pro-Vice-Chancellor for Academic Affairs)
Ping K. KO, BS Hong Kong Univ; MS, PhD Univ of California, Berkeley
Hoi Sing KWOK, BS Northwestern; MS, PhD Harvard

Readers:
Philip C.H. CHAN, BS Univ of California, Davis; MS, PhD Univ of Illinois, Urbana-Champaign
Justin C. CHUANG, BS National Taiwan; MS, PhD Michigan State

Senior Lecturers:
Zexiang LI, BS Carnegie-Mellon; MS, PhD Univ of California, Berkeley
Tai-chin LO, BS National Taiwan; MS, PhD Univ of Illinois, Urbana-Champaign
(Director of Microelectronics Fabrication Centre)

Lecturers:
Oscar C. AU, BS Toronto; MA, PhD Princeton
Aaron W. BUCHWALD, BSEE Iowa; MS, PhD Univ of California, Los Angeles
Kwan-fai CHEUNG, BS, MS, PhD Univ of Washington
Ho-chi HUANG, BS, MS National Taiwan; PhD Univ of Washington
Tsze-Mei KO, BEE, BSc, MPhil, PhD California Inst of Tech
Ross David MURCH, BS, PhD Univ of Canterbury, Christchurch
Cuong T. NGUYEN, BS Univ of California, Berkeley; MS, PhD Stanford
Vincent M.C. POON, BSc, MPhil, PhD Chinese Univ of Hong Kong
Johnny K.O. SIN, BS, MS, PhD Toronto
Danny H.K. TSANG, BS Winnipeg; BEng, MS Technical Univ of Nova Scotia, PhD Pennsylvania
Man WONG, BS, MS Massachusetts Inst of Tech; PhD Stanford
Mark Sze-Fong YAU, BSc Hong Kong, MS Boston; PhD Univ of Illinois, Urbana-Champaign
Bing ZENG, BS, MS Univ of Electronic Sc & Tech of China; PhD Tampere Univ of Tech

Assistant Lecturer:
Jack Ka-Chun LAU, BS, MS Univ of California, Berkeley

Undergraduate Programme

During the first year, students take courses in linear circuits theory, basic electronics, digital logic and systems, microprocessor in addition to the courses in mathematics, language, computer science, humanities and social science. In the Spring Semester of the second year, students are advised to select technical sequences in Circuit and Systems, Electronics, or Computer Engineering. In the final year, students will take a set of approved electives to gain depth in a technical specialty. All students are required to complete a final-year project under the supervision of a faculty member, and submit a written project report.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in either two AL subjects (Pure Mathematics and Physics) and two AS subjects, or three AL subjects (including Pure Mathematics and Physics).
The following semester-by-semester description of the undergraduate programme defines what courses students must complete to satisfy programme requirements and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

First Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 112</td>
<td>C</td>
<td>Linear Circuit Theory</td>
<td>3-1-3</td>
</tr>
<tr>
<td>ELEC 151</td>
<td>C</td>
<td>Digital Circuits and Systems</td>
<td>3-1-3</td>
</tr>
<tr>
<td>COMP 102</td>
<td>C</td>
<td>Computer Fundamentals and Programming</td>
<td>3-0-2</td>
</tr>
<tr>
<td>LANG 001</td>
<td></td>
<td>Language Skills Enhancement I</td>
<td>0-3-1</td>
</tr>
<tr>
<td>MATH 101</td>
<td>R</td>
<td>Multivariable Calculus</td>
<td>3-1</td>
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16 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 102</td>
<td>R</td>
<td>Electronic Circuits</td>
<td>3-1-3</td>
</tr>
<tr>
<td>ELEC 152</td>
<td>R</td>
<td>Microprocessors and Applications</td>
<td>3-1-6</td>
</tr>
<tr>
<td>COMP 106</td>
<td>C</td>
<td>Programming</td>
<td>1-0-2</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>MATH 151</td>
<td>R</td>
<td>Differential Equations and Applications</td>
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18 credits

Second Year

**Fall Semester**

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<thead>
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<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ELEC 211</td>
<td>R</td>
<td>Signals and Systems</td>
<td>3-1-0</td>
</tr>
<tr>
<td>ELEC 221</td>
<td>R</td>
<td>Semiconductor Materials and Devices</td>
<td>3-1-0</td>
</tr>
<tr>
<td>ELEC 241</td>
<td>R</td>
<td>Electromagnetics and Distributed Circuits</td>
<td>3-1-3</td>
</tr>
<tr>
<td>ENGG/MATH</td>
<td>E</td>
<td>Non-ELEC Engineering or Math Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0</td>
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</table>

16 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 397</td>
<td>R</td>
<td>Final Year Project I</td>
<td>0-0-18</td>
</tr>
<tr>
<td>ELEC</td>
<td>E</td>
<td>Electronic Elective</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ELEC</td>
<td>E</td>
<td>Electronic Elective</td>
<td>3-0-3</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>E</td>
<td>Business and Management Elective</td>
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</table>

18 credits

Third Year

**Fall Semester**

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<th>Credits</th>
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<tbody>
<tr>
<td>ELEC 398</td>
<td>R</td>
<td>Final Year Project II</td>
<td>0-0-18</td>
</tr>
<tr>
<td>ELEC</td>
<td>E</td>
<td>Electronic Elective</td>
<td>3-0-3</td>
</tr>
<tr>
<td>ELEC</td>
<td>E</td>
<td>Electronic Elective</td>
<td>3-0-3</td>
</tr>
<tr>
<td>LANG 103</td>
<td>R</td>
<td>Technical Communication</td>
<td>0-3-0</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>E</td>
<td>Business and Management Elective</td>
<td>3-0-0</td>
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</table>

18 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LANG 103</td>
<td></td>
<td>Technical Communication</td>
<td>0-3-0</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>E</td>
<td>Business and Management Elective</td>
<td>3-0-0</td>
</tr>
</tbody>
</table>

A minimum of 101 credits is required for the BEng programme in Electronic Engineering. A student’s choice of electives may result in this minimum being exceeded.

Postgraduate Programmes and Research

The Department emphasises several research areas according to the projected manpower and technological needs in Hong Kong.
Microelectronics and semiconductor devices are becoming an increasingly important research area in Hong Kong. With the establishment of the Microelectronics Fabrication Centre (MFC), the Department places major emphasis on the area of semiconductor devices and microelectronics, in particular advanced semiconductor materials preparation and characterisation; microwave and high frequency semiconductor devices; custom integrated circuits fabrication technology; integrated sensor technology; and optoelectronic devices and integrated optics. Results from this research programme will spawn novel electronic devices and stimulate the creation of products that are not restricted to the electronics industry.

Rapid advances in computer and communication technologies are bringing these two fields closer. Emerging and evolving technologies, coupled with increasing demands for efficient and timely collection, processing, and dissemination of information, are creating the need for an integrated information and telecommunication system that transmits and processes all types of data. Research projects have been initiated under the sponsorship of the Hong Kong Telecom Institute of Information Technology which is funded by a generous grant from the Hong Kong Telecom Foundation.

The postgraduate programmes of the Department provide advanced training in state-of-the-art analysis and design, and expose students to an environment of active engineering research and development. Graduates of the programmes should be well equipped to meet the challenges of the rapidly developing field of electrical and electronic engineering and to contribute to the economic development needs of Hong Kong and the Asia-Pacific region. These programmes lead to the degrees of Master of Science (MSc), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD) in Electrical and Electronic Engineering. Students may pursue the degrees on a full-time or part-time basis. The normal duration of residence, and the course and thesis requirements for the degrees are described below.

Applicants for admission to the postgraduate programmes are required to have completed, by the time they enter HKUST, a bachelor's degree in electrical engineering, or a related science or engineering field. Students must have demonstrated knowledge in fundamental areas of electrical and electronic engineering as normally provided by an undergraduate programme. Deficiencies can be made up concurrently with postgraduate work. Students must also demonstrate a sufficient command of English.

Applicants are required to submit academic transcripts of undergraduate studies (and beyond, if applicable), three letters of recommendation, a one-page statement of purpose for postgraduate study, and a completed application form for admission. Scores in standard examinations such as the Graduate Record Examination (GRE), if available, are encouraged to be submitted as supplementary information.

Postgraduate Programmes

The Department offers postgraduate programmes leading to the degrees of Master of Science (MSc), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD) in Electrical and Electronic Engineering. In order to efficiently utilise resources, most postgraduate classes are scheduled in the evening on weekdays and on Saturdays. In this manner, both part-time and full-time students receive the same classroom instruction and work together during laboratory sessions.

Master of Science (MSc) in Electrical and Electronic Engineering

The MSc programme is designed for students who wish to strengthen their knowledge of electrical and electronic engineering at an advanced level in order to prepare themselves for more advanced professional practice. It is best suited for students who wish to pursue an industrial career as a senior project engineer in technical design and development.

The period of study is no longer than three years for full-time MSc students, or four years for part-time students.

Specific programme requirements are at least 30 credits, including:

- at most two courses from the School of Business and Management or School of Humanities and Social Science;
- at most two postgraduate courses from the School of Science or School of Engineering (other than the Department);
- a maximum of one 300-level ELEC course; and
- no more than three credits for ELEC 690 Independent Study.

Master of Philosophy (MPhil) in Electrical and Electronic Engineering

The MPhil programme is designed for students who are interested in pursuing a career in research and development in industry or in academia. It is also an excellent preparation for those interested in pursuing a PhD degree.

The period of study is no longer than three years for full-time MPhil students, or five years for part-time students.

Besides completing a small number of postgraduate courses in an approved programme of study, an MPhil student must complete, under the supervision of a research advisor, a research project leading to a master's thesis and pass an oral thesis defence. Specific programme requirements are:

- 15 ELEC course credits excluding ELEC 690 Independent Study;
- a maximum of one 300-level course; and
- research leading to a satisfactory thesis.
Doctor of Philosophy (PhD) in Electrical and Electronic Engineering

The PhD programme is the highest degree offered by the Department of Electrical and Electronic Engineering. It caters for students who wish to pursue a career in advanced industrial research and development, or university research and teaching.

The period of study is no longer than five years for full-time students, or seven years for part-time students, on the basis of entry with only a first degree.

The PhD programme emphasises training in original thinking and independent research. The course of study must be approved by the Department.

To be eligible for the PhD degree, a student must

• complete 15 course-credits of approved ELEC postgraduate courses, excluding ELEC 690 Independent Study. (For students pursuing or have completed an MPhil or MSc programme, their previous postgraduate courses will count towards this requirement. Partial credit may be given to students with other postgraduate qualifications.

• pass a qualifying examination within two years of admission with a first degree only for full-time students or three years for part-time students, or one and two years respectively for those entering with an MPhil or MSc degree; and

• undertake research leading to a satisfactory doctoral thesis and defence.

Faculty Profiles

Professor Peter W.P. CHEUNG, Head of Department

Analogue integrated circuits design; microelectronics; microsensors; biosensors; medical electronics and medical instrumentation; microprocessor-based instruments design; optoelectronics.

Professor Donald A. GEORGE, Associate Pro-Vice-Chancellor for Academic Affairs

Communications and control; signal and information processing systems and communications; analysis of nonlinear systems; engineering education.

Professor Ping KO

Semiconductor devices, silicon-on-insulator technology, microelectronics and microsensors.

Professor Hoi S. KWOK

Application of lasers to thin film deposition; fabrication of thin film opto-electronic devices with applications to optical signal processing and display technology.

Professor Ming L. LIOU

Low bit-rate video, image compression techniques, advanced television, packet video, VLSI architecture, and implementation of signal processing systems for visual applications.

Professor Ruey-Wen LIU

Network system theory, artificial neural networks; algebraic theory of control system design; computer-aided design; signal and image processing; blind signal processing; and multichannel system identification.

Dr Philip Ching-Ho CHAN, Reader

Electronic design automation; VLSI devices, circuits and systems; CAD/CAE/CAM technologies; microelectronics.

Dr Justin C. CHUANG, Reader

Wireless communication and networking.

Dr Zexiang Li, Senior Lecturer

Robotics and control; holonomic and nonholonomic motion planning, mechanism design, robust and H∞ control, adaptive control. CAD/CAM for control systems.

Dr Tai-Chin LO, Senior Lecturer

Integrated circuit technology; electronic materials; microwave bipolar transistors and integrated circuits; semiconductor device modelling for circuit simulation.

Dr Oscar C. AU, Lecturer

Image processing, digital signal processing, coding theory, communications, detection and estimation.
Dr Aaron BUCKWALD, Lecturer

Design of high-speed analog integrated circuits for fiber optic communication systems; design of precision analog integrated circuits for signal processing, signal conditioning, and data conversion.

Dr Kwan-Fai CHEUNG, Lecturer

Digital signal processing algorithms; artificial neural networks and applications; fuzzy set theory and applications; digital image processing; optical information processing.

Dr Ho-Chi HUANG, Lecturer

Semiconductor devices; optical probing for VLSI testing; opto-electronics; integrated guided-wave optics; optically based instruments.

Dr Tsz-Mei KO, Lecturer

Communication system, information processing, coding theory, VLSI design and computer networks.

Dr Ross David MURCH, Lecturer

Electromagnetics, inverse scattering, imaging, and image/signal processing.

Dr Cuong T. NGUYEN, Lecturer

High-performance bipolar and MOS devices, characterisation and modelling of chemo-mechanical polishing for VLSI and microsensors.

Dr Vincent Ming Cheong POON, Lecturer

Microelectronic device physics and technology; ULSI design and fabrication; optoelectronics, opto-computing and integrated optics; advanced semiconductor materials.

Dr Johnny K.O. SIN, Lecturer

Power integrated circuits and devices; semiconductor devices and fabrication technology; modelling and characterisation of semiconductor devices.
DEPARTMENT OF INDUSTRIAL ENGINEERING

Industrial engineering is a broad-based discipline which is built upon a collection of methodological tools for problem-solving in engineering and manufacturing management, with productivity improvement as the overall objective. Unique among the engineering disciplines, industrial engineering is primarily concerned with translating designs into economic products, rather than with the fundamental design of the products themselves.

Modern industrial engineering encompasses a wide spectrum of sub-specialties, from the "people-oriented" human-factor engineering to the "high-tech sounding" computer-integrated manufacturing (CIM). Other examples are manufacturing strategy, facility and environment engineering, quality assurance, and manufacturing processes. Industrial engineers work in diverse industries and environments under a wide variety of job titles.

The Department of Industrial Engineering at HKUST will offer four degrees: Bachelor of Engineering (BEng), Master of Science (MSc), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD).

Faculty:
Head of Department: To be filled

Lecturers:
Richard LINN, BEng Pennsylvania State, MEng Virginia Polytech and State Univ, PhD Pennsylvania State
Liming LIU, BEng, MEng HUST, PhD Toronto

Undergraduate Programme

At the undergraduate level, a three-year curriculum is being designed to provide students with a broad and balanced knowledge base in the areas of mathematics, physics, humanities, social science, basic engineering, computer applications, and business administration. In order that theory and practice are combined, workshops and industrial training are required. All students take courses offered by the School of Business and Management.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in either (1) two AL subjects (Physics and Pure Mathematics) and two AS subjects (Biology, Chemistry, Design and Technology, Applied Mathematics, Computer Applications, or Mathematics and Statistics) or (2) three AL subjects (Physics, Pure Mathematics, and one of Applied Mathematics, Biology, or Chemistry).

The following semester-by-semester description of the undergraduate programme defines what courses students must complete to satisfy programme requirements and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

The second- and third-year programmes are provisional and subject to the approval of the Senate.

First Year

Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Type</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDE 101</td>
<td>R</td>
<td>Introduction to Industrial Engineering</td>
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<td>Language Skills Enhancement</td>
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<td>MATH 101</td>
<td>R</td>
<td>Multivariable Calculus</td>
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<td>MATH 111</td>
<td>R</td>
<td>Linear Algebra</td>
<td>[3-1-0:4]</td>
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<td>MECH 102</td>
<td>R</td>
<td>Statics and Dynamics</td>
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Spring Semester

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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>INDE 110</td>
<td>R</td>
<td>Computing in Industrial Applications</td>
<td>[3-1-1:3]</td>
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<tr>
<td>COMP 171</td>
<td>R</td>
<td>Data Structure and Algorithms</td>
<td>[3-0-1:3]</td>
</tr>
<tr>
<td>ELEC 101</td>
<td>C</td>
<td>Basic Electronics</td>
<td>[3-1-3:4]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>MECH 152</td>
<td>R</td>
<td>Design and Communication</td>
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<td>MECH 182</td>
<td>C</td>
<td>Experimental Methods</td>
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Second Year

Fall Semester

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<tbody>
<tr>
<td>INDE 210</td>
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<td>Operations Research I</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td>INDE 213</td>
<td></td>
<td>Applied Ergonomics</td>
<td>[2-0-3:3]</td>
</tr>
<tr>
<td>INDE 215</td>
<td></td>
<td>Manufacturing Processes I</td>
<td>[2-1-0:2]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td></td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>MATH 244</td>
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<td>Applied Statistics</td>
<td>[3-1-0:4]</td>
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<td>MECH 241</td>
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<td>Materials Technology I</td>
<td>[3-1-0:3]</td>
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Spring Semester

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<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>INDE 220</td>
<td>Industrial Organisation and Management</td>
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<tr>
<td>INDE 223</td>
<td>Engineering Economy</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>INDE 225</td>
<td>Industrial Control Systems</td>
<td>[3-1-1-3]</td>
</tr>
<tr>
<td>INDE 227</td>
<td>Quality Engineering</td>
<td>[3-1-0-3]</td>
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<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0-3]</td>
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<tr>
<td>SCIE</td>
<td>Science Elective</td>
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18 credits

Fall Semester

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<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDE 310</td>
<td>Integrated Production Systems I</td>
<td>[3-0-1-3]</td>
</tr>
<tr>
<td>INDE 313</td>
<td>System Simulation</td>
<td>[3-2-0-3]</td>
</tr>
<tr>
<td>INDE 315</td>
<td>Manufacturing Processes II</td>
<td>[3-0-1-3]</td>
</tr>
<tr>
<td>INDE</td>
<td>Industrial Engineering Elective</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0-3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0-3]</td>
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18 credits

Third Year

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>INDE 320</td>
<td>Integrated Production Systems II</td>
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</tr>
<tr>
<td>INDE 398</td>
<td>Project</td>
<td>[0-0-0-3]</td>
</tr>
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<td>INDE</td>
<td>Industrial Engineering Elective</td>
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<td>Industrial Engineering Elective</td>
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<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>[3-0-0-3]</td>
</tr>
</tbody>
</table>

15 credits

(1) Students may be exempted from this course by the Language Centre.

A minimum of 103 credits is required for the BEng programme in Industrial Engineering. A student's choice of electives may result in this minimum being exceeded.

Postgraduate Programmes

Master of Science (MSc) in Industrial Engineering

The MSc programme prepares students to master advanced tools for Industrial Engineering practice in order to become professional engineers or industrial managers.

Master of Philosophy (MPhil) in Industrial Engineering

The MPhil programme is designed for students who are interested in pursuing a career in research and development in industry or in academia, and is also an excellent preparation for those interested in pursuing a PhD degree. Students are required to complete 15 credits of postgraduate course work and, in addition, a research project leading to a thesis. The MPhil degree normally takes one and a half years, but the time required depends on the student's undergraduate background.

Doctor of Philosophy (PhD) in Industrial Engineering

The PhD programme caters for students who wish to pursue a career in advanced industrial research and development, or university research and teaching. It emphasizes training in original thinking and independent research. There is a minimum requirement of 15 credits of postgraduate courses which should cover a specialised area in industrial engineering and two minor areas. In addition to courses, a PhD student must pass a qualifying examination within two years of admission for full-time students, or three years for part-time students, as well as a general examination, and complete a research project leading to the writing and successful defence of a thesis.

Faculty Research Interests

Dr Richard LINN, Lecturer

CAD/CAM, process planning, and manufacturing system control. Production control and material handling.

Dr Liming LIU, Lecturer

Queueing theory and its application in manufacturing, telecommunication, and other industrial and service systems. Production and inventory control models. Reliability and quality control.
Research students of the Department of Physics are making optical alignments in preparation for an experiment using ultrafast high-power pulses from a wavelength tunable Ti:Sapphire laser system in the Joyce M. Kuok Laser Physics and Photonics Laboratory. This Laboratory has several state-of-the-art laser systems for conducting cutting-edge research on fundamental laser physics and advanced photonic devices.
DEPARTMENT OF MECHANICAL ENGINEERING

The mission of the University is to train students who can actively contribute to the industrial and economic progress of Hong Kong and its region, and conduct research and development which are relevant to this progress. The objective of the Department is to help accomplish this mission by providing society with competent mechanical engineers and to become one of the world's leading mechanical engineering departments. The Department is recruiting high quality faculty and students, developing innovative and efficient teaching methods, carrying out relevant research and development, and building close ties with industry. It provides quality education to both undergraduate and postgraduate students and contributes to society, industry, and the knowledge base of engineering practice.

Departmental programmes aim to train students to deal with the technological issues of mechanical systems and advance the state of knowledge in the profession. The purpose is to prepare them to become productive and contributing members of their profession and future leaders of society, industry and academia. Four degree programmes in mechanical engineering are offered: Bachelor of Engineering (BEng), Master of Science (MSc), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD). The BEng in Mechanical Engineering prepares students to enter professional practice or continue study in a technical or management field after graduation.

Faculty

Head of Department: To be filled

Professors:
- Jay-Chung CHEN, BS Cheng Kung; MS, PhD California Inst of Tech (Director of Research Centre)
- Yiu-Wing MAI, PhD Hong Kong
- Gareth THOMAS, BS Univ of Wales, Cardiff; PhD, ScD Cambridge (Director of Technology Transfer Centre)
- Pin TONG, BS National Taiwan; MS, PhD California Inst of Tech

Senior Lecturers:
- Chin-Tsau HSU, BS, MS National Taiwan; MS, PhD Stanford
- See-Chun KOT, BS Univ of Illinois, Urbana-Champaign; MEng, PhD Cornell
- Matthew Ming-Fai YUEN, BSc Hong Kong; PhD Bristol

Lecturers:
- Chih-Chen CHANG, BS National Taiwan; MS, PhD Purdue
- Yang LENG, BS Chongqing; MS Michigan Tech; PhD Virginia
- Wai Ming TO, BSc Glasgow; PhD London
- Tong-Yi ZHANG, MS, PhD Univ of Science & Tech, Beijing
- Yiftshak ZOHAR, BS, MS Technion-Israel Inst of Tech; PhD Univ of Southern California

Undergraduate programme

The purpose of undergraduate education in the Department is to equip students with a capability for self-learning and to produce broadly educated persons with a basic knowledge of engineering and sufficient specific skills. This allows students to start their career in engineering or professional services, or to carry on postgraduate study.

Traditionally, mechanical engineers apply their knowledge of materials behaviour and the principles of dynamics, mechanics, control, heat and mass transport, thermodynamics, system analysis, and experimental methods to the design, analysis, manufacture, and operation of mechanical systems. Modern mechanical engineers face many more challenges: designing for manufactureability, quality control, and engineering for high quality products at low cost. Electronics, optics, and computers have become an integral part of mechanical systems. There is also a variety of sophisticated tools for computer aided design and analysis. Practising engineers today are expected to effectively utilise these tools. Because of the importance of balancing social needs, economic costs and benefits, and environmental concerns in all engineering decisions, engineers must also be trained in the humanities, social sciences and management.

Engineering in Hong Kong and the region faces some particular challenges. Most companies in this region are small, highly flexible and adapt quickly to ever changing market demand. Students must be equipped with both a broad background and relevant experience in order to be quickly effective after graduation. The Department promotes self-learning by designing the curriculum to train students to think on their own, a skill which is becoming increasingly important with rapid technological changes. One way to accomplish this is to have students involved in design and, therefore, we introduce design as the first course in the curriculum and follow through to the final year design project to further strengthen students' design and synthesis capabilities.

The undergraduate programme is structured in three stages. The first concentrates on the fundamentals of mechanical engineering in solid mechanics, dynamics, fluid mechanics, thermal sciences, manufacturing, material processing, and design. It also provides students with the basic knowledge of modern electronics and computers. The second stage integrates engineering sciences with laboratory work and exposes students to state-of-the-art tools and equipment. The third stage comprises of electives that provide students with sufficient depth in one or more areas of specialisation and with research opportunities. Integration and synthesis are emphasised throughout all three stages.

For admission, in addition to the general entrance requirements of the University, acceptable grades are required in either (1) two AL subjects (Physics and Pure Mathematics) and one AS subject (one of Applied Mathematics, Computer Applications,
Mathematics and Statistics, Biology, Chemistry, or Design and Technology) or (2) three AL subjects (Physics, Pure Mathematics, and one of Applied Mathematics, Biology, or Chemistry).

The following semester-by-semester description of the undergraduate programme defines what courses students must complete to satisfy programme requirements and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), elective (E) courses can be found on page 29.

The third-year programme is provisional.

First Year

Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Type</th>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>MECH 102</td>
<td>R</td>
<td></td>
<td>Statics and Dynamics</td>
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<tr>
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<td>E</td>
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</tr>
<tr>
<td>LANG 001</td>
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<td>R</td>
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<td>Multivariate Calculus</td>
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<tr>
<td>MATH 151</td>
<td>R</td>
<td></td>
<td>Differential Equations and Applications</td>
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18 credits

Spring Semester

<table>
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<th>Type</th>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
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<td>Mechanics of Solids</td>
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<tr>
<td>MECH 121</td>
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<td>Fluid Mechanics I</td>
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<tr>
<td>MECH 131</td>
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<td>Thermodynamics</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td>MECH 152</td>
<td>R</td>
<td></td>
<td>Design and Communication</td>
<td>[2-0-0:2]</td>
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<tr>
<td>MECH 182</td>
<td>C</td>
<td></td>
<td>Experimental Methods</td>
<td>[1-2-4:3]</td>
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<td>ELEC 101</td>
<td>C</td>
<td></td>
<td>Basic Electronics</td>
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18 credits

Second Year

Fall Semester

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<thead>
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<tbody>
<tr>
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<td></td>
<td>Materials Technology I</td>
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<tr>
<td>MECH 252</td>
<td>R</td>
<td></td>
<td>Elements of Mechanical Design</td>
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<td>MECH 262</td>
<td>R</td>
<td></td>
<td>System Dynamics</td>
<td>[3-1-0:3]</td>
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<tr>
<td>MECH 283</td>
<td>R</td>
<td></td>
<td>Laboratory I (Thermofluid Experiments)</td>
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<tr>
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<td>E</td>
<td></td>
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<tr>
<td>H&amp;SS</td>
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18 credits

Spring Semester

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<th>Credits</th>
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<tr>
<td>MECH</td>
<td>R</td>
<td></td>
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<td>[3-0-0:3]</td>
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<tr>
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<tr>
<td>SB&amp;M</td>
<td>C</td>
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16 credits

Third Year

Fall Semester

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<td>Project Laboratory</td>
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<td>MECH</td>
<td>R</td>
<td></td>
<td>Mechanical Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>MECH</td>
<td>R</td>
<td></td>
<td>Mechanical Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>R</td>
<td></td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>R</td>
<td></td>
<td>Business and Management Elective</td>
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15 credits

Spring Semester

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<th>Course</th>
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<tbody>
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<td>[3-0-0:3]</td>
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<tr>
<td>FREE</td>
<td>C</td>
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<td>Free Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>H&amp;SS</td>
<td>C</td>
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<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>C</td>
<td></td>
<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
</tr>
</tbody>
</table>

16 credits

(1) Students may be exempted from this course by the Language Centre.

A minimum of 101 credits is required for the BEng programme in Mechanical Engineering. A student's choice of electives may result in this minimum being exceeded.

Postgraduate Programmes and Research

The Department offers postgraduate programmes leading to the degrees of Master of Science (MSc), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD) in Mechanical Engineering. The programmes aim at equipping students with the necessary skills and knowledge to meet the challenges of Hong Kong's present and future development needs.
Master's programmes focus on strengthening the students' background in mechanical engineering, increasing their mathematical proficiency, and exposing them to the environment of engineering research and development. The PhD programme aims at imbuing students with depth in mechanical engineering and the capability of formulating and conducting independent and original research and development in their chosen field.

Applicants for admission to the postgraduate programmes normally should have completed a bachelor's degree in engineering or a related field. Qualified students may be admitted directly to the PhD programme. Students must demonstrate a sufficient command of English in addition to having basic knowledge in mechanics, dynamics, thermodynamics, materials, electronics and circuits, and design.

All students are required to complete at least one postgraduate course in each of solid mechanics, fluid mechanics, and mathematics.

**Master of Science (MSc) in Mechanical Engineering**

The MSc programme is for students who intend to pursue further studies or advanced work in industry. The programme normally requires one and a half years of full-time studies. The student is required to complete 30 credits of approved course work. Up to nine of the credits may be a design project under the supervision of an advisor from either the University or industry.

**Master of Philosophy (MPhil) in Mechanical Engineering**

The MPhil programme differs from the MSc programme in that students are required to complete only 12 credits of postgraduate course work. In addition, students must complete a thesis to demonstrate competence in engineering research. If the student participates in an industrial project and writes the thesis on a work-related topic, the work will be supervised jointly by a faculty member of the Department and a representative from the participating company. The MPhil degree normally takes one and a half years.

**Doctor of Philosophy (PhD) in Mechanical Engineering**

The PhD degree is awarded upon the successful completion of an advanced study programme which includes a minimum of 24 credits of postgraduate subjects, 16 in the student's major, eight in a minor field, and a thesis of significant original research. Students entering with a master's degree in engineering may be granted a partial waiver of credits towards fulfilling the PhD requirements.

The doctoral programme usually takes a minimum of three years of full-time studies beyond the bachelor's degree, or a minimum of two years beyond the master's degree.

After a student enters the PhD programme, a doctoral committee will be established to supervise the programme of study and thesis. To become a doctoral candidate, the student must pass a qualifying examination no later than the end of the fourth semester of postgraduate study at HKUST. The qualifying examination consists of an oral and/or a written part. The oral/written examination, which covers the undergraduate and first-year postgraduate materials, evaluates the student's preparation for postgraduate study in mechanical engineering. The examination is normally taken in the third semester of postgraduate study.

Another oral examination is given by the doctoral committee after the student passes the qualifying examination. The purpose of this oral examination is to establish the student's ability to formulate and conduct original research in the chosen discipline.

Upon completion of the postgraduate study programme and the thesis, the candidate is required to defend the thesis before a thesis examination committee.

**Research Activities**

Hong Kong's industry is in transition and the Department is responding by supporting technology transfer and developing new technologies in the areas of manufacturing, energy, transportation, environment, and health care. The research also makes contributions to the fundamental knowledge, engineering practice, and technology.

The main thrust of the Department's research is in manufacturing and design, supported by disciplinary research in materials, solid mechanics and thermo-fluid mechanics. Research is conducted in several functional areas, particularly: manufacturing, materials, and design; energy and environment; and micro-mechanical systems. The first two are well-established in the Department while the third is an emerging research area.

Efforts in manufacturing processes place emphasis on flexibility and an integrated approach to design for manufacturability, inspection, maintenance, and repair. Robotics and control research will emphasise applications in the existing factory environment such as designing automated workcells to manufacture families of products.

Since the management of energy and resources is important in the transition of Hong Kong's industry from low-technology to high-technology, and a successful transition can not be achieved without assessment of the environment impact of energy utilisation and manufacturing process, departmental research objective seeks to improve energy efficiency, minimise the consumption of natural resources, and abate the discharge of pollutants. In particular, industrial development in the Pearl River Delta region poses a serious environmental threat. Industrial wastes are discharged into the estuary where the transport, dispersion and sedimentation processes of toxic waste depend on tides, current and waves. The Department has now undertaken research in sediment transport both theoretically and experimentally, and is actively participating in the development of the proposed Institute of Environmental Science and will play the key role in the study of atmospheric dispersion, noise, and air and water pollution.
With the support of China Light and Power, the Department will build an environmental wind-waves channel to serve as the main facility for studying the wave dynamics, air-sea interaction, current generation, wind engineering and atmospheric dispersion in order to improve the management of the air, coastal and ocean environment, including typhoon conditions. The combination of intense development and unusually high wind loading makes Hong Kong one of the most challenging locations for applications at structural dynamics.

Micro-mechanical systems is an area of special interest to the Department, which will initially concentrate on the applications of micro-mechanical technology, primarily microsensors, and the fundamentals of micro-mechanics.

The field of computational mechanics has steadily grown into one of the most important engineering disciplines and the Department will further develop its currently strong research group.

Faculty Research Interests

Professor Jay-Chung CHEN, Director of Research Centre

Structural dynamics, including the development of analytical and experimental methods, test-analysis correlation criteria, dynamic test of complex structural systems, structural system identification, damage assessment and structure-control interaction.

Professor Yiu-Wing MAI

Mechanical behaviour of materials; fracture mechanics and composite technology.

Professor Gareth THOMAS, Director of Technology Transfer Centre

Materials science engineering, relationships of microstructure and properties in materials and electron microscopy.

Professor Pin TONG

Solid mechanics, fracture, finite element methods, structural integrity, micromechanics, and computational mechanics.

Dr Chin-Tsau HSU, Senior Lecturer

Heat and mass transfer in porous medium; microelectronic cooling; ocean wave dynamics; air-sea interaction.

Dr See-Chun KOT, Senior Lecturer

Computational and environmental fluid mechanics, field studies; physical and computer modelling of atmospheric dispersion in urban areas.

Dr Matthew Ming-Fai YUEN, Senior Lecturer

Design theory, computer-aided design and manufacturing, intelligent CAD/CAM systems, numerical control of machine tools, novel manufacturing processes, vibration control.

Dr Chih-Chen CHANG, Lecturer

Structural dynamics.

Dr Yang LENG, Lecturer

Mechanical behaviour/microstructure relationships; metal matrix and polymer composites; advanced alloys; fracture and fatigue at elevated temperature; novel processing of new materials.

Dr Wai Ming TO, Lecturer

Experimental modal analysis, sensitivity analysis of mechanical structures, model updating and vibro-acoustic study.

Dr Tong-Yi ZHANG, Lecturer

Materials.

Dr Yitshak ZOHAR, Lecturer

Fluid mechanics of micromachines; microsensors; turbulent shear flows; boundary layers; unsteady aerodynamics; flow control.
School of Engineering

Mr John C. WELCH, Visiting Scholar
CAD/CAM.

Dr Pu CHEN, Research Associate
Engineering application of computational mechanics; structural dynamics; parallel computing.

Dr Guangyu SHI, Research Associate
Computational mechanics; elasto-plastic nonlinear analysis of structures; refined plate and shell theory; continuum damage mechanics; composite materials.

School of Business and Management

Dean: Yuk-Shee CHAN, BBA Chinese Univ of Hong Kong; MA, MBA, PhD Univ of California, Berkeley (Professor of Finance)

Associate Dean: Leonard Kwok-Hon CHENG, BSSc Chinese Univ of Hong Kong; MA, PhD Univ of California, Berkeley (Reader of Economics)

The School of Business and Management comprises six departments: Accounting, Business Information Systems, Economics, Finance, Management, and Marketing. When fully established, the School will enrol about 35% of the University’s undergraduate students and approximately 31% of its postgraduate students. All departments offer undergraduate as well as postgraduate programmes through to the doctorate.

In keeping with the University’s general philosophy of providing specialised training with a generalist outlook, undergraduates take over one-third of their programme outside their major discipline, including at least 12 credits in the School of Humanities and Social Science.

All students are registered in one of the departments although there are no first-degree “majors” in the traditional sense. Rather every student, building on a strong broad-based foundation, chooses an area of concentration in which particular skills are acquired. Thus, graduates are able to enter the job market while retaining sufficient flexibility and adaptability for future career growth.

Strong emphasis is placed on scientific and analytical methods as the fundamental pedagogical approach, supplemented by the use of case studies appropriate to Hong Kong and its region. The School takes full advantage of the University’s state-of-the-art technological capabilities in its instruction and research.

International Co-operation

A close partnership has emerged between the School of Business and Management and the Anderson Graduate School of Management of the University of California, Los Angeles (UCLA). Senior academic administrators and staff from UCLA are seconded to the School to advise on curricular matters, offer joint executive education programmes, recruit, teach and conduct research. In return, the School provides a dynamic homebase for UCLA in the Asia-Pacific region. Joint appointments and long-term exchanges and collaborations are being instituted.

In addition to the partnership with UCLA, co-operation is being established with universities in the United States, Canada and the United Kingdom. Some of the student exchange programmes already established for MBA students include: UCLA, UC Irvine, University of Washington, University of Southern California, University of Maryland, University of Florida, University of British Columbia and University of Toronto.
The School of Business and Management is thus very international in all its teaching, research, and service functions. It is mandated to become a leading business school in Asia within the University's first decade.

**FACULTY**

**DEPARTMENT OF ACCOUNTING**

Professor and Head of Department:
Chi-Wen Jevons LEE, BBA, MA National Taiwan; MA, PhD Rochester

Visiting Professors:
David K. EITEMAN, BBA Univ of Michigan, Ann Arbor; MA Univ of California, Berkeley; PhD Northwestern

Reader:
Danny S. N. WONG, BS California State Univ, Fresno; MS, PhD Pennsylvania State

Lecturers:
Yew Ming CHIA, MS Southampton; PhD Griffith
Won W. CHOI, BA Yonsei; MBA Univ of Michigan, Ann Arbor; PhD Columbia
Alice P.L. CHUI, BA Liverpool; MA, PhD Manchester
Howard J. GENSLER, BA Univ of California, Irvine; MPP, JD Univ of California, Berkeley; MA, PhD Univ of California, Irvine
Berry F.C. HSU, BS, LLM Alberta; MA Oregon; PhD London
WooD Y WU, BE South China Inst of Tech; MBA Concordia; MS, PhD New York
Bing Xiang, BE Xian Jiaotong; PhD Alberta
Guochang ZHANG, BE Shanghai Jiaotong; MS, PhD British Columbia

Assistant Lecturer:
Hong-leung LAM, BFinAdmin New England; MBA Chicago
(Joint teaching duties in Department of Finance)

**DEPARTMENT OF BUSINESS INFORMATION SYSTEMS**

Head of Department: To be filled

Senior Lecturers:
Tung X. BUI, PhD Univ of Fribourg; PhD New York Univ
Kar Yan TAM, BS Univ of Illinois, Urbana-Champaign; MS, PhD Purdue
(Deputy Head)

Lecturers:
Grace AU, BSc, MSc, PhD London
Patrick Y.K. CHAU, BScSc Chinese Univ of Hong Kong; MBA Edinburgh; PhD Western Ontario
Kunihiko HIGA, BS(Hons), PhD Arizona

**School of Business and Management**

Sunro LEE, BA Yonsei; MA Central Michigan; MS Texas A&M; PhD Rensselaer Polytech Inst

Ben A. PETRAZZINI, BA National Univ of Cordoba; MA Catholic Univ of Argentina; MA, PhD Univ of California, San Diego

Roy C. SCHMIDT, BA, BS Maryland; MBA St Mary's; PhD Indiana

Visiting Lecturer:
Brenda MAK, BBA Chinese Univ of Hong Kong; MBA Carnegie-Mellon; MS, PhD Northwestern

Visiting Scholar:
Kalle LYYTINEN, MBA, EconLic, PhD Jyvaskyla

**DEPARTMENT OF ECONOMICS**

Head of Department: To be filled

Visiting Professor:
Isaac EHLRIC, BA Hebrew; PhD Columbia

Adjunct Professor:
Gregory CHOW, PhD Chicago

Reader:
Leonard Kwok-Hon CHENG, BSSc Chinese Univ of Hong Kong; MA, PhD Univ of California, Berkeley
(Associate Dean of Business & Management)

Visiting Reader:
Ivan P. PNG, BA Cambridge; PhD Stanford

Senior Lecturer:
Francis T. LUI, BA Chicago; PhD Minnesota

Lecturers:
Louis M. CHAN, BA Brown; PhD Chicago
Son Ku KIM, BA Seoul National; MA, PhD Univ of Calif, Los Angeles
Yungsan KIM, PhD Univ of California, Los Angeles
Yum Keung KWAN, BA Chinese Univ of Hong Kong; PhD Minnesota
Joseph Y. LIN, BA, PhD Minnesota
Zhiqiang LIU, BS Tianjin; MBA, PhD State Univ of New York, Buffalo
Larry Dongxia OUI, BSc Zhongshan; MA, PhD British Columbia
Zhihang TAO, BS Fudan; PhD Princeton
Grant Allan TAYLOR, BA Macquarie; MA, PhD Southern California
Philip A. TROSTEL, BA Univ of Texas, Arlington; MSci, PhD Texas A&M
Susheng WANG, BSc, MSc Nankai; PhD Toronto
Changqi WU, BA Shandong; MBA, Dr Teogepaste Econ Wetensch Katholieke Univ, Leuven
DEPARTMENT OF FINANCE

Head of Department: To be filled

Professors:
- Yuk-Shee CHAN, BBA Chinese Univ of Hong Kong; MA, MBA, PhD Univ of California, Berkeley
  (Dean of Business & Management)
- Nai-fu CHEN, AB, PhD Univ of California, Berkeley; PhD Univ of California, Los Angeles
- Sheridan TITMAN, BS Colorado; MS; PhD Carnegie-Mellon
- K.C. CHAN, BA Wesleyan; MBA, PhD Chicago
- Eric C. CHANG, BS National Cheng Kung; MBA Wright State; PhD Purdue
  (Deputy Head)

Senior Lecturer:
- John K.C. WEI, BS National Taiwan Inst of Tech; MBA National Chengchi; PhD Univ of Illinois, Urbana-Champaign

Readers:
- Anthony T. CHAN, BE National Univ of Singapore; MBA, MSc, PhD Univ of Michigan, Ann Arbor
- Ki-Ling CHEUNG, BSc Univ of Wisconsin, Madison; MSc PhD Stanford
- Harsh GURNANI, BTechIIT New Delhi; MS, PhD Carnegie-Mellon
- Peter J. HWANG, BS Fu-Jen Catholic; MBA National Chengchi; PhD Michigan State
- Inchi HU, BS National Taiwan; MS National Tsing-Hua; PhD Stanford
- Chun HUI, BA Greenville Colf; MA, PhD Indiana
- Siming HUANG, BS Univ of Science & Tech of China; MS Academia Sinica; PhD Iowa
- Shing Keung LAW, BA, MPhil Hong Kong; MS Stanford; PhD Carnegie-Mellon
- Dorothy S.C. WONG, BA Chinese Univ of Hong Kong; MPhil, DPhil Oxford

Lecturers:
- Anthony T. CHAN, BE National Univ of Singapore; MBA, MSc, PhD of Michigan, Ann Arbor
- Ki-Ling CHEUNG, BSc Univ of Wisconsin, Madison; MSc PhD Stanford
- Harsh GURNANI, BTechIIT New Delhi; MS, PhD Carnegie-Mellon
- Peter J. HWANG, BS Fu-Jen Catholic; MBA National Chengchi; PhD Michigan State
- Inchi HU, BS National Taiwan; MS National Tsing-Hua; PhD Stanford
- Chun HUI, BA Greenville Colf; MA, PhD Indiana
- Siming HUANG, BS Univ of Science & Tech of China; MS Academia Sinica; PhD Iowa
- Shing Keung LAW, BA, MPhil Hong Kong; MS Stanford; PhD Carnegie-Mellon
- Dorothy S.C. WONG, BA Chinese Univ of Hong Kong; MPhil, DPhil Oxford

Visiting Scholar:
- Stephen A. LINSTEAD, BA Keele; MA Leeds; MSc, PhD C.N.A.A./Sheffield City Polytech
DEPARTMENT OF MARKETING

Head of Department: To be filled

Senior Lecturer:
David Kwai-Che TSE, BBA Chinese Univ of Hong Kong; MBA, PhD Univ of California, Berkeley

Visiting Senior Lecturer:
Bernd H. SCHMITT, Diplom Heidelberg; PhD Cornell

Lecturers:
Jin Kyung HAN, AB Brown; MPhil, PhD Columbia
Sangman HAN, BA Seoul National; MBA, MSc Stanford; PhD Columbia
Namwoon KIM, BA Yonsei; MS Korea Advanced Inst of Sci and Tech; PhD Univ of Texas, Austin
Robert E. KRIDER, BSc, MSc British Columbia; MBA Calgary; PhD British Columbia
Seshan RAMASWAMI, BSc Bombay; PGDM Indian Inst of Management, Ahmedabad; PhD Florida

Visiting Scholar:
Philip M. PARKER, BSc California Polytechnic State Univ; DEA Univ d'Aix-Marseille; MA, PhD Pennsylvania

UNDERGRADUATE PROGRAMMES

All undergraduate students in the School of Business and Management are required to complete a common core of foundation subjects in the School. These subjects include financial accounting, managerial accounting, microeconomics, business statistics, introduction to information systems, macroeconomics, financial management, organisational behaviour and marketing management. In addition, students will select a programme with the guidance and approval of academic advisors in one of the following areas of concentration: accounting, business information systems, economics, finance, management, or marketing.

For admission, students must satisfy the general entrance requirements of the University. Applicants may be requested to attend personal interviews and/or take additional tests to be administered by the University. Interviews are designed for the purpose of providing further assessment of the applicant's motivation, aptitude and overall suitability for the chosen field of study.

The following semester-by-semester description of the undergraduate programme defines what students must complete to satisfy programme requirements, and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.

DEPARTMENT OF ACCOUNTING

As a basic quantitative skill, accounting is fundamental to all business undertakings and has applications in many areas of business and management. Courses offered by the Department focus on concepts and theories, providing students with a solid basis on which they can adapt to changing techniques and practices when they enter the professional world. The quality and coverage of the accounting curriculum should enable students to be exempted from a number of papers in the Joint Examination Scheme of the Hong Kong Society of Accountants and the Chartered Association of Certified Accountants. Students should also be well prepared to pass the remaining papers.

The Department of Accounting offers a BBA in Accounting. Students will have a choice of either following a Managerial Accounting or Financial Accounting Stream. The suggested courses required of each stream are presented below.

Managerial Accounting Stream

Fall Semester

First Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
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<td>ACCT 101</td>
<td>Financial Accounting</td>
<td>[3-1-0:3]</td>
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<tr>
<td>ACCT 122</td>
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<tr>
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<td>OR MATH 005</td>
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Spring Semester

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<td>ECON 112</td>
<td>Macroeconomics</td>
<td>[3-1-0:4]</td>
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<td>FINA 111</td>
<td>Financial Management</td>
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<tr>
<td>OR MATH 006</td>
<td>Algebra and Calculus II</td>
<td>[3-1-0:4]</td>
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<td><strong>Spring Semester</strong></td>
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<tr>
<td><strong>Third Year</strong></td>
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<tr>
<td><strong>Fall Semester</strong></td>
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<tr>
<td>ENGG  E  Engineering Elective  [3-0-0-3]</td>
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<td>SB&amp;M  E  Business and Management Elective  [3-0-0-3]</td>
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</table>

(3) Students entering with an acceptable grade in AL Pure Mathematics will replace MATH 001 with either MATH 101 or 111. Students entering with HKCEE Mathematics only or did not score an acceptable grade in Additional Mathematics in HKCEE will take MATH 005.

(4) Students who have taken MATH 101 or 111 in the Fall Semester will replace MATH 002 with an approved Science elective. Those who have taken MATH 005 in the Fall Semester will take MATH 006.

A minimum of 100 credits is required for the BBA programme in Accounting – Managerial Accounting Stream. A student's choice of electives may result in this minimum being exceeded.

**Financial Accounting Stream**

<table>
<thead>
<tr>
<th>School of Business and Management</th>
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</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
</tr>
<tr>
<td><strong>Fall Semester</strong></td>
</tr>
<tr>
<td>ACCT 101  C  Financial Accounting  [3-1-0-3]</td>
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<tr>
<td>ACCT 122  C  Managerial Accounting  [3-1-0-3]</td>
</tr>
<tr>
<td>(1) ECON 111  C  Microeconomics  [3-1-0-4]</td>
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<tr>
<td>(2) LANG 001  Language Skills Enhancement I  [0-3-1-0]</td>
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<tr>
<td>(3) MATH 001  R  Beginning Calculus  [3-1-0-4]</td>
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<tr>
<td>OR MATH 005  R  Algebra and Calculus I  [3-1-0-4]</td>
</tr>
<tr>
<td>MGMT 111  C  Business Statistics  [3-1-0-4]</td>
</tr>
<tr>
<td><strong>Spring Semester</strong></td>
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<tr>
<td>BINF 101  C  Introduction to Information Systems  [3-1-0-4]</td>
</tr>
<tr>
<td>ECON 112  C  Macroeconomics  [3-1-0-4]</td>
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<tr>
<td>FINA 111  C  Financial Management  [4-0-0-4]</td>
</tr>
<tr>
<td>LANG 101  R  Business Communication  [0-3-0-3]</td>
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<td>(4) MATH 002  R  Intermediate Calculus  [3-1-0-4]</td>
</tr>
<tr>
<td>OR MATH 006  R  Algebra and Calculus II  [3-1-0-4]</td>
</tr>
</tbody>
</table>

18 credits

(1) Students entering with a grade of B or above in AL Economics will take ECON 191. Students entering with a grade of C in AL Economics, or C or above in AL Mathematics, will take ECON 111. All other students will take ECON 110.

(2) Students entering with an acceptable grade in AS Use of English will be exempted from this course by the Language Centre.
## School of Business and Management

### Second Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACCT 201</td>
<td>Intermediate Accounting I</td>
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<td>Humanities and Social Science Elective</td>
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<tr>
<td>MARK 212</td>
<td>Marketing Management</td>
<td>[4-0-0:4]</td>
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<tr>
<td>MGMT 221</td>
<td>Organisational Behaviour</td>
<td>[4-0-0:4]</td>
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<td>Business and Management Elective</td>
<td>[3-0-0:3]</td>
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<td>[3-0-0:3]</td>
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<tr>
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17 credits

#### Spring Semester

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
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<td>Intermediate Accounting II</td>
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<td>Cost/Management Accounting</td>
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<td>ACCT 262</td>
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17 credits

### Third Year

#### Fall Semester

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<tr>
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<td>ACCT 361</td>
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<td>ACCT 381</td>
<td>Quantitative Methods</td>
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17 credits

#### Spring Semester

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<td>ACCT 344</td>
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<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
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<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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</table>

17 credits

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1. Students entering with a grade of B or above in AL Economics will take ECON 191. Students entering with a grade of C in AL Economics, or C or above in AL Mathematics, will take ECON 111. All other students will take ECON 110.
2. Students entering with an acceptable grade in AS Use of English will be exempted from this course by the Language Centre.
3. Students entering with an acceptable grade in AL Pure Mathematics will replace MATH 001 with either MATH 101 or 111. Students entering with HKCEE Mathematics only or did not score an acceptable grade in Additional Mathematics in HKCEE will take MATH 005.
4. Students who have taken MATH 101 or 111 in the Fall Semester will replace MATH 002 with an approved Science elective. Those who have taken MATH 005 in the Fall Semester will take MATH 006.
5. The course shown is recommended, but may be replaced by a suitable elective as approved by the Department.

A minimum of 105 credits is required for the BBA programme in Accounting – Financial Accounting Stream. A student's choice of electives may result in this minimum being exceeded.

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### DEPARTMENT OF BUSINESS INFORMATION SYSTEMS

The discipline of Business Information Systems is concerned with the application of information technology to achieve management objectives of profit-oriented and non-profit organisations. In modern society, a major portion of economic activities involves the collection, analysis, processing, management, and distribution of information. Computer and telecommunication technologies, if properly applied, can provide a means to carry out these activities effectively and efficiently. Organisations are increasingly facing challenges of rapid technology advances and the ever-changing marketplace. There is a strong demand for professionals who both understand business functions and possess the necessary technical skills to assist an organisation to face these challenges.

In recognition of the vital role information technology plays in today's business world, the Business Information Systems Department was established within the School of Business and Management in 1992. The Department began offering the BBA and MBA degrees in the fall of 1992, and will commence its doctoral programme in the fall of 1993. Courses offered by the department aim to provide students with basic knowledge in major functional areas of organisation and the analytical competence to design, implement and control information systems required by business.

The Department has a number of laboratories to support teaching and research. Three laboratories are at different stages of planning and construction. A workstation laboratory is under construction and is scheduled to open in summer 1993. It will house more than 30 SPARC workstations with colour monitors. In 1993-94, a multimedia laboratory and a networking laboratory will start operation. The multimedia laboratory consists of advanced audio-visual equipment, high performance workstations,
and peripherals, all housed in a specially designed acoustic room. The networking laboratory consists of a network of PCs and workstations running a variety of network management packages and groupware utilities.

### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 101</td>
<td>Financial Accounting</td>
<td>3-1-0:3</td>
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<td>ACCT 122</td>
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<td>OR MATH 005</td>
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**Total Credits:** 18

### Spring Semester

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<tr>
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<td>Introduction to Information Systems</td>
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<td>ECON 112</td>
<td>Macroeconomics</td>
<td>3-1-0:4</td>
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<td>Financial Management</td>
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<td>LANG 101</td>
<td>Business Communication</td>
<td>0-3-0:3</td>
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<tr>
<td>MATH 002</td>
<td>Intermediate Calculus</td>
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<tr>
<td>OR MATH 006</td>
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**Total Credits:** 19

### Second Year

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<td>BINF 221</td>
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<td>COMP 102</td>
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<td>MARK 212</td>
<td>Marketing Management</td>
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<td>Organisational Behaviour</td>
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**Total Credits:** 19

### Spring Semester

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<tbody>
<tr>
<td>BINF 223</td>
<td>Business Applications Programming</td>
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<td>BINF 226</td>
<td>Database Design and Administration</td>
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<td>Data Structures and Algorithms</td>
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**Total Credits:** 16

### Third Year

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<td>Information Systems Development and Project Management</td>
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<td>BINF 333</td>
<td>Information Systems Project</td>
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<td>3-0-0:3</td>
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<td>H&amp;SS</td>
<td>Humanities and Social Science</td>
<td>3-0-0:3</td>
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<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>3-0-0:3</td>
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</tbody>
</table>

**Total Credits:** 14

(1) Students entering with a grade of B or above in AL Economics will take ECON 191. Students entering with a grade of C in AL Economics, or C or above in AL Mathematics, will take ECON 111. All other students will take ECON 110.

(2) Students entering with an acceptable grade in AS Use of English will be exempted from this course by the Language Centre.

(3) Students entering with an acceptable grade in AL Pure Mathematics will replace MATH 001 with either MATH 101 or 111. Students entering with HKCEE Mathematics only or did not score an acceptable grade in Additional Mathematics in HKCEE will take MATH 005.

(4) Students who have taken MATH 101 or 111 in the Fall Semester will replace MATH 002 with an approved Science elective. Those who have taken MATH 005 in the Fall Semester will take MATH 006.

(5) Students admitted in 1992-93 will take BINF 222.

(6) Students admitted in 1992-93 will take FINA 111.

(7) Students admitted in 1991-1992 will take MGMT 221.


A minimum of 101 credits is required for the BBA programme in Business Information Systems. A student's choice of electives may result in this minimum being exceeded.
DEPARTMENT OF ECONOMICS

Economics is a social science that deals with the allocation of resources within and across firms, households, and other decision-making units. It also deals with the functional and personal distribution of income. As such, it covers the operation and organisation of firms and industries, the determination of prices for factors and products, as well as the determinates of economic growth and development. It analyses production, consumption, investment, employment, trade, and government intervention including fiscal, monetary, and regulatory policies. Thus, economic analyses both at the micro and macro levels are essential to business decision making as well as to household and government decision making. To reflect the twin roles of economics, courses offered by the Department fall into two streams of specialisation:

(1) Business Economics
(2) Economics Science

The main differences between these two streams are the perspectives from which problems are analysed and the applications they emphasise. In the first stream, the focus is on problems that are closely related to a company’s external economic environment and/or internal operation, and on economic reasoning which can contribute to sound business decision making. In the second stream, the focus is on the scientific basis of economics and on a wide range of economic phenomena, problems, and solutions from the perspective of social scientists and policy makers.

Specialisation in Business Economics would result in a BBA degree whereas specialisation in Economics Science would result in a BSc degree.

(For both streams)

First Year

Fall Semester

| (1) ECON 111 C Microeconomics | [3-1-0:4] |
| ACCT 101 C Financial Accounting | [3-1-0:3] |
| ACCT 122 C Managerial Accounting | [3-1-0:3] |
| (2) LANG 001 Language Skills Enhancement I | [0-3-1:0] |
| (3) MATH 001 R Beginning Calculus | [3-1-0:4] |
| or MATH 005 R Algebra and Calculus I | [3-1-0:4] |
| MGMT 111 C Business Statistics | [3-1-0:4] |

18 credits

Spring Semester

(For Business Economics stream):

| ECON 112 C Macroeconomics | [3-1-0:4] |
| BINF 101 C Introduction to Information Systems | [3-1-0:4] |
| FINA 111 C Financial Management | [4-0-0:4] |
| LANG 101 R Business Communication | [0-3-0:3] |
| (4) MATH 002 R Intermediate Calculus | [3-1-0:4] |
| OR MATH 006 R Algebra and Calculus II | [3-1-0:4] |

19 credits

Second Year

Fall Semester

(For Business Economics stream):

| ECON 214 R Managerial Microeconomics | [4-0-0:4] |
| ENGG E Engineering Elective | [3-0-0:3] |
| MARK 212 C Marketing Management | [4-0-0:4] |
| MGMT 221 C Organisational Behaviour | [4-0-0:4] |
| SB&M E Business and Management Elective | [3-0-0:3] |

18 credits

(For Economics Science stream):

| ECON 213 R Intermediate Microeconomics | [4-0-0:4] |
| ENGG E Engineering Elective | [3-0-0:3] |
| MARK 212 C Marketing Management | [4-0-0:4] |
| MGMT 221 C Organisational Behaviour | [4-0-0:4] |
| SB&M E Business and Management Elective | [3-0-0:3] |

18 credits

Spring Semester

(For Business Economics stream):

| ECON 216 R Managerial Macroeconomics | [4-0-0:4] |
| ECON 232 R Business Forecasting and Econometrics | [4-0-0:4] |
| FREE E Free Elective | [3-0-0:3] |
| H&SS E Humanities and Social Science Elective | [3-0-0:3] |
| H&SS E Humanities and Social Science Elective | [3-0-0:3] |

17 credits
School of Business and Management

(For Economics Science stream):

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ECON 215</td>
<td>R Intermediate Macroeconomics</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>ECON 232</td>
<td>R Business Forecasting and Econometrics</td>
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</tr>
<tr>
<td>FREE</td>
<td>E Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>17 credits</strong></td>
</tr>
</tbody>
</table>

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON</td>
<td>E Economics Elective</td>
<td>[4-0-0:4]</td>
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<tr>
<td>ECON</td>
<td>E Economics Elective</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>ENGG</td>
<td>E Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE</td>
<td>E Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td></td>
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**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>ECON</td>
<td>E Economics Elective</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>FREE</td>
<td>E Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>13 credits</strong></td>
</tr>
</tbody>
</table>

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(2) Students entering with an acceptable grade in AS Use of English will be exempted from this course by the Language Centre.

(3) Students entering with an acceptable grade in AL Pure Mathematics will replace MATH 001 with either MATH 101 or 111. Students entering with HKCEE Mathematics only or did not score an acceptable grade in Additional Mathematics in HKCEE will take MATH 005.

(4) Students who have taken MATH 101 or 111 in the Fall Semester will replace MATH 002 with an approved Science elective. Students who have taken MATH 005 will take MATH 006.

A minimum of 102 credits is required for both the BBA and BSc Programmes in Economics. A student's choice of electives may result in this minimum being exceeded.

**DEPARTMENT OF FINANCE**

Finance deals with individual as well as corporate decisions with regard to the allocation of financial resources. Three major areas emphasised by the Department are corporate finance, investment and portfolio management, and financial markets and institutions. Corporate finance analyses the investment and financing decisions of projects of firms, including mergers and acquisitions. Investment and portfolio management deals with the problems of asset pricing, portfolio design and risk management by individuals and investment firms, such as unit trusts. The financial markets and institutions area presents the unifying framework and environment in which the financial activities take place. Key features of the major financial instruments and institutions are explained and analysed. In addition to the above, the Department also offers courses in international financial management, speculative markets, and other topics of interest to the Asia-Pacific region.

The BBA degree in Finance will suitably equip a student with strong interests in pursuing a career in banking, financial analysis, and investment firms.

**First Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 101</td>
<td>C Financial Accounting</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td>ACCT 122</td>
<td>C Managerial Accounting</td>
<td>[3-1-0:3]</td>
</tr>
<tr>
<td>ECON 111</td>
<td>C Microeconomics</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>LANG 001</td>
<td>Language Skills Enhancement I</td>
<td>[0-3-1:0]</td>
</tr>
<tr>
<td>MATH 001</td>
<td>R Beginning Calculus</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>OR MATH 005</td>
<td>R Algebra and Calculus I</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>MGMT 111</td>
<td>C Business Statistics</td>
<td>[3-1-0:4]</td>
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<tr>
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**Spring Semester**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>FINA 111</td>
<td>C Financial Management</td>
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<tr>
<td>BINF 101</td>
<td>C Introduction to Information Systems</td>
<td>[3-1-0:4]</td>
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<tr>
<td>ECON 112</td>
<td>C Macroeconomics</td>
<td>[3-1-0:4]</td>
</tr>
<tr>
<td>LANG 101</td>
<td>R Business Communication</td>
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</tr>
<tr>
<td>MATH 002</td>
<td>R Intermediate Calculus</td>
<td>[3-1-0:4]</td>
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<tr>
<td>OR MATH 006</td>
<td>R Algebra and Calculus II</td>
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<tr>
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</table>
School of Business and Management

Second Year

Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>(5) FINA 221</td>
<td>Investment Analysis and Portfolio Management</td>
<td>[4-0-0:4]</td>
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<td>ENGG</td>
<td>Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>MARK 212</td>
<td>Marketing Management</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>MGMT 221</td>
<td>Organisational Behaviour</td>
<td>[4-0-0:4]</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
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18 credits

Spring Semester

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<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>H&amp;SS</td>
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16 credits

Third Year

Fall Semester

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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tr>
<td>FINA 321</td>
<td>Advanced Financial Management</td>
<td>[4-0-0:4]</td>
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<td>FINA 342</td>
<td>International Finance</td>
<td>[4-0-0:4]</td>
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<td>Free Elective</td>
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<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
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</table>

17 credits

Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>(8) (9) FINA</td>
<td>Finance Elective</td>
<td>[4-0-0:4]</td>
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<td>ENGG</td>
<td>Engineering Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>[3-0-0:3]</td>
</tr>
</tbody>
</table>

13 credits

(3) Students entering with an acceptable grade in AL Pure Mathematics will replace MATH 001 with either MATH 101 or 111. Students entering with HKCEE Mathematics only or did not score an acceptable grade in Additional Mathematics in HKCEE will take MATH 005.

(4) Students who have taken MATH 101 or 111 in the Fall Semester will replace MATH 002 with an approved Science elective. Those who have taken MATH 005 will take MATH 006.

(5) Current second-year students (admitted in 1992-93) will take FINA 232.

(6) Current second-year students (admitted in 1992-93) will take FINA 221.

(7) Current third-year student (admitted in 1991-92) will take a FINA area elective.

(8) Current third-year student (admitted in 1991-92) will take FINA 342.

(9) Students must choose either FINA 331 or FINA 332.

A minimum of 101 credits is required for the BBA programme in Finance. A student's choice of electives may result in this minimum being exceeded.

DEPARTMENT OF MANAGEMENT

The Department of Management admits its first undergraduate students in 1992 to study towards the BBA in Management. Courses offered by the Department basically fall into two streams:

1. Organisation and Management
2. Management Operations

Organisation and Management Stream

The responsibility of managers is the effective and efficient management of individuals and groups in business firms, non-profit organisations, etc. Management, therefore, deals with the many aspects of the administration of an organisation such as the formulation of goals including long- and short-term planning; the establishment of decision-making processes; the design of control systems and the development of human resources. Courses offered in the stream of Organisation and Management cover the following areas of study:

- Organisational Behaviour and Management,
- Human Resources Management,
- International Business,

and aim to provide students with the knowledge they will need to become effective managers. They will learn not only to evaluate the current needs but also to anticipate the future needs of an organisation, and acquire practical skills in planning, decision making, and problem solving.

(1) Students entering with a grade of B or above in AL Economics will take ECON 191. Students entering with a grade of C in AL Economics, or C or above in AL Mathematics, will take ECON 111. All other students will take ECON 110.

(2) Students entering with an acceptable grade in AS Use of English will be exempted from this course by the Language Centre.
School of Business and Management

Students who wish to concentrate their studies on International Business are required to take electives from the following international courses offered by the Departments of Economics, Finance, Management, and Marketing:

- ECON 335 International Economics
- ECON 351 Comparative Economic Systems
- FINA 342 International Finance
- MARK 243 Global Marketing
- MGMT 223 Multinational Corporations
- MGMT 349 Special Topics in International Business

Management Operations Stream

To be successful in business requires the ability to manage work. This calls for working with both people and tasks: on your own, as a member of a group, as a task leader and eventually as a manager. Management operations provide the technical skills to break work down into tasks, develop methods for carrying out the tasks, and evaluate the time and resources needed. This forms the basis for undertaking the work and controlling it to a successful completion.

The general theme of the Management Operations programme is the development of problem-solving skills for technical problems which are useful to all managers. These include the identification of management problems, the modelling and solution of the technical aspects of a problem, the interpretation and use of the solution of the model in solving the management problem, the implementation of the practical solution and solution maintenance. Areas of study covered in this stream include:

- Management Science; and
- Operations and Technology Management.

Organisation and Management Stream

First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 111</td>
<td>C</td>
<td>Business Statistics</td>
<td>3-1-0:4</td>
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<tr>
<td>ACCT 101</td>
<td>C</td>
<td>Financial Accounting</td>
<td>3-1-0:3</td>
</tr>
<tr>
<td>ACCT 122</td>
<td>C</td>
<td>Managerial Accounting</td>
<td>3-1-0:3</td>
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<tr>
<td>(1)</td>
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<tr>
<td>ECON 111</td>
<td>C</td>
<td>Microeconomics</td>
<td>3-1-0:4</td>
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<td>(2)</td>
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<td>LANG 001</td>
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<td>Language Skills Enhancement I</td>
<td>0-3-1:0</td>
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<td>(3)</td>
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<td></td>
<td></td>
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<tr>
<td>MATH 001</td>
<td>R</td>
<td>Beginning Calculus</td>
<td>3-1-0:4</td>
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<tr>
<td>OR</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>MATH 005</td>
<td>R</td>
<td>Algebra and Calculus I</td>
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18 credits

Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MGMT 221</td>
<td>C</td>
<td>Organisational Behaviour</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>MGMT</td>
<td>E</td>
<td>Management Elective</td>
<td>4-0-0:4</td>
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<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>MARK 212</td>
<td>C</td>
<td>Marketing Management</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>E</td>
<td>Business and Management Elective</td>
<td>4-0-0:4</td>
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19 credits

Third Year

<table>
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<tr>
<th>Course</th>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 321</td>
<td>R</td>
<td>Corporate Strategy</td>
<td>4-0-0:4</td>
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<td>FREE</td>
<td>E</td>
<td>Free Elective</td>
<td>3-0-0:3</td>
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<tr>
<td>FREE</td>
<td>E</td>
<td>Free Elective</td>
<td>4-0-0:4</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>E</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0:3</td>
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</table>

14 credits
Spring Semester

MGMT  E Management Elective  [4-0-0:4]
ENGG  E Engineering Elective  [3-0-0:3]
FREE  E Free Elective  [4-0-0:4]
H&SS  E Humanities and Social Science Elective  [3-0-0:3]

14 credits

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(4) Students who have taken MATH 101 or 111 in the Fall Semester will replace MATH 002 with an approved Science elective. Those who have taken MATH 005 in the Fall Semester will take MATH 006.

A minimum of 101 credits is required for the BBA programme in Management with concentration in Organisation and Management. A student’s choice of electives may result in this minimum being exceeded.

Management Operations Stream

First Year

Fall Semester

MGMT 111 C Business Statistics  [3-1-0:4]
ACCT 101 C Financial Accounting  [3-1-0:3]
ACCT 122 C Managerial Accounting  [3-1-0:3]
(1) ECON 111 C Microeconomics  [3-1-0:4]
(2) LANG 001 Language Skills Enhancement I  [0-3-1:0]
(3) MATH 001 R Beginning Calculus  [3-1-0:4]
OR MATH 005 R Algebra and Calculus I  [3-1-0:4]

18 credits

Spring Semester

MGMT 221 C Organisational Behaviour  [4-0-0:4]
MGMT 261 R Production and Operations Management  [4-0-0:4]
FREE E Free Elective  [4-0-0:4]
H&SS E Humanities and Social Science Elective  [3-0-0:3]
MARK 212 C Marketing Management  [4-0-0:4]

19 credits

Second Year

Fall Semester

MGMT 321 R Corporate Strategy  [4-0-0:4]
MGMT E Management Elective  [4-0-0:4]
ENGG E Engineering Elective  [3-0-0:3]
FREE E Free Elective  [3-0-0:3]
H&SS E Humanities and Social Science Elective  [3-0-0:3]

17 credits

Third Year

Fall Semester

MGMT 321 R Corporate Strategy  [4-0-0:4]
MGMT E Management Elective  [4-0-0:4]
FREE E Free Elective  [3-0-0:3]
H&SS E Humanities and Social Science Elective  [3-0-0:3]

14 credits
DEPARTMENT OF MARKETING

Marketing is an activity that facilitates exchange. As such, the success of an organisation (whether for-profit or not-for-profit) often depends on the effectiveness of its marketing efforts. Therefore, marketing includes strategy decisions about the product or service to offer, advertising and promotional methods for communication, prices to charge, and the distribution system to utilise for delivery. Central to marketing is consumer behaviour (since consumers are why organisations exist) and marketing research (since it provides an informational link between consumers and the decision makers within an organisation). Courses cover all aspects of marketing and provide students with knowledge of the analytical tools to understand marketing problems and the skills to solve practical problems they will encounter in the profession.
School of Business and Management

Third Year

Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MARK</td>
<td>Marketing Elective</td>
<td>[4-0-0:4]</td>
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<tr>
<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
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<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
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<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
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16 credits

Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MARK 321</td>
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<td>FREE</td>
<td>Free Elective</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>H&amp;SS</td>
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</tr>
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13 credits

(1) Students entering with a grade of B or above in AL Economics take ECON 191. Students entering with a grade of C in AL Economics, or C or above in AL Mathematics, will take ECON 111. All other students will take ECON 110.

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(4) Students who have taken MATH 101 or 111 in the Fall Semester will replace MATH 002 with an approved Science elective. Those who have taken MATH 005 in the Fall Semester will take MATH 006.

A minimum of 100 credits is required for the BBA programme in Marketing. A student's choice of electives may result in this minimum being exceeded.

Postgraduate Programmes

The School of Business and Management offers postgraduate programmes leading to the degree of Master of Business Administration (MBA), in both full-time and part-time formats. The PhD programme in Business Administration, oriented towards those planning to undertake research or university teaching careers, and has a global perspective with a focus on the Asia-Pacific region.

Full-time MBA Programme

At HKUST, management education is designed to provide students with the management skills and tools necessary to direct and manage organisations, whether large or small, public or private, domestic or international, for-profit or not-for-profit, and with a means for envisioning the future and realising objectives.

The MBA Programme cultivates the student's ability to deal successfully with the challenges and opportunities presented by continued technological development and globalisation. While providing students with skills and knowledge to operate successfully in today's environment, the Programme also prepares them to cope with the challenges of the future. The approach utilised is designed to meet Hong Kong's needs in the transition from a labour-intensive to a technology-based economy. As a professional School, the School of Business and Management is building and maintaining a close relationship with the professional management community to prepare strongly motivated individuals for highly skilled managerial roles.

Designed to provide a balance between theory and practice and between individual and team approaches to management questions, the MBA Programme is structured to provide a broad base of general management skills on which specialised skills may be developed. Thus, both generalists and specialists can meet their individual career preparation goals. Students not only develop analytical and conceptual tools for innovative problem solving, but also build confidence and interpersonal skills to interact effectively in difficult and complex situations. Various teaching techniques and methods, such as lectures, computer simulations, case discussions, and individual and group projects, are employed to provide students with an intellectual as well as an experiential background.

Admission

Applicants for admission to the MBA Programme are expected to have completed a bachelor's degree from a university or approved institution or have obtained qualifications considered by the School to be equivalent to a first degree. For applicants who are employed, their employment history will play a critical role in the admissions process. Demonstrated proficiency in the English language is important for successful completion of the Programme.

Applicants to the MBA Programme must submit the following:

(a) a completed application form, including a one-page essay covering the student's study plan and career goals;

(b) two letters of recommendation mailed directly to the Director of Admissions, Registration and Records Office;

(c) an original or officially certified academic transcript of undergraduate studies (and postgraduate studies, if any);
a copy of a bank pay-in slip confirming that the non-refundable application fee of $120 has been paid into the bank account of the Hong Kong University of Science and Technology; 

the score obtained on the Graduate Management Admission Test (GMAT) (applicants should instruct the Educational Testing Service to send the score to the School of Business and Management, Hong Kong University of Science and Technology, Code Number 0369); and

the score obtained in the Test of English as a Foreign Language (TOEFL) or the International English Language Testing Service (IELTS) (only for applicants who attended educational institutions where the language of instruction was not English and whose first language is not English). 

For overseas applicants, if official transcripts are in a language other than English or Chinese, a certified translation into English must be provided. In lieu of the bank pay-in slip confirming payment of application fee, overseas applicants may submit with the completed application form a bank draft or certified bank cheque for an amount equivalent to $120. 

Fees

The tuition fee for full-time students admitted for the academic year 1993-94 is $17,000 per annum. It is expected that full-time MBA students will be charged approximately $3,000 per year to cover the costs of residential seminar lodging and meals, photocopying materials and other sundry expenses. The fee may be paid at the beginning of the academic year at registration or in equal instalments at the beginning of each semester. In addition, each new student is required to pay a deposit of $300 as caution money on first registration. Charges will be made against this deposit if there are any unpaid claims against the student, such as outstanding library dues. Except for caution money, all fees are non-refundable.

Curriculum

As a programme of professional management education, the MBA curriculum requires rigorous study, creativity and imagination, analytical thinking, problem diagnosis and solution, and teamwork. The MBA Programme aims to provide an environment in which students develop competence in functional management disciplines such as finance, marketing, operations and technology management, accounting, human resource management; general management perspectives and an ability to approach situations from the perspective of the entire organisation; a comprehensive understanding of organisations and the skills essential to managing and working effectively with people; sophisticated awareness of the complex global, technological, industrial, and governmental environments in which organisations operate; and sensitivity to the economic and social responsibilities of management. Full-time students are expected to complete the Programme in two years.

Full-time MBA Curriculum

First Year

Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 500</td>
<td>Accounting Foundations</td>
<td>[2-0-0:2]</td>
</tr>
<tr>
<td>ACCT 501</td>
<td>Accounting for Management and Financial Decisions</td>
<td>[2-0-0:2]</td>
</tr>
<tr>
<td>BINF 511</td>
<td>Management Information Systems</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>ECON 511</td>
<td>Managerial Microeconomics</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>MARK 512</td>
<td>Marketing Strategy and Policy</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>MGMT 501</td>
<td>Introductory Statistics for Business</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>MGMT 521</td>
<td>Managerial Problem Solving</td>
<td>[2-0-0:2]</td>
</tr>
</tbody>
</table>

18 credits

Winter Session

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 545</td>
<td>Managerial Communication</td>
<td>[2-0-0:2]</td>
</tr>
</tbody>
</table>

2 credits

Spring Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 552</td>
<td>Legal Environment of Business</td>
<td>[2-0-0:2]</td>
</tr>
<tr>
<td>ECON 512</td>
<td>Managerial Macroeconomics</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FINA 512</td>
<td>Corporate Finance</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>MGMT 523</td>
<td>Management of Organisations</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>MGMT 562</td>
<td>Operations and Technology Management Electives</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE</td>
<td>Electives</td>
<td>[2 credits]</td>
</tr>
</tbody>
</table>

16 credits

Second Year

Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 541</td>
<td>Management Policy</td>
<td>[3-0-0:3]</td>
</tr>
<tr>
<td>FREE</td>
<td>Electives</td>
<td>[10 credits]</td>
</tr>
</tbody>
</table>

13 credits
Winter Session

(3) SB&M 588 Field Study I
   (Includes International Business Game) [2-0-0:2]

2 credits

Spring Semester

(3) SB&M 589 Field Study II [3-0-0:3]
(2) FREE Electives [10 credits]

13 credits

Total core course credits: 42
Total credits: 64

(1) This course is normally held in the week prior to the start of the Fall Semester.
(2) Electives may be two- to four-credit courses. Two-credit courses allow students
to enrol in a greater number of elective topics in specialised areas.
(3) Students choose one of the departmental field study courses: ACCT, BINF, ECON, FINA, MARK or MGMT 588, 589.

The MBA Core

The MBA core provides basic knowledge of management functions that every
manager must understand, and builds a foundation for advanced study in selected areas.
Classroom education is balanced by opportunities for practical application using the Hong Kong
business community as a laboratory. Sixteen required core courses provide students with both
the functional field and basic conceptual and analytical tools needed to address management
problems.

The MBA core must be taken in a prescribed sequence. Students are assigned
to a section of approximately 30 students each semester and take the required core
courses for that semester with their assigned section, thus creating a closely integrated,
supportive learning community.

In addition to core courses, special courses and career development pro-
grames are offered, such as management communication, company internships, career
planning, managerial image, and field study orientation, during the Winter Session in both
the first and second years. In particular, the School has instituted a Management
Communication Programme to enhance students’ oral and written skills. This includes
topics such as audience analysis, case analysis, cognitive and writing processes, cross-
cultural communication, group and individual oral presentations, persuasive strategies,
and the visual display of quantitative information.

Advanced Electives

Advanced electives, selected from course offerings in several curriculum
areas, comprise about a quarter of the MBA Programme. They allow students to develop
in-depth expertise in accounting, business economics, finance, human resource manage-
ment, information management, international business, marketing, management policy,
management science, and operations and technology management. Students can choose
to concentrate in accounting, business information systems, economics, finance,
management or marketing.

Accounting plays an important role in financial communication and control
within an enterprise, and between the enterprise and the investor. It also provides an
essential tool with which society and government evaluate and control economic behav-
ior. Students may choose to follow a public accounting stream and pursue a career in
auditing, taxes, or administrative consulting services; or the management/corporate
accounting stream, where they focus on internal audits, and systems and procedures
studies. Whichever path they choose, MBA graduates with an accounting emphasis are
likely to enter careers in high-level management in corporations, accountancy firms,
government, and not-for-profit organisations.

Problem-solving in the practice of business management requires a firm
theoretical base in economics. In private firms, managers are guided by economic
principles in making decisions on almost all aspects of their business such as production,
investment, employment, budget forecast, and marketing choices. In public agencies,
managers likewise rely on economic analyses in their design, determination, and
assessment of public policies. MBA graduates who choose the economics emphasis will
serve both the private and public sectors in a wide range of management positions.

Finance provides a study of issues in corporate finance investments, financial
markets and institutions and the international financial system. Applications in this area
of study include the functioning of the securities market, portfolio management, manage-
ment of banks and insurance companies, and multinational finance. MBA graduates in
finance are equipped to work in corporate financial divisions, commercial banks, invest-
ment houses, and private and public research institutions.

The marketing function is crucial to the health and survival of any organisation.
With basic concepts of marketing operations and strategic planning, managers can help
an organisation to decide which consumer groups it should serve, which products or
services it should produce, as well as the levels of promotional effort, pricing and other
considerations in sales promotion. MBA graduates in marketing assume positions in
brand management, product management, new product development, sales force
management, advertising and marketing research.

Information systems play a central role in integrating the communication,
data processing and information processing across all functions in an organisation. They
not only support the current application requirements, but also enable the transformation
of organisation work and human organisation to meet the ever-changing demands of the
marketplace. Managing this process requires a broad range of skills from the highly
technical to the strategically business-oriented. Students who choose information
systems as their concentration will be prepared to enter careers involving the development and marketing of information products and services, as corporate managers, entrepreneurs, or management consultants.

Management covers a wide spectrum of fields of studies including organisational behaviour and management policy, human resource management, management science, operations and technology management and international business. MBA graduates with emphasis on management will be equipped to serve in both private and public sectors in a variety of managerial positions such as private management consulting, personnel management, production management, research and administration. A description of the various fields of study in management is given below:

1. Human resource management provides the theoretical framework and practical tools for achieving an effective management of human resources in different organisational environments. Areas of study include: human resource management, job design, manpower planning, training and development, labour relations, compensation administration.

2. Management science plays an important role in managerial decision making by applying the formal scientific methods of analysis and synthesis. Areas of study include model building, probability theory, simulation and optimisation methods. Students may either choose a theoretical orientation or apply the concepts to a particular area of interest such as finance.

3. Operations and technology management emphasises managerial decision making in production or operations and its inter-relationships with other organisational activities such as strategy planning, inventory management, and project management and control.

4. International business focuses on the international environment and its effects on various organisational functions such as organisational control, financial planning, management strategies and marketing activities.

5. Organisational behaviour and management policy focuses on personality and individual differences, leadership, motivation, communications, conflict, power, and issues relating to the interaction between an organisation and its environment, which include policy and strategy formulation and implementation, organisational analysis, corporate planning and control, and the social context of business decisions.

Field Study

As the capstone requirement of the MBA Programme, second-year full-time students and third-year part-time students participate in a field study. The study provides students with an opportunity to integrate and apply their accumulated skills in a professional setting outside the classroom. Working in teams under the guidance of faculty advisors, students conduct a thorough study of a client organisation, including the diagnosis, evaluation, and solution of some of its most critical management problems.
## Part-time MBA Curriculum

### First Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 500</td>
<td>Accounting Foundations</td>
<td>2-0-0:2</td>
</tr>
<tr>
<td>ACCT 501</td>
<td>Accounting for Management and Financial Decisions</td>
<td>2-0-0:2</td>
</tr>
<tr>
<td>MGMT 501</td>
<td>Introductory Statistics for Business</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td>MGMT 521</td>
<td>Managerial Problem Solving</td>
<td>2-0-0:2</td>
</tr>
</tbody>
</table>

**Total:** 9 credits

#### Winter Session

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 545</td>
<td>Managerial Communication</td>
<td>2-0-0:2</td>
</tr>
</tbody>
</table>

**Total:** 2 credits

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 552</td>
<td>Legal Environment of Business</td>
<td>2-0-0:2</td>
</tr>
<tr>
<td>BINF 512</td>
<td>Highlights in Management Information Systems</td>
<td>2-0-0:2</td>
</tr>
<tr>
<td>ECON 511</td>
<td>Managerial Microeconomics</td>
<td>3-0-0:3</td>
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</table>

**Total:** 7 credits

#### Summer Session

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINA 512</td>
<td>Corporate Finance</td>
<td>3-0-0:3</td>
</tr>
</tbody>
</table>

**Total:** 3 credits

### Second Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 523</td>
<td>Management of Organisations</td>
<td>3-0-0:3</td>
</tr>
</tbody>
</table>

**Total:** 2 credits

#### Winter Session

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB&amp;M 588</td>
<td>Field Study I</td>
<td>2-0-0:2</td>
</tr>
</tbody>
</table>

**Total:** 2 credits

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 544</td>
<td>International Business Game</td>
<td>1-0-0:1</td>
</tr>
</tbody>
</table>

**Total:** 1 credit

### Third Year

#### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MGMT 545</td>
<td>Managerial Problem Solving</td>
<td>2-0-0:2</td>
</tr>
</tbody>
</table>

**Total:** 2 credits

#### Winter Session

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB&amp;M 589</td>
<td>Field Study II</td>
<td>3-0-0:3</td>
</tr>
</tbody>
</table>

**Total:** 4 credits

#### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>SB&amp;M 588, 589</td>
<td>Field Study I</td>
<td>3-0-0:3</td>
</tr>
</tbody>
</table>

**Total:** 3 credits

### Summary

- **Total core course credits:** 42
- **Total credits:** 56

(1) This course is normally held in the week prior to the start of the Fall Semester.
(2) Electives may be two- to four-credit courses.
(3) Students choose one of the departmental field study courses: ACCT, BINF, ECON, FINA, MARK or MGMT 588, 589.
Concentrations

The School provides students with the option of studying for a general MBA Programme or a concentration in any of the departments. For the latter, in addition to completing the MBA core courses, a minimum of 10 credits specified by the relevant department are required. Those who do not meet the requirements of specific departments may declare Management as their concentration.

Format and Schedule

The format and schedule of the Part-time MBA is designed to be compatible with the work demands of responsible, busy professionals. Classes are held in both Semesters and the Summer Session on the University campus on Saturdays beginning at 9 am and ending at 5 pm. Typically, two courses are scheduled for each Semester—one course session to be conducted on Saturday mornings and the second scheduled for Saturday afternoons. During the Summer Session, students enrol in one course only.

To enrich the learning experiences and widen the perspectives of the students, business executives and spokespersons, political leaders, and faculty experts will be frequently invited to provide luncheon presentations.

Part-time MBA students are also required to attend a five-day residential management core course prior to the start of the Programme in the Fall Semester. For part-time MBA students entering in 1993-94, the course on Managerial Problem Solving will be held at a conference centre in Hong Kong in mid-August 1993. Reading assignments will be provided in advance of the course. Students will be provided homework assignments to be completed in small groups after the first weekend. Meals and lodging will be arranged for students for the two residential weekends.

The two additional courses scheduled for the Fall Semester will commence on Saturday, 11 September 1993 and follow the regular University schedule for the remainder of the academic year. Regular attendance is an important part of course requirements. Each student's input is important as classes are organised for optimum size and diversity of backgrounds to increase the value of class discussion. Consequently, students who are absent from a significant number of class sessions will not be awarded course credits.

Fees

In addition to the 1993-94 tuition fee for part-time students of $12,750 per annum, it is expected that part-time MBA students entering in 1993-94 will be charged approximately $16,250 per annum to cover the costs of conference centre lodging and meals, Saturday luncheons, and speakers' honoraria.

PhD PROGRAMME

The Doctor of Philosophy (PhD) in the School of Business and Management, which started to admit students in Fall 1992, is a research-oriented degree programme. It prepares students for a teaching and research career in universities, research institutes, governmental or business organisations. The programme has a global perspective with a focus on the Asia-Pacific region.

Major Fields

For the academic year 1993-94, the programme will cover major fields in accounting, business information systems, economics, finance, and management science. Marketing may also be offered as a major field in the 1994-95 academic year.

Programme Requirements

In addition to the University regulations, the requirements for the PhD programme are:

(a) Students' overall programme requirements will be prescribed and their progress monitored by the School's PhD Programme Committee and Director.

(b) Specific course requirements are prescribed for the students' major field in order to establish an area of teaching and research expertise. At least five PhD level courses should be taken in the major field before advancing to candidacy. In addition, students are required to take a minimum of three PhD level courses to form a minor field. Those with prior graduate education at recognised institutions may have some of these requirements waived and advance more rapidly, provided that they meet the University's residence requirements.

(c) Students normally take their major and minor field examinations by the end of the second summer, and no later than the end of the third summer unless a later date is approved by the PhD Programme Director. Courses are offered to prepare students for these examinations. A major field examination is required for all students but a minor field examination is only required if students fail to earn acceptable grades.

(d) Each student should prepare a research paper in the major field. The paper has to be approved by two faculty members of the student's major department, and will normally be presented in a formal seminar at the beginning of the third year.

(e) After passing the field examinations and obtaining approval of the research paper by the major department, the student prepares and presents a dissertation proposal before a panel comprising the student's Thesis Committee and two members appointed by the PhD Programmes Director. After the presentation, the student prepares a memorandum summarising the discussion and suggestions made during the presentation, the deficiencies and weaknesses of the proposed
research, and ways in which these deficiencies and weaknesses have been or will be remedied. Once the panel approves the memorandum, it becomes a dissertation agreement between the student and the PhD Programme Committee. The student is then admitted to candidacy and proceeds to complete the dissertation in accordance with the agreement. The thesis must be completed and successfully defended within seven years of the date of entrance into the programme.

Admission

Applicants for admission to the PhD programme are expected to possess a first degree from a university or approved institution. In addition, an applicant must demonstrate his/her capability for graduate studies by obtaining a satisfactory score in the Graduate Management Admission Test (GMAT), or Graduate Record Examination (GRE), or some other equivalent test. For applicants who attended educational institutions where the language of instruction was not English and whose first language is not English, a satisfactory score in the Test of English as a Foreign Language (TOEFL) or the International English Language Testing Service (IELTS) is required.

Individual departments may also impose requirements on prior educational background and/or experience.

Part-time students who will remain employed during their study must demonstrate commitment to the PhD programme at the time of application by providing evidence of commitment from their employers.

Application Procedures

Application procedures are the same as for the MBA programme prescribed elsewhere in this Calendar.

Financial Assistance

Full-time PhD students are normally offered postgraduate studentships.

Enquiries

Enquiries about admission, financial assistance, course requirements and research speciality should be addressed to the department of intended study.

EXECUTIVE EDUCATION PROGRAMME

The School of Business and Management offers non-degree Executive Education Programmes to senior executives and middle management personnel for the purpose of providing broadened managerial perspectives to meet the challenge in today's dynamic business environment, as well as the urgent needs relating to new demands in management, business and technology expressed by the private sector. Topics of new interest or high demand are offered regularly. Specific programmes can also be tailor-made to meet the needs of specific business sectors.

FACULTY RESEARCH INTERESTS

Department of Accounting

Professor Jevons Chi-Wen LEE, Head of Department

Market models; inventory accounting; accounting policy and information.

Professor David K. EITEMAN, Visiting Professor

Financial management of multinational corporations; control systems used in multinational corporations.

Dr Danny WONG, Reader

Management accounting models; optimisation; production control.

Dr Yew-ming CHIA, Lecturer

Application of contingency theory and agency theory in the design of management accounting systems; materiality in an auditing context.

Dr Won W. CHOI, Lecturer

Empirical research on capital markets; valuation implication of book value and earnings; economic consequences of accounting choice; firm's response to tax law changes.

Dr Alice P.L. CHUI, Lecturer

Capital asset pricing model; arbitrage pricing theory; financial statement analysis.

Dr Howard J. GENSLER, Lecturer

Tax policy, applied economics.
School of Business and Management

Dr Berry F. C. HSU, Lecturer
Law and accounting; law and society; economic analysis of tax cases.

Dr Woody Y. WU, Lecturer
Management buyouts; management manipulation of accounting information; valuation of assets and liabilities; noise trading.

Dr Bing XIANG, Lecturer
Market-based accounting; agency theory; industrial organisation and accounting information.

Dr Guochang ZHANG, Lecturer
Contracting theory; information asymmetry in financial markets; corporate financial policy; theory of the firm.

Department of Business Information Systems

Dr Tung X. BUI, Senior Lecturer
Implementation of information systems in large organisations; group decision and negotiation support systems, crisis management support systems; design of distributed knowledge-bases for organisational decision making.

Dr Kar Yan TAM, Senior Lecturer and Deputy Head of Department
Decision support systems; information systems development and management; applications of information technology in finance, and logistic and operation management.

Dr Grace AU, Lecturer
Office automation; multi-media information system; document image processing; workflow analysis; executive information system; visual simulation modelling.

Dr Patrick Y.K. CHAU, Lecturer
Decision support systems; expert systems; visual interactive modelling; simulation; applications of management science techniques in marketing and finance.

School of Business and Management

Dr Kunihiko HIGA, Lecturer
Database design; expert systems design; object-oriented data model; distributed information systems.

Dr Sunro LEE, Lecturer
Methodological issues in expert systems development and testing, experimentation in software engineering; AI applications to managerial problem solving.

Dr Ben A. PETRAZZINI, Lecturer
Telecommunications policy; telecommunications reforms in developing countries; socioeconomic impact of telecommunications privatisation.

Dr Roy C. SCHMIDT, Lecturer
Interaction between organisations and information systems; information systems support for strategic decision making; information systems development (involvement and satisfaction).

Dr Brenda MAK, Visiting Lecturer
Model-based marketing decision support systems; systems and models for the information needs of marketing and sales managers; improving the utilisation of market information.

Dr Kalle LYYTINEN, Visiting Scholar
Systems design methods and methodologies; management and planning of information systems as a strategic issue; IS research strategies and their selection.

Department of Economics

Professor Isaac EHRLICH, Visiting Professor
General application of economic theory; economics of human resources; law and economics; economics of information and uncertainty; economic growth and development.
School of Business and Management

Professor Gregory CHOW, Adjunct Professor
Econometrics, optimal control.

Dr Leonard CHENG, Reader and Associate Dean of Business and Management
International trade, microeconomic theory.

Dr Ivan P. PNG, Visiting Reader
Economics of enforcement; pricing policies; international business economics.

Dr Francis T. LUI, Senior Lecturer
Economic growth; macroeconomic theory; social security; public economic policy.

Dr Louis CHAN, Lecturer
Industrial organisation, econometrics.

Dr Son Ku KIM, Lecturer
Microeconomics; uncertainty and information; game theory; industrial organisation; corporate finance.

Dr Yungsan KIM, Lecturer
Industrial organisation; managerial economics; corporate finance.

Dr Yum Keung KWAN, Lecturer
Econometrics; Bayesian Methods; macroeconomics.

Dr Joseph Y. LIN, Lecturer
Industrial organisation; economics of marketing; development economics; law and economics.

Dr Zhiqiang LIU, Lecturer
Applied microeconomics; economic growth and development; applied econometrics; corporate finance.

Dr Larry D. QIU, Lecturer
International economics; industrial organisation.

Dr Zhigang TAO, Lecturer
Microeconomic theory; industrial organisation; theory of the firm.

Dr Grant Allan TAYLOR, Lecturer
Econometrics; applied microeconomics; dynamic optimisation.

Dr Philip A. TROSTEL, Lecturer
Applied microeconomics; public economics; macroeconomics.

Dr Susheng WANG, Lecturer
Microeconomics; macroeconomics; econometrics.

Dr Changqi WU, Lecturer
Industrial organisation: strategic aspects of oligopolistic vertical integration, cooperative R&D; industry and competition analysis.

Dr Danyang XIE, Lecturer
Economic growth; general equilibrium theory.

Dr Chi-Wa YUEN, Lecturer
Economic growth; dynamic macro-policies in closed and open economies.
School of Business and Management

Dr Haiying ZHAO, Lecturer
- International economics; international business and multinational firms; growth and development economics; monetary economics.

Dr Lijing ZHU, Lecturer
- Theory of organisations; applied game theory; auction theory; comparative economic systems; China's economy.

Department of Finance

Professor Yuk-Shee CHAN, Dean of Business and Management
- Corporate finance; financial contracts and institutions; information economics.

Professor Nai-Fu CHEN
- Arbitrage pricing theory; empirical research in asset pricing.

Professor Sheridan TITMAN
- Corporate finance; portfolio management and performance evaluation; mergers and acquisitions.

Dr K. C. CHAN, Reader
- Investment; empirical asset pricing; options and futures; market microstructure.

Dr Eric CHANG, Reader and Deputy Head of Department
- Capital asset pricing theory; risk and return in futures trading; investment performance evaluation; market microstructure; applications of econometrics in finance.

Dr John WEI, Senior Lecturer
- Asset pricing theories; options and futures; international finance; applications of econometrics in finance.

Dr Jess BELTZ, Lecturer
- Theoretical and empirical issues in corporate finance and financial intermediation.

Dr Jun CAI, Lecturer
- Asset pricing; empirical finance; applied time series.

Dr Andrew P. CARVERHILL, Lecturer
- Valuation of derivative financial instruments; bond options, interest rate caps and associated computational problems.

Dr Lewis LU, Lecturer
- Market microstructure; continuous time heterogeneous information; continuous time finance.

Dr Ann Guenther SHERMAN, Lecturer
- Investment banking; shelf registration of new security issues; initial offering; interaction of investment and financing decisions.

Dr Jhinyoung SHIN, Lecturer
- Market microstructure; corporate finance; financial market regulation; derivative securities; investment analysis.

Dr Wilson TONG, Lecturer
- International finance; investment; economic theory.

Dr Keith WONG, Lecturer
- Bank regulation; corporate finance; industrial organisation.

Dr Takeshi YAMADA, Lecturer
- Empirical test of asset pricing with asymmetric information; corporate finance.
School of Business and Management

Mr Hong-Leung LAM, Assistant Lecturer

Empirical research in asset pricing; applied econometrics.

Dr Sudipto DASGUPTA, Visiting Lecturer

Corporate finance; auction theory; industrial organisation; game theory.

Department of Management

Professor Albert Y. LO, Deputy Head of Department

Statistics (Bayesian Estimation).

Professor Karlene ROBERTS, Visiting Professor

Psychology; organisational behaviour.

Dr Thomas R. JEFFERSON, Reader

Management science (particularly optimisation); operations management; statistics; information systems.

Dr Ann S. TSUI, Visiting Reader

Behavioral and organisational science; personnel/industrial relations; psychology.

Dr Jiing Lih Larry FARH, Senior Lecturer

Organisational behaviour; human resource management; research methods; comparative management.

Dr Hong CHEN, Visiting Senior Lecturer

Engineering economic systems; operations research.

Dr Marc J. DOLLINGER, Visiting Senior Lecturer

Organisational behaviour; organisational theory; general economic theory; managerial economics.

Dr Murray Z. FRANK, Visiting Senior Lecturer

Industrial behaviour; economics.

Dr Anthony T. CHAN, Lecturer

Statistics (time series and forecasting stochastic control); management science.

Dr Ki Ling CHEUNG, Lecturer

Production and operations management; decision theory.

Dr Haresh GURNANI, Lecturer

Enterprise and logistics management; operations and technology management; manufacturing strategy; total quality management; operations research; applied optimisation models.

Dr Inchi HU, Lecturer

Sequential analysis; stochastic control; stochastic process.

Dr Chun HUI, Lecturer

Human resource/organisational behaviour; cognitive psychology.

Dr Siming HUANG, Lecturer

Mathematical programming; combinatorial optimisation; graph theory; stochastic process; quantitative approaches to production/operations management problems; facility location/design modelling and analysis.

Dr Peter HWANG, Lecturer

Organisational behaviour; strategic management.

Dr Shing Keung LAW, Lecturer

Human resource management; marketing.
Dr Shu Ming NG, Lecturer

Mathematical programming; combinatorial optimisation; manufacturing models.

Dr Dorothy S.C. WONG, Lecturer

Management studies; marketing and organisational behaviour.

Dr Stephen A. LINSTEAD, Visiting Scholar

Organisation theory and behaviour especially postmodernism; management learning; education and development; organisational change and development; personnel/human resource management; qualitative research methods; strategic management.

Department of Marketing

Dr David Kwai-che TSE, Senior Lecturer

Cross-cultural consumer behaviour; cross-cultural managerial decisions; consumer satisfaction and post-choice process; marketing issues in greater China.

Dr Bernd H. SCHMITT, Visiting Senior Lecturer

Global branding and advertising; categorisation and brand positioning; waiting and delays in services; customer satisfaction and service quality; consumer behaviour in transforming socialist countries; corporate aesthetics.

Dr Jin Kyung HAN, Lecturer

Brand equity; comparative advertising; categorisation; context effects; advertisement effects; information processing.

Dr Sangman HAN, Lecturer

Price and promotion strategy, specifically reference price effects, price promotions, private label brands and price discounts; consumer segmentation and market structure; diffusion models.

Dr Namwoon KIM, Lecturer

Use of quantitative methods and modelling techniques in marketing decision making; new product diffusion models; consumer brand choice models; impact of perceived risk and information on consumer choice behaviour; organisational buying behaviour; use of dynamic models for strategic resource allocations; models incorporating bayesian updating and time-dependent coefficients; marketing research methodology; interface of marketing and R&D.

Dr Robert E. KRIDER, Lecturer

Retailing and distribution; long-term competition dynamics; competition in entertainment industries.

Dr Seshan RAMASWAMI, Lecturer

Models of consumer response to pricing and advertising; consumer decision making; market structure analysis; marketing in developing countries; pricing.

Dr Philip M. PARKER, Visiting Scholar

Competitive pricing and advertising strategy; diffusion of innovations; developing pre-launch forecasting methodologies: role of product characteristics, the social system, product perceptions on diffusion; study of particular forms of information asymmetry and their impact on marketing strategies.
The confocal microscope is an instrument for optical sectioning of the cell and intracellular chemistry. Professor Donald Chang (top) of the Department of Biology and one of his research students (right) are adjusting the microscope to obtain the best image.
In addition to the Schools of Science, Engineering, and Business and Management, the University has established the School of Humanities and Social Science. While placing emphasis on science, technology and business, the intention from the outset has been that the University's graduates should be more than narrow specialists. They should also be introduced to and become familiar with a wider range of intellectual perspectives. So over one-third of all undergraduates' programmes are spent on courses outside their major department, including at least 12 credits devoted to studies in humanities and social science.

The School comprises two divisions - the Division of Humanities and the Division of Social Science - and its role is twofold. First, its course offerings support the undergraduate students' main specialisations by illuminating the social, regional and international contexts of science, technology and business enterprise. This is crucial to the education of the region's future leaders and innovators in commerce, industry, the professions and public service. Second, the School offers studies in the Chinese cultural heritage and in other fields, with the aim of extending students' knowledge and widening their field of vision.

The School of Humanities and Social Science does not offer undergraduate degrees. But both divisions do offer postgraduate work, by means of a joint MA programme in Chinese Studies and the enrolment of research students for MPhil and PhD degrees. An MA programme in Humanities begins in 1993.

DIVISION OF HUMANITIES

Unlike the single-discipline departments in the University, the Division of Humanities offers a range of specialisations which includes history, art history, literature, philosophy, religion, and anthropology. A significant focus of interest is on studies relating to Hong Kong, China and the wider Asia-Pacific region. The Division will also offer courses in music, the performing arts and in other fields, in due course.

In line with the University's aim to produce specialists who will not only excel in their technical expertise but also be equipped with a broad outlook on life and the universe, the Humanities Division offers a range of service courses for undergraduates in science, engineering and management, and also a focused, integrated curriculum for postgraduates who are specialising in the humanities. For both, the first emphasis is placed on Asia, progressing from East Asia (Hong Kong, Macau, China and Japan) to cover South and Southeast Asia, to Europe by 1993-1994. Moreover, the Humanities programme is interdisciplinary and comparative in orientation for both teaching and research. Asia is approached not in isolation as a region but from a cosmopolitan perspective which promotes critical self-awareness in a global context. It is also noteworthy that the Humanities Division is not subdivided into traditional departments such as history, literature and philosophy, etc. Instead, it stands as an organised multiplicity which is an institutional locus for creative dialogue and interaction between faculty and students with different disciplinary interests.

Faculty

Professor and Head of Division:
Hong HSU, BA, MA, PhD National Taiwan

Professors:
Edward T. CH'IEN, BA National Taiwan; MA Univ of California, Riverside; MPhil, PhD Columbia
William TAY, BA National Chengchi; PhD Univ of California, San Diego
Ching-Hsien WANG, BA Tunghai Taiwan; MFA Iowa; PhD Univ of California, Berkeley

Visiting Professors:
Chang-tai HUNG, BA Chinese Univ of Hong Kong; MA, PhD Harvard
Lawrence R. SMITH, BA, MA, PhD Univ of California, Berkeley, BFA Eastern Michigan
Qinyuan WEI, Beijing; Graduate School, People's Univ, China

Visiting Reader:
John C. HOLT, AB Gustavus Adolphus Col; AM Graduate Theological Union; PhD Chicago

Senior Lecturers:
Kwok-kou Leonard CHAN, BA, MPhil, Cert of Educ, PhD Hong Kong; MA Toronto
Michelle YEH, BA National Taiwan; MA, PhD Univ of Southern California
Lecturers:
Paula ARAI, BA Kalamazoo Coll; MTS, MA, PhD Harvard
James P. BUCHANAN, Jr, BA Hampden-Sydney Coll; MA Yale; PhD Chicago
Li-ien CHEN, BA National Taiwan; MA Wake Forest; PhD Univ of Washington
Chi-Cheung CHOI, BA National Taiwan; MPhil Chinese Univ of Hong Kong; DLitt Tokyo
Bockja KIM, BA Yonsei; MST Yale; PhD Boston
David P. LAWRENCE, BA George Washington; MA, PhD Chicago
Ke-wen WANG, BA National Taiwan; MA, PhD Stanford

Assistant Lecturers:
Tik-sang LIU, BScSc, Dip Ed Chinese Univ of Hong Kong

Undergraduate Courses

The Division offers a range of electives in the fields of Chinese history, intellectual history, literature, philosophy, religion, and cultural anthropology. There are no prerequisites for most courses. Lectures, seminars, and individual tutorials are utilized in most courses, and students are assessed by coursework and/or written examinations.

Postgraduate Programmes and Research

Research programmes lead to the degrees of MPhil and PhD in the fields of early modern and modern Chinese history, South China studies, intellectual history, literature, religion, and philosophy. A taught MA programme in Chinese Studies is offered jointly with the Division of Social Science. An MA programme in Humanities is also offered beginning in 1993/94. Candidates for all postgraduate degrees should normally be good honours graduates in relevant disciplines, and those seeking admission to the PhD programme will generally be registered as MPhil students in the first instance, and will be subject to an upgrading review. Candidates for both MPhil and PhD degrees will attend such preparatory courses as are required, but the greater part of the work for each degree will be devoted to the preparation of a research thesis.

Master of Philosophy (MPhil) in Humanities

The primary aim of the MPhil programme in the humanities is to provide training for students who are intent on careers of teaching and research as professionals. Admission into the programme is contingent upon the possession of an MPhil or its equivalent. Students may decide to specialize in literature, history, cultural anthropology, or philosophy and religion, but are expected to transcend conventional disciplinary boundaries to cultivate expertise in inter-disciplinary dialogue and interaction.

Students may specialize in literature, history, cultural anthropology, philosophy and religion, but are expected to transcend conventional disciplinary boundaries to cultivate expertise in inter-disciplinary dialogue and interaction.

Master of Arts (MA) in Humanities

This MA degree by coursework may be pursued either as an end-in-itself or as preparation for the research degree of PhD. Students are required to take a minimum of 30 credits, of which at least 24 must be at the postgraduate level. Among these 24 credits, students may take six credits of independent studies under the supervision of a faculty member. Depending on their state of preparedness, students in the MA programme may be required to attend lecture courses, but the essential training takes place in seminars which involve the writing of term papers.

Given its emphasis upon comparative and interdisciplinary approaches, the Humanities Division is not subdivided into traditional departments such as history, literature, and philosophy. Each student will work under the guidance of the Division and a faculty supervisor to formulate a study plan combining course work within the chosen field of specialization as well as other disciplines.

Doctor of Philosophy (PhD) in Humanities

The primary aim of the PhD programme in the humanities is to provide training for students who are intent on careers of teaching and research as professionals. Admission into the programme is contingent upon the possession of an MPhil or its equivalent. Students may decide to specialize in literature, history, cultural anthropology, or philosophy and religion, but are expected to transcend conventional disciplinary boundaries to cultivate expertise in inter-disciplinary dialogue and interaction. All students are required to fulfill a minimum of 24 credits of course work and to demonstrate a reading knowledge of a language other than Chinese and English. After the successful completion of a qualifying examination covering areas specified for each specialization, the student will prepare, and have approved, a thesis research proposal. Subsequently, the candidate's independent research conducted under the supervision of a faculty member aims at the writing and defense of a doctoral thesis.

Students in literature will focus primarily on Chinese literature from comparative, interdisciplinary, and theoretical perspectives. Of the 24 credits in required course work, nine shall be from the core courses: Seminar in Comparative Literature, Modern Literary Theory, and Traditional Chinese Literary Theories and Criticism. To become a doctoral candidate, the student must pass a qualifying examination, which covers one major field (i.e., the chosen field of concentration) and one supporting field (e.g. another genre or period).

Students in history have the option of choosing one of the following two areas as their major field of concentration: Late Imperial China (from Ming to ca. 1800) and Modern China (since ca. 1800). Approaches to the historical subject can be political,
social and economic, intellectual, and comparative. Of the 24 credits in required course work, nine shall be from the core courses (selected according to the chosen field of concentration) and another nine shall be courses in a supporting field. The supporting field, selected by the student with the approval of the supervisor, can be in the humanities or any one area in the social sciences. The qualifying examination covers the chosen field of concentration, the supporting field, and one other field of the student's own choice.

Students in cultural anthropology and social history will focus their research primarily on South China. Research areas include not only Guangdong and Fujian, but span Taiwan through Hong Kong and Macau to Hainan. It also include overseas Chinese (in Southeast Asia, Japan, North America and Europe) and the minorities of south and southwestern China (She, Yao, Dan, etc.). Of the 30 credits in course work required, 12 shall be from the core courses: Field Research: Theory and Practice, Study of Archival and Folk Documents, Topics in Cultural Anthropology, and Topics in Social History. The qualifying examination covers three areas: the first focuses on theory and methods in cultural anthropology, the second on modern Chinese social and economic history, and the third on the ethnographical literature and ethnological issues of South China.

Students in philosophy and religion have the option of choosing one of the following three areas as their major field of concentration: East Asia (e.g., China and Japan), South Asia (e.g. India and Sri Lanka) and the West (e.g., France and Germany). These areas, in spite of appearances to the contrary, are to be understood, not eidetically as geopolitical enclosures, but in fluid terms as historically constituted cultural formations. Course work must be cross-cultural in scope and critically self-aware in methodology. Therefore, of the 24 credits in required course work, at least half shall involve theory, and philosophies and religions, in areas other than the chosen field of concentration. The qualifying examination covers one major and two minor fields. The major is the field of concentration whereas the minor fields can be theory, an area of philosophy and religion outside the area of concentration, or another discipline in the humanities and the social sciences. The culmination of the PhD programme in philosophy and religion is a successful oral defence of the thesis which should demonstrate not only originality in research and analysis but also a thorough bibliographical knowledge of relevant scholarly works including those written in a second language.

Faculty Research Interests

Professor Hong HSU, Head of Division

Early modern Chinese social and economic history, including the salt industry, internal migration and social change; the city in Chinese history.

Professor Edward CH'IEN

Pre-modern Chinese thought in a comparative perspective, especially of the early medieval and early modern periods of Chinese history.

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School of Humanities and Social Science

Professor William TAY

Critical theory, cultural criticism; twentieth-century Chinese literature.

Professor Ching-Hsien WANG

Classical Chinese poetry, poetics and traditional literary criticism; comparative literature, especially East-West relations; modern literature.

Dr John Clifford HOLT, Visiting Reader

Religion and social change in Buddhist cultures; Buddhist art in India and Sri Lanka.

Dr Kwok-kou Leonard CHAN, Senior Lecturer

Classical Chinese literary criticism; classical and modern Chinese poetry and fiction; theory of literary history.

Dr Michelle YEH, Senior Lecturer

Modern and contemporary Chinese literature; Chinese and Western comparative poetics; women's literature.

Dr Paula ARAI, Lecturer

Comparative religion, particularly Japanese Buddhism, and also modern American religious history, especially issues related to Asian-Americans, and the reinterpretation of Japanese Buddhism in light of the contributions of women.

Dr James Porter BUCHANAN, Lecturer

Comparative philosophies and religions, with emphasis on China and the modern and postmodern West. Principal concerns are classical and modern ethical theories as they relate to issues of science, technology, and society.

Dr Li-fen CHEN, Lecturer

Fiction; literary theories; comparative poetics; modern literature.
Dr Chi-Cheung Choi, Lecturer

The socio-economic history of China, particularly South China and overseas Chinese settlements including Hong Kong, Macau and Southeast Asia, from the 12th century to the present.

Dr Bockja Kim, Lecturer

Philosophy of religion; comparative philosophy of religion; history of Western philosophy; comparative ethics; philosophy of J.N. Findlay; Greek philosophy, German idealism, Wittgenstein.

Dr David Peter Lawrence, Lecturer

Comparative philosophy and philosophy of religion; problems of cross-cultural interpretation and relativism; monistic Kashmiri Saivism; Indian linguistic theory; Buddhist logic.

Dr Ke-wen Wang, Lecturer

Nationalist China, especially intra-party politics of the Guomindang; the political career of Wang Jingwei (1883-1944); modern Chinese nationalism.

Tik-sang Liu, Assistant Lecturer

Family and kinship, Chinese popular religion and shamanism, marginal cultures and fluid societies, ethnicity, ecological anthropology, and visual anthropology.

DIVISION OF SOCIAL SCIENCE

The Social Science Division seeks to accomplish three primary objectives. First, it aims at offering a rich, relevant and well-rounded body of courses designed to give undergraduate majors in the Schools of Science, Engineering and Business and Management an awareness of how a social science perspective can improve their understanding of the contemporary world. These courses should sharpen students’ appreciation of the intricate linkages between science and technology on the one hand and the human-ecological environment on the other, and also help students to relate their own career pursuits to the needs of society and the times, and include social, political and cultural considerations in their professional judgements.

Second, the Division is building a strong postgraduate programme to equip students with essential theoretical, methodological, and substantive skills to conduct independent research. The faculty provides students with close supervision in their work, guides them in the implementation of their research projects, and helps them to acquire standards of assessing their own work as well as that of others.

Third, it intends to create a centre of excellence in academic research and scholarly productivity. Faculty members are expected to maintain a lively intellectual environment where new ideas are explored, frontiers are pushed, and a genuine commitment is made to contribute relevant, innovative, and significant scholarship to the social sciences.

Faculty

Professor and Head of Division:

Hsi-sheng Ch'í, BA Tunghai Taiwan; MA, PhD Chicago
(Dean of Humanities and Social Science)

Professor:

William T. Liu, BA St Thomas Coll; MA Notre Dame; PhD Florida State

Senior Lecturer:

Edward Jow-ching Tu, BA Chung-Hsing; MA Pennsylvania; PhD Tennessee

Lecturers:

Jae Ho Chung, BA Seoul National; MA Brown; PhD Univ of Michigan, Ann Arbor
X. L. Ding, BS Hefei Polytechnic; MPhil Fudan; MA, PhD Harvard
Irene Eng, BA Univ of California, Los Angeles; MS Univ of Washington; PhD Univ of California, Los Angeles
Julian M. Groves, BA Durham; MA, PhD Univ of North Carolina, Chapel Hill
Gaochao He, BA Beijing; MA Southern Illinois; PhD Chicago
Yimin Lin, BA Huazhong Normal; MA CASS Graduate School; MA, MPhil, PhD Yale
Shiu Fung Lo, BA York Univ, Toronto; MA Waterloo; PhD Toronto
Mark Alan Montgomery, AB Dartmouth Coll; M.A.L.D., PhD Tufts
School of Humanities and Social Science

Gerald R. PATCHELL, BA, MA Western Ontario; PhD Simon Fraser
Barry SAUTMAN, MLS, JD Univ of California, Los Angeles; LLM New York; PhD Columbia
Kung-chia YEH, LLB National Tsing Hua; PhD Columbia

Assistant Lecturers:
Kimberly A. CHANG, BA Hobart & William Smith; MS, MA Syracuse
Alfred Ko-wei HU, BA, MA National Taiwan
De-piao TANG, BA Tunghai Taiwan; MA Pennsylvania State; MPhil Columbia

Undergraduate Courses

The Division offers a range of electives in the fields of economics, geography, political science, and sociology. There are no prerequisites for most courses. Lectures, seminars and individual tutorials are utilised in most courses, and students are assessed by course work and/or written examinations.

Postgraduate Programmes and Research

Postgraduate programmes lead to the degrees of MPhil and PhD in the fields of Chinese economics, human geography, sociology, and political science. A taught MA programme in Chinese Studies is also offered jointly with the Division of Humanities. Candidates for all postgraduate degrees should normally be good honours graduates in relevant disciplines, and those seeking admission to the PhD programme will generally be registered as MPhil students in the first instance, and will be subject to an upgrading review. Candidates for both MPhil and PhD degrees will attend such preparatory courses as are required, but the greater part of the work for each degree will be devoted to the preparation of a research thesis.

Master of Philosophy (MPhil) in Social Science

The MPhil degree is available to students who wish to pursue a major research enquiry in the fields indicated above, individually or in association with other research students. For the degree of MPhil, applicants must demonstrate the capacity to identify a worthwhile area of research, locate it within a relevant and critically reviewed literature, select and effectively employ an appropriate methodology, and systematically carry through the enquiry to an ordered conclusion. Students for the degree may attend such preparatory courses as are required, but the greater part of the work will be devoted to the preparation of a research thesis. Students are required to complete four three-credit courses and a thesis.

Faculty Research Interests

Professor Hsi-sheng CH'I, Dean of Humanities and Social Science, and Head of Division
Chinese domestic politics, foreign policies, ideology, and intellectual history.

Professor William LIU
Non-demographic aspect of fertility; family and social change; social context of ageing, and psychiatric epidemiology.

Dr Edward Jow-ching TU, Senior Lecturer
Demography, research methods, social dimensions of science and technology.

Dr X.L. DING, Lecturer
The rise of East Asian Industrial civilisation; comparative studies of communist and post-communist societies; state-making in Chinese and Western history; nationalism; social theory.

Dr Irene ENG, Lecturer
Regional and international development; the recent rapid industrialisation in parts of East and Southeast Asia.

Dr Julian McAllister GROVES, Lecturer
Controversies over science and technology; social theory; Hong Kong culture; qualitative research methods.

Dr Yimin LIN, Lecturer
Organisational behaviour, political economy, industrial organisations in post-Mao China; and business networks in Taiwan, Hong Kong, Singapore and South China.

Dr Gerald R. PATCHELL, Lecturer
The economic component of cultural geography, the diffusion of organisations and the creation of regional economies based on mutual development relationships.
JOINT DEGREE PROGRAMMES

Undergraduate Programme

BEng Programme in Computer Engineering

Computer Engineering is concerned with the design, analysis and implementation of computer systems. With the rapid advancement of microprocessor and networking technologies, numerous applications arise which require the use of computers. System design must take into consideration the requirements imposed and the technology available for implementation, while analysis techniques are useful in verifying if the requirements are met. There is a need worldwide for people with skills in computer hardware and software as well as the related technologies to solve existing and new applications. The BEng Programme in Computer Engineering is designed to prepare students for this challenge. It will be offered beginning in Fall 1994.

The programme aims at providing students with a sound foundation in: the theory and practice of computer and digital system design; systems and application software design and implementation; interfacing among computers, digital devices, computer networks, sensors and controllers; future application areas; and applying a computer-based systems approach to problem solving. Initially, existing Computer Science and Electrical and Electronic Engineering courses will be utilised, plus electives from other departments of the University.

For admission, in addition to satisfying the General Entrance Requirements of the University, candidates applying on the basis of the Hong Kong Advanced Level Examinations should have obtained acceptable grades in Pure Mathematics, Physics and one other approved technical subject. Candidates applying on the basis of other qualifications will also be expected to have achieved acceptable grades in examinations taken.

The following semester-by-semester description of the undergraduate programme defines what courses students must complete to satisfy programme requirements and the desirable times for taking particular courses. Students should note that all courses selected, including electives, require departmental approval. Explanations of core (C), required (R), and elective (E) courses can be found on page 29.
Joint Degree Programmes

First Year

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 102</td>
<td>Computer Fundamentals and Programming</td>
<td>3-0-2-4</td>
</tr>
<tr>
<td>COMP 111</td>
<td>Software Tools</td>
<td>2-0-2-3</td>
</tr>
<tr>
<td>ELEC 101</td>
<td>Basic Electronics</td>
<td>3-1-3-4</td>
</tr>
<tr>
<td>LANG 001</td>
<td>Language Skills Enhancement I</td>
<td>0-3-1-0</td>
</tr>
<tr>
<td>MATH 101</td>
<td>Multivariable Calculus</td>
<td>3-1-0-4</td>
</tr>
</tbody>
</table>

15 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 171</td>
<td>Data Structures and Algorithms</td>
<td>3-0-1-3</td>
</tr>
<tr>
<td>ELEC 112</td>
<td>Linear Circuit Theory</td>
<td>3-1-3-4</td>
</tr>
<tr>
<td>ELEC 121</td>
<td>Semiconductor Materials and Devices</td>
<td>3-1-0-3</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Differential Equations and Applications</td>
<td>3-1-0-4</td>
</tr>
</tbody>
</table>

17 credits

**Second Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 180</td>
<td>Computer Organisation</td>
<td>3-0-1-3</td>
</tr>
<tr>
<td>COMP 251</td>
<td>Principles of Programming Languages</td>
<td>3-0-1-3</td>
</tr>
<tr>
<td>ELEC 251</td>
<td>Digital Circuits and Systems</td>
<td>3-1-3-4</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td>MATH 111</td>
<td>Linear Algebra</td>
<td>3-1-0-4</td>
</tr>
</tbody>
</table>

17 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 252</td>
<td>Principles of Systems Software</td>
<td>3-0-2-4</td>
</tr>
<tr>
<td>COMP 271</td>
<td>Design and Analysis of Algorithms</td>
<td>3-1-0-3</td>
</tr>
<tr>
<td>ELEC 252</td>
<td>Microprocessors and Applications</td>
<td>3-1-6-5</td>
</tr>
<tr>
<td>MATH 241</td>
<td>Probability</td>
<td>3-1-0-4</td>
</tr>
</tbody>
</table>

16 credits

**Third Year**

**Fall Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 395</td>
<td>Final Year Project I</td>
<td>0-0-9-3</td>
</tr>
<tr>
<td>OR ELEC 395</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP/ELEC</td>
<td>COMP/ELEC Electives</td>
<td>6 credits</td>
</tr>
<tr>
<td>ELEC 241</td>
<td>Engineering Electromagnetics and Distributed Circuits</td>
<td>3-1-3-4</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>3-0-0-3</td>
</tr>
</tbody>
</table>

19 credits

**Spring Semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP 396</td>
<td>Final Year Project II</td>
<td>0-0-9-3</td>
</tr>
<tr>
<td>OR ELEC 396</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP/ELEC</td>
<td>COMP/ELEC Electives</td>
<td>6 credits</td>
</tr>
<tr>
<td>H&amp;SS</td>
<td>Humanities and Social Science Elective</td>
<td>3-0-0-3</td>
</tr>
<tr>
<td>LANG 103</td>
<td>Technical Communications</td>
<td>0-3-0-3</td>
</tr>
<tr>
<td>SB&amp;M</td>
<td>Business and Management Elective</td>
<td>3-0-0-3</td>
</tr>
</tbody>
</table>

18 credits

(1) Students exempted from this course by the Language Centre may replace it with a Humanities and Social Science elective.

(2) Students will enrol in either COMP 395/396 or ELEC 395/396.

(3) A combination of courses to be selected from an approved list to a total of 6 credits. Students should ensure that they have the proper prerequisites.

A minimum of 102 credits is required for the BEng programme in Computer Engineering. A student's choice of electives may result in this minimum being exceeded.

**Postgraduate Programmes**

**Master of Science (MSc) in Biotechnology**

Biotechnology is the application of techniques and processes that utilise biological systems for efficient and useful production of materials to serve human needs in agriculture, medicine, industry or daily life. Although biotechnology had its beginnings in man’s earliest cultivation of crop plants and the production of wines and cheeses, domestication of animals, modern developments of the field have been greatly stimulated by the recent advances in biochemistry and molecular biology. Biotechnology is endowed with enormous potential for the future, and Hong Kong is well suited for its deployment.
This MSc programme is designed for the training of research and technical personnel for the biotechnology industry in Hong Kong and its surrounding regions, and admits both full-time and part-time students. Normally, the programme will take 18 months to two years of full-time study and about twice as long for part-time students.

For this multi-disciplinary programme, undergraduate training is required in one of the following disciplines: biochemistry, biology, chemistry, chemical engineering and civil and structural engineering.

The curriculum comprises three groups of courses, with students being required to complete a total of 32 credits:

<table>
<thead>
<tr>
<th>Group</th>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>BICH 363 Principles of Biotechnology</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td></td>
<td>BICH 366 Biotechnology Seminar</td>
<td>0-4-0:4</td>
</tr>
<tr>
<td></td>
<td>BIOL 517 Advanced Topics in Molecular Biology</td>
<td>2-2-0:4</td>
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<tr>
<td></td>
<td>CENG 561 Biochemical Reactor Engineering</td>
<td>3-0-3:4</td>
</tr>
<tr>
<td></td>
<td>CIVL 542 Biological Waste Treatment</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td></td>
<td>and elective courses chosen from:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHEM 541 Advanced Analytical Chemistry</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td></td>
<td>CENG 562 Enzyme Catalysis, Transport Processes and Downstream Processing</td>
<td>3-0-3:4</td>
</tr>
<tr>
<td></td>
<td>CENG 564 Biomedical Engineering</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td></td>
<td>CENG 566 Food Processing</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td></td>
<td>CIVL 545 Hazardous Waste Treatment and Disposal</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td></td>
<td>CIVL 547 Industrial Waste Water Treatment</td>
<td>3-0-0:3</td>
</tr>
<tr>
<td></td>
<td>(# will be offered beginning in 1994-95.)</td>
<td></td>
</tr>
</tbody>
</table>

(2) (a) BTEC 567 Industrial Biotechnology [0-1-6:3]

Case studies of industrial biotechnology through examples of value-added and specialty product development.

(b) At least two of the following project courses:

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BTEC 695 Biotechnological Research</td>
<td>0-1-9:4</td>
</tr>
<tr>
<td>BTEC 696 Biotechnological Research</td>
<td>0-1-9:4</td>
</tr>
<tr>
<td>BTEC 697 Biotechnological Research</td>
<td>0-1-9:4</td>
</tr>
<tr>
<td>BTEC 698 Biotechnological Research</td>
<td>0-1-9:4</td>
</tr>
</tbody>
</table>

These are project courses in biotechnological fields under the supervision of faculty members. In each course, at the end of the semester, the student is required to submit a written report on the project and give an oral presentation.

(3) In addition, and without programme credits:

If a student has not completed the following, the student is required to complete the course(s) listed in the right-hand column.

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Course Code</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Any Business and Management courses</td>
<td>At least one approved undergraduate from the School of Business and Management</td>
<td></td>
</tr>
<tr>
<td>(b) Any chemical engineering courses</td>
<td>CENG 103</td>
<td></td>
</tr>
<tr>
<td>(c) Any biochemistry courses</td>
<td>BIOL 103</td>
<td></td>
</tr>
<tr>
<td>(d) AL Biology or equivalent</td>
<td>BIOL 001</td>
<td></td>
</tr>
<tr>
<td>(e) AL Chemistry or equivalent</td>
<td>CHEM 101</td>
<td></td>
</tr>
</tbody>
</table>

Students may first enter the programme in Fall 1993.

Master of Arts (MA) in Chinese Studies

The MA in Chinese Studies is an inter-disciplinary course-work degree programme at the postgraduate level jointly offered by the Division of Humanities and the Division of Social Science. It may be pursued either as an end-in-itself or as preparation for PhD studies.

Students are required to take a minimum of 30 credits, of which at least 24 must be at the postgraduate level. Among these 24 credits, students may take six credits of independent studies under the supervision of a faculty member. Depending on their state of preparedness, students may be required to attend lecture courses, but the essential training takes place in seminars which involve the writing of term papers.

Given an emphasis on an interdisciplinary approach, the programme offers courses in history, literature, philosophy, religion, anthropology, political science, economics and sociology which are China-related, and given by both the Humanities and Social Science Divisions.

Each student will work, under the guidance of the Joint Committee which oversees the programme and a faculty supervisor, to formulate a study plan combining course-work within a chosen specialisation as well as other disciplines. Three areas have been identified as possible fields of specialisation: tradition and modernisation (or modernisation in historical perspective); development both as a socio-economic process and as an intellectual outlook (i.e., developmentalism as a value); and the inter-related developments of Hong Kong, Macau, South China and South and Southeast Asia as a cultural and economic sphere. The term "Chinese" in "Chinese Studies" is broadly conceived. It includes Chinese not only in the People's Republic of China but also in diaspora.
UNDERGRADUATE COURSE DESCRIPTIONS

Course descriptions are arranged in alphabetical order, based on course codes.

DEPARTMENT OF ACCOUNTING

Explanations of prerequisites and exclusions can be found on page 23.

ACCT 101 Financial Accounting [3-1-0:3]
Introduction to the concepts and principles of accounting, analysis, recording and reporting of business transactions; preparation and interpretation of financial statements.

ACCT 122 Managerial Accounting [3-1-0:3]
Introduction to cost accounting; collection, analysis and interpretation of cost data; product costing; direct costing; cost distribution; techniques for cost control and performance evaluation.
Prerequisite: ACCT 101

ACCT 201 Intermediate Accounting I [3-0-0:3]
Further study of the application of generally accepted accounting principles to accounting for business organisations; evaluation of balance sheet accounts and the related effects on income determination.
Prerequisite: ACCT 101

ACCT 202 Intermediate Accounting II [3-0-0:3]
Continuation of ACCT 201. Special problems in accounting for long-term liabilities and owners' equities; business combinations and price-level adjustments; analysis of business performance.
Prerequisite: ACCT 201

ACCT 221 Cost/Management Accounting [4-0-0:4]
[Previous Course Code: ACCT 321]
Principles relating to standard costs and budgeting; reports and analysis for cost control; relevant costs for managerial decisions; capital budgeting.
Prerequisite: ACCT 122

ACCT 262 Business Law [4-0-0:4]
The legal system and process of Hong Kong; law of contract; law of business entities, inclusive of partnership and limited company; negotiable instruments and sales; guarantees; indemnity and suretyship.

ACCT 301 Advanced Accounting [4-0-0:4]
Accounting records for partnership and fund units; business combination; preparation of consolidation statements; insolvency and receivership records and statements; accounting for estates and trusts.
Prerequisite: ACCT 202

ACCT 304 Accounting Theory [3-0-0:3]
The theoretical framework of accounting; application of accounting theories for income measurement and assets valuation; the institutional framework; the development process of accounting standards and practices.
Prerequisite: ACCT 202

ACCT 306 Accounting for Non-Profit Organisations [3-0-0:3]
Reporting and management problems of non-profit organisations; basic concepts and principles of fund accounting; contemporary issues in not-for-profit and regulatory accounting.
Prerequisite: ACCT 202

ACCT 342 Taxation [4-0-0:4]
The Hong Kong taxation system and its administration; taxation of individuals, partnerships and corporations; taxation of overseas activities; stamp duty and estate duty; obligations compliance.
Prerequisite: ACCT 202

ACCT 343 The Law of Trust and Succession [3-0-0:3]
Common law and equity, trust, appointment, trustees' power and duties, breach and variation of trusts, trust accounts; wills, intestacy, probate and letters of administration, administration of assets, accounts; tax payable.
Prerequisite: ACCT 262

ACCT 344 Auditing [4-0-0:4]
Objectives, standards and procedures of auditing; preparation of working papers; applications of statistical sampling; computer-assisted auditing and auditing of electronic data processing (EDP) services; professional liability and ethics.
Prerequisite: ACCT 202

ACCT 361 Company Law [4-0-0:4]
Law relating to companies registered in Hong Kong; company formation and records; share and loan capital; management and administration; reconstructions; mergers and take-overs; liquidation and receivership.
Prerequisite: ACCT 262
Undergraduate Course Descriptions

ACCT 381 Quantitative Methods [3-0-0:3]
An introduction to quantitative techniques for management decisions. Theory and applications of linear programming; transportation and assignment problems; network analysis; inventory planning and control; simulation; queuing theory.
Prerequisite: MGMT 111

ACCT 384 Accounting and Financial Information Systems [3-0-0:3]
Analysis, design, implementation, control and evaluation of accounting and information systems and subsystems; decision support systems and expert systems for accounting and finance; database management concepts.
Prerequisite: BINF 101

ACCT 398 Independent Study [2-4 credits]
Directed study of selected problems in the area of accounting not covered in other courses.

DEPARTMENT OF BIOCHEMISTRY

Explanations of prerequisites and exclusions can be found on page 23.

BICH 103 Nature of Biochemistry and Biotechnology [3-0-0:3]
Major classes of biochemical compounds; enzymic catalysis, metabolic pathways; genetic information; genetic coding of protein synthesis, genetic engineering; industrial, medical and agricultural applications of biochemistry.
Textbook: Plummer, Biochemistry - The Chemistry of Life

BICH 121 Introduction to Biochemistry [3-0-0:3]
Major classes of biochemical compounds; primary, secondary, tertiary and quaternary structures of macromolecules; enzyme kinetics and mechanisms; biosynthesis of DNA and RNA; transfer RNA and protein synthesis.
Prerequisite: AL Chemistry or Biology
Textbook: Mathews and Van Holde, Biochemistry

BICH 122 Intermediary Metabolism [3-0-0:3]
Principles of bioenergetics and cellular structures; glycolysis, citric acid cycle, electron transport, oxidative phosphorylation and chemiosmosis; carbohydrate, lipid, amino acid and nucleotide metabolism; photosynthesis and nitrogen fixation.
Prerequisite: BICH 121
Textbook: Mathews and Van Holde, Biochemistry

BICH 172 Introductory Biochemical Laboratory [0-0-6:2]
Investigation of the properties of enzymes, lipids, carbohydrates and nucleic acids by physical-chemical methods and specific assays; purification and quantitation of biochemical compounds by various biochemical techniques.

BICH 182 Biochemical Laboratory Techniques [1-0-0:1]
Principles of biochemical techniques including spectrophotometry, column chromatography, electrophoresis, metabolite assay, enzyme assay, nucleic acid isolation and protein isolation.

BICH 201 Modern Molecular Biology [3-0-0:3]
Replication and roles of nucleic acids in cellular and viral systems; genome organisation, vector-host systems, expression and regulation of genes; catalytic RNA, genetic code evolution, RNA modification and processing, and anti-sense systems.
Prerequisites: BICH 121 and BICH 122
Textbook: Mathews and Van Holde, Biochemistry; and Lewin, Gene IV

BICH 211 Biochemistry of Nucleic Acids [0-0-6:2]
Plasmid isolation, gene cloning, restriction mapping; DNA sequencing, and identification of genes and gene products by blotting procedures. Part of the course will be given in the Winter Session.
Pre- or Corequisite: BICH 201

BICH 214 Structure and Function of Proteins [3-1-0:4]
(Previous Course Code: BICH 314)
Determination of protein sequences and three-dimensional structures; relationship between structure and function; principles of protein design and engineering.
Prerequisites: BICH 121 and BICH 122
Textbook: Creighton, Proteins. Structures and Molecular Properties

BICH 303 Immunochemistry [3-0-0:3]
Nature of the immune response; structure and diversity of antibodies; complement system and immunoassays.
Prerequisites: BICH 201 and BICH 211
Textbook: Basiro Davey, Immunology: A Foundation Text

BICH 313 Immunochemistry Laboratory [0-0-3:1]
Basic immunological techniques such as immunisation of animals, antibody preparations, immunodiffusion, immunoelectrophoresis, immunofluorescence, and enzyme immunoassays.
Corequisite: BICH 303
BICH 318  Cell Membranes and Metabolic Regulation  [3-0-0:3]
Structure of biological membranes, and the nature of membrane transport; receptor-
signalling systems in intermediary metabolism; role of enzymic phosphorylation, second
messengers; response to hormones and growth factors; action of oncogenes.
Prerequisites  : BICH 121 and BICH 122

BICH 355  Food Biochemistry  [3-0-0:3]
Functional and nutritional properties of major food ingredients including protein, oil and
starch from important agricultural crops; aspects of food formulation and production.
Prerequisites  : BICH 121 and BICH 122

BICH 363  Principles of Biotechnology: Pharmaceuticals,  [3-0-0:3]
Environment and Energy
Principles of important methods in biotechnology, including bioreactors, immobilised
enzymes, fermentation, filtration, chromatography, cryopreservation; drug formulation
and delivery; food processing; industrial impact of biotechnology.
Prerequisite : BICH 211

BICH 366  Biotechnology Seminar  [0-4-0:4]
An in-depth reading and analysis by the student of selected facets of biotechnology
leading to the submission of a written report, and its presentation in a seminar.
Prerequisite : BICH 363

BICH 376  Biochemistry of Diseases  [3-0-0:3]
Biochemical changes in diseases; diagnostic applications of biochemical and immuno-
logical methods; principles of drug action, and major classes of drugs.
Prerequisites  : BICH 121 and BICH 122

BICH 398  Biochemical Research  [0-1-9:4]
[Previous Course Code: BICH 388]
A research project conducted under faculty supervision: design of experiments, analysis
of data, submission of a written report and oral presentation.
Prerequisites  : BICH 201 and BICH 211

DEPARTMENT OF BUSINESS INFORMATION SYSTEMS

Explanations of prerequisites and exclusions can be found on page 23.

BINF 101  Introduction to Information Systems  [3-1-0:4]
An overview of management information systems in modern organisations. Fundamental
concepts and techniques of computing will be covered with hands-on business problem-
solving exercises using various software packages.
Exclusions : BINF 222 and COMP 101
Prerequisites : ACCT 101 and ACCT 122

BINF 221  Information Systems Analysis and Design  [3-1-0:4]
[Previous Course Code: BINF 224]
The process by which large software systems are built by teams of developers. Techniques
for modelling data and process requirements are surveyed and illustrated
using computer-aided software engineering (CASE) tools.
Exclusion : COMP 331
Prerequisite : BINF 101
Corequisite : COMP 102

BINF 222  Business Information Systems  [4-0-0:4]
Fundamental concepts and techniques of computing; use of computing systems for
solving problems related to the planning and control functions of the firm; methodology
of systems analysis, design and implementation; management and control of business
information systems.
Exclusion : BINF 101
Prerequisite : COMP 101

BINF 223  Business Applications Programming  [3-1-0:4]
Basic concepts of program design and development for business applications; a proced-
ural language will be used to illustrate the process of transforming a problem definition
to a software solution.
Prerequisites : COMP 102 and BINF 101 or BINF 222

BINF 226  Database Design and Administration  [2-1-0:3]
[Previous Course Code : BINF 225]
Fundamental concepts of database management systems and their usage for managing
the information resources of an organisation; methodologies for designing and managing
a database system to support business applications.
Exclusion : COMP 231
Prerequisites : COMP 102 and BINF 221
**BINF 298  Field Study Project**  
[0-0-6:2]
Selected organisational information systems projects conducted under the supervision of a faculty member. Students are required to submit project reports and present their findings at the end of the course.

**BINF 300  Special Topics**  
[2-4 credits]
This course covers current developments in the field of Information Technology. Topics to be selected by instructors.

**BINF 330  Information Systems Development and Project Management**  
[2-1-0:3]
Issues and techniques in managing a team of analysts and programmers involved in a system development project; topics include group interaction and problem solving, end user involvement, and resource planning.

Prerequisites: BINF 226 and MGMT 221
Corequisite: BINF 333

**BINF 333  Information Systems Project Development**  
[1-0-2:2]
Development of an information system with substantial complexity through the use of advanced development methodologies and CASE tools.

Prerequisites: BINF 226 and MGMT 221
Corequisite: BINF 330

**BINF 335  Telecommunications and Computer Networking Management**  
[3-0-0:3]
Essential elements of telecommunications in support of business activities; voice and data communication technologies; networking; communication architectures; protocols, and standards; Hong Kong's telecommunication infrastructure.

Prerequisite: BINF 330

**BINF 337  Multimedia Applications Development**  
[2-0-2:3]
Design and development of multimedia information systems which enable the archiving and retrieval of text, graphics, sound and video via optical storage devices. The use of multimedia technology in modern organisations will be discussed.

Prerequisites: BINF 226 and COMP 171

**BINF 339  Decision Support Systems**  
[3-0-0:3]
This course provides a user-oriented introduction to decision support systems; technical and managerial issues related to the development and implementation of decision support systems are discussed.

Prerequisite: BINF 226

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**DEPARTMENT OF BIOLOGY**

Explanations of prerequisites and exclusions can be found on page 23.

**BIOI 001  Introduction to Biological Sciences**  
[3-1-0:4]
Diversity of life forms; origin of life; chemical basis of life; cell structure and function; genetics and molecular biology; structure and life processes in animals and plants; evolution; ecology and environment.

Exclusion: AL Biology

**BIOI 101  Biodiversity**  
[3-0-3:4]
Diversity of life; taxonomy and phylogeny; different kingdoms of living organisms; structure and function; evolution and the generation of biodiversity.

Prerequisite: AL Biology

**BIOI 102  Environmental Biology**  
[3-1-0:4]
[Previous Course Code: BIOI 214]
Inter-relationships among groups of living forms and their community structures in the ecosystem; environmental issues; population growth; resource management; waste treatment and management. Tutorial hours will be spent on field trips during the semester.

Prerequisite: AL Biology

**BIOI 104  Cell Biology I**  
[3-0-3:4]
Evolution of cell; cytological techniques; structure and function of subcellular organelles; cytoskeleton; cell growth and division; germ cell and fertilisation; cellular mechanisms of development.

Exclusion: BIOI 201

Prerequisite: AL Biology

**BIOI 202  Animal Physiology**  
[3-0-3:4]
Structure and life processes in animals; neurophysiology; circulation; respiration; digestion and absorption; metabolism and energy regulation; muscle and movement; endocrinology.

Prerequisite: AL Biology

**BIOI 204  Cell Biology II**  
[3-0-0:3]
Continuation of BIOI 104; membrane transport; intracellular protein sorting and trafficking; cell signalling; cell adhesion molecules; cell junctions and the extra cellular matrix, differentiated cells and the maintenance of tissues; specialised cells.

Exclusion: BIOI 201

Prerequisites: BIOI 104, BICH 121, and BICH 122
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 206</td>
<td>Microbiology</td>
<td>3-0-3:4</td>
<td>BICH 121, BICH 122, and BIOL 211</td>
</tr>
<tr>
<td>BIOL 211</td>
<td>General Genetics</td>
<td>3-1-0:4</td>
<td>BICH 121, BICH 122, and BIOL 104</td>
</tr>
<tr>
<td>BIOL 213</td>
<td>Marine Biology</td>
<td>3-0-3:4</td>
<td>AL Biology</td>
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<tr>
<td>BIOL 216</td>
<td>Ecology</td>
<td>3-0-0:3</td>
<td>BIOL 102</td>
</tr>
<tr>
<td>BIOL 225</td>
<td>Plant Biology</td>
<td>3-0-3:4</td>
<td>BICH 121, BICH 122 and BIOL 104</td>
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<tr>
<td>BIOL 301</td>
<td>Advanced Seminars I</td>
<td>0-3-0:3</td>
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<tr>
<td>BIOL 302</td>
<td>Advanced Seminars II</td>
<td>0-3-0:3</td>
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<tr>
<td>BIOL 307</td>
<td>Immunobiology</td>
<td>3-0-3:4</td>
<td>BICH 121, BICH 122, and BIOL 104</td>
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<tr>
<td>BIOL 309</td>
<td>Developmental Biology</td>
<td>3-0-0:3</td>
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<tr>
<td>BIOL 312</td>
<td>Introduction to Biophysics</td>
<td>3-0-0:3</td>
<td>BIOL 104 and PHYS 101</td>
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<tr>
<td>BIOL 313</td>
<td>Advanced Marine Biology</td>
<td>2-1-0:3</td>
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<tr>
<td>BIOL 314</td>
<td>Tumor Biology</td>
<td>2-1-0:3</td>
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<tr>
<td>BIOL 316</td>
<td>Advanced Ecology</td>
<td>2-1-0:3</td>
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<tr>
<td>BIOL 317</td>
<td>Advanced Molecular Biology</td>
<td>2-1-0:3</td>
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</tbody>
</table>
**BIOL 319  Advanced Cell Biology** [2-1-0:3]
Recent advances in the study of cellular structure and function; molecular mechanisms of cell function; cell division and cell cycle; cell-cell signalling; molecular and cellular control in small eukaryotes; control of cell differentiation and morphogenesis.
Prerequisites : BIOL 104 and BIOL 204

**BIOL 323  Behavioral Biology** [3-0-0:3]
Animal behaviour at different levels; classical ethology and innate behaviour; behaviour genetics; learning; behavioral ecology; migration; social behaviour; territoriality; human psychology.
Prerequisites : BIOL 101 and BIOL 202

**BIOL 324  Neurobiology** [2-1-0:3]
Membrane excitability and synaptic transmission; sensory processes and control of movement; the limbic system and disorders of thought and feeling; plasticity in the nervous system; developmental neurobiology, learning and memory.
Prerequisites : BIOL 104 and BIOL 202

**BIOL 328  Plant Molecular Biology and Biochemistry** [2-1-0:3]
Continuation of BIOL 225; frontiers of plant physiology and biochemistry; plant genetics and genetic engineering.
Prerequisites : BICH 211 and BIOL 225

**BIOL 338  Pharmacology and Toxicology** [2-1-0:3]
Fundamental concepts of drug action and toxicity; clinically useful agents in central and peripheral disorders; toxicity of drugs and agents that are hazardous to living organisms.
Prerequisite : BIOL 202

**CENG 101  Chemical Process Principles** [3-1-0:3]
Processes and process variables, engineering data. The conservation principle. Material and energy balances on non-reactive and reactive process units and systems, recycle and purge. Unsteady state processes.

**CENG 103  Products and Processes** [2-1-0:2]
Physical, chemical and biochemical transformation of materials. Strategy of molecule synthesis, reaction-path synthesis, process synthesis, process route selection, batch versus continuous, from chemistry to engineering.
Prerequisite : HKCEE Chemistry

**CENG 131  Chemical Engineering Thermodynamics** [3-1-0:3]

**CENG 141  Process Fluid Mechanics** [3-1-0:3]
Applications of fluid mechanics in chemical engineering. Fluid properties; energy equations and applications in process systems; flow in pipes and channels, around submerged objects and through porous media. Laminar and turbulent flow, non-Newtonian flow and flow measurements.

Second- and Third-year courses are indicative only.

**CENG 201  Process Dynamics and Control** [3-0-1:3]
Basic concepts, mathematical model, classical transfer function, and modern state space representation. Dynamics of first and second order systems. Feedback control, closed loop systems. Frequency response methods. Cascade control, feed forward and ratio control. Control strategies for selected chemical and biochemical processes, control and instrumentation hardware.

**CENG 202  Process Design and Integration** [2-0-2:3]
Prerequisite : CENG 101
Chemical Engineering Laboratory I


Chemical Engineering Laboratory II

Continuation of CENG 297. Extended projects on selected topics.

Process Optimisation and Advanced Control


Prerequisite : CENG 201

Plant Design and Economics


Prerequisite : CENG 202
CENG 372  Environmental Control II  [3-0-0:3]

CENG 373  Environmental Management  [3-0-0:3]

CENG 381  Mathematical Methods in Chemical Engineering  [3-0-0:3]
Prerequisite:  MATH 151

CENG 397  Design Project  [0-1-12:6]
A major project on the design of a chemical or biochemical process to demonstrate the student’s ability in the synthesis and analysis of process design. The students, working in small teams under supervision, are expected to demonstrate creative and critical powers through choices and decisions made in areas of uncertainty.

CENG 398  Investigation Project  [0-1-6:3]
Students conduct in-depth experimental/computational investigations on selected topics in one of the departmental research areas. Students work under supervision and are encouraged to use their own initiative to complete an appropriate programme of work within the time allocated.

DEPARTMENT OF CHEMISTRY

Explanations of prerequisites and exclusions can be found on page 23.

CHEM 101  Fundamentals of Organic Chemistry  [3-0-0:3]
Various classes of organic compounds, emphasising organic chemical reactions and mechanisms and their importance in the area of biological chemistry. A course for non-Chemistry students who prefer to cover organic chemistry in a single semester. A concise combination of the topics of CHEM 111 and CHEM 112.
Prerequisite:  AL Chemistry

CHEM 102  Physical Chemistry: Fundamentals and Applications  [3-0-0:3]
A course for non-Chemistry students. Physical chemistry principles emphasising molecular structure and spectroscopy; their applications to chemistry and problems in related disciplines.
Prerequisite:  AL Chemistry

CHEM 111  Organic Chemistry I  [3-0-0:3]
Structure and bonding; regio-, geometric, and stereoisomerism; polar and radical reactions of alkenes and alkynes; substitution and elimination reactions; and an introduction to NMR, IR, and mass spectrometry.
Exclusion:  CHEM 101
Prerequisite:  AL Chemistry

CHEM 112  Organic Chemistry II  [3-0-0:3]
Continuation of CHEM 111. Dienes, resonance and aromatics; electrophilic aromatic substitution and nucleophilic aromatic substitution; benzylic and allylic reactivity; the chemistry of carbonyl compounds and carboxylic acid derivatives; and pericyclic reactions.
Prerequisite:  CHEM 111

CHEM 114  Organic Chemistry Laboratory I  [0-1-3:2]
Experimental techniques of organic chemistry; preparation / properties / reactions of representative organic compounds; separation / analysis / characterisation of organic compounds.
Prerequisite:  CHEM 111

CHEM 131  Inorganic Chemistry I  [3-0-0:3]
[Previous Course Code: CHEM 231] Bonding and structure of inorganic compounds; principles/ theories that assist in understanding their behaviour.
Prerequisite:  AL Chemistry
Undergraduate Course Descriptions

CHEM 132  Inorganic Chemistry II  [3-0-0:3]
[Previous Course Code: CHEM 232]
Mechanism of inorganic reactions; organometallic and bioinorganic chemistry; catalysis.
Prerequisite: CHEM 131

CHEM 201  Basic Inorganic Chemistry  [3-0-0:3]
An introduction to organic chemistry of metallic elements and their major compounds with
emphasis on the properties and structures of solid materials; transition metal complexes
and the theories of chemical bonding in these substances; selected aspects of
organometallic chemistry; bioinorganic chemistry.
Prerequisite: AL Chemistry

CHEM 215  Organic Chemistry Laboratory II  [0-1-3:2]
Continuation of CHEM 114. The synthesis of significant types of organic compounds and
their derivatives; laboratory separations of mixtures of organic substances, identification
of compounds by functional group tests; instrumental methods of separation, identification
and analysis.
Prerequisite: CHEM 114

CHEM 221  Physical Chemistry I  [3-0-0:3]
[Previous Course Code: CHEM 121]
Properties of gases; classical chemical thermodynamics/equilibrium, energetics of chemical
reactions, and changes of state; thermodynamic aspects of electrochemistry.
Prerequisite: AL Chemistry

CHEM 222  Physical Chemistry II  [3-0-0:3]
[Previous Course Code: CHEM 122]
Chemical kinetics of gases and solutions; kinetic aspects of electrochemistry; quantum
chemistry; group theory and symmetry; valence and bonding.
Prerequisite: CHEM 221

CHEM 224  Structure and Properties of Polymers  [3-0-0:3]
The structure-property relationship in polymers in the glassy, rubber and crystalline
states; phase equilibrium and transitions; viscosity and viscoelastic flow behaviour;
fabrication processing of polymeric materials.
Prerequisite: CHEM 101 or CHEM 112

CHEM 226  Physical Chemistry Laboratory I  [0-0-6:2]
[Previous Course Code: CHEM 124]
Physical chemical measurements with emphasis on analysis for precision,
accuracy, and propagation of errors; basic principles and techniques of physical chemical
measurements together with laboratory instrumentation and application of computers to
solve assigned problems.
Prerequisite: CHEM 221

CHEM 227  Symmetry Principles and Group Theory in Chemistry  [3-0-0:3]
Principles of molecular symmetry and point group and their application to problems of
structure, reaction and spectroscopy.
Prerequisite: CHEM 222
Textbook: Cotton, Chemical Applications of Group Theory, Third Edition

CHEM 233  Synthetic Inorganic Chemistry  [1-1-3:3]
[Previous Course Code: CHEM 333]
Preparation and characterisation of inorganic compounds, with special emphasis on
apparatus and techniques employed in modern synthetic inorganic chemistry.
Prerequisite: CHEM 132

CHEM 242  Analytical Separation and Instrumental Analysis  [3-0-3:4]
Theories and practical aspects of modern instrumental methods of qualitative and
quantitative analyses; instrumental approaches to selectivity and sensitivity. Topics
include spectroscopic methods, chromatography, and electrochemical methods.
Prerequisite: CHEM 112

CHEM 311  Natural Products  [3-0-0:3]
Biogenetic approach to secondary metabolites. Structures, chemistry, and biological
activities of naturally-occurring organic molecules, such as terpenoids, alkaloids, phenolic
compounds, organic acids, lipids, and macromolecules.
Prerequisite: CHEM 101 or CHEM 112

CHEM 312  Structural Elucidation in Organic Chemistry  [0-0-6:2]
Designed for students planning to do postgraduate work. Qualitative organic analysis
using semi-microchemical techniques, modern chromatographic separation procedures
and molecular spectroscopy.
Prerequisite: CHEM 215
CHEM 313 Intermediate Organic Chemistry [3-0-0:3]
This course provides further training in the multistep organic synthesis of natural and
unnatural products, and will focus on the retrosynthetic analysis, pericyclic reactions,
carbonium ion rearrangements and organic photochemistry. CHEM 313 is a prerequisite
for students wishing to take CHEM 511/512 as part of their undergraduate programme.
Prerequisite: CHEM 112
Textbooks: Warren, Stuart, Organic Synthesis: The Disconnection Approach, and
Warren, Stuart, Workbook for Organic Synthesis: The Disconnection Approach

CHEM 321 Photochemistry of Organic and Organometallic Materials [3-0-0:3]
Fundamental concepts and theories of molecular photochemistry are presented with a
mechanistic emphasis on organic photochemistry. The material covered includes poly-
meric systems with organic and inorganic structures. Applications to microelectronics and
chemical industry are described.
Prerequisite: CHEM 102 or CHEM 221

CHEM 325 Physical Chemistry Laboratory II [0-0-6:2]
[Previous Course Code: CHEM 225]
Vibrational, rotational and electronic properties of simple molecules and macromolecules;
use of contemporary instrumentation for analysis of kinetic properties of reacting systems.
Application of computer techniques.
Prerequisites: CHEM 222 and CHEM 226

CHEM 398 Undergraduate Research [2-3 credits]
[Previous Course Code: CHEM 400]
Offered every semester, this course carries two to three credits. Also offered in the
summer session for three credits. Students do original research in accordance with their
ability and background. The course is assessed by a letter grade and may be repeated
for credit, but the total number of credits is not to exceed 6.
Prerequisites: CHEM 114 and CHEM 226

CHEM 399 Undergraduate Thesis [0-0-9:3]
The student performs original research and writes a thesis under the supervision of a
faculty member. The thesis should include the results of original research carried out in
CHEM 398.
Prerequisite: CHEM 398
CIVL 202  Construction Engineering  [3-1-0:3]
Study of the construction industry; fundamental principles underlying construction practices; economic factors in planning, organizing, and operating a construction force; field trips and analyses of Hong Kong construction projects.

CIVL 231  Structural Theory and Design I  [3-1-1:3]
Statically determinate structures, influence lines, deflections of simple structures; design philosophy, structural forms, codes of practice, ultimate limit state design of reinforced concrete members with flexure; masonry construction.
Prerequisites: CIVL 111 and CIVL 112

CIVL 232  Structural Theory and Design II  [3-1-1:3]
Statically indeterminate structures, arches and frames, deflections of structures, energy methods; design of reinforced concrete members with axial loading, shear and torsion; design of structural steelwork, connections and built-up sections.
Prerequisite: CIVL 231

CIVL 242  Water Pollution Control  [3-1-0:3]
Introduction to basic concepts of water quality; fundamentals of water and wastewater treatment processes; analysis of treatment process flowsheets; analysis of water quality management alternatives.
Prerequisite: CIVL 141

CIVL 251  Fluid Mechanics I  [3-0-3:3]
Introduction to the fundamentals of fluid mechanics; includes the kinematics of fluid flow, energy, hydrodynamics, momentum, dimensional analysis and forces on submerged bodies.
Exclusion: MECH 121
Prerequisites: AL Physics and Pure Mathematics

CIVL 252  Fluid Mechanics II  [3-0-3:3]
Application of the fundamentals of fluid mechanics to flow in conduits, open channel flow and an introduction to hydrology.
Exclusion: MECH 221
Prerequisite: CIVL 251

CIVL 271  Geotechnical Engineering I  [3-1-2:3]
Introduction to minerals, rock, structural geology and geologic processes, introduction to soil mechanics principles; includes properties of geotechnical materials, soil classification, phase relationship, state of stress, ground water flow consolidation and shear strength.
Prerequisites: CIVL 111 and CIVL 112

CIVL 272  Geotechnical Engineering II  [3-1-2:3]
Soil engineering with emphasis on principles of shear strength, flow and seepage problems; consolidation theory and design; short and long term slopes stability; introduction to geotechnical earthquake engineering.
Prerequisite: CIVL 271

CIVL 301  Civil Engineering Planning  [3-1-0:3]
Planning concepts; role of engineering, economic, environmental, and social information; institutional, political and legal aspects; planning of water regulation and distribution systems, waste treatment and disposal systems, land and water transportation systems.
Prerequisite: CIVL 101

CIVL 302  Construction Engineering and Technology  [3-1-0:3]
Construction engineering theory, construction processes; methods engineering, automation and mechanisation; task analysis; adaptive systems and control concepts; construction technologies; studies of tunnelling and ground support, harbours, dams, bridges and high-rise structures.
Prerequisite: CIVL 202

CIVL 303  Project Management  [3-1-0:3]
Project initiation, development and management, planning and estimating procedures, CPM, PERT, precedence, resource scheduling, networking, cost and project control; legal considerations; simulation in networks, stochastic networks, project management and evaluation.

CIVL 323  Construction Materials Technology  [3-1-0:3]
Properties and constituents of cement paste, microcracking and failure mechanisms; concrete: quality control, high strength, admixtures; properties of bitumen: mix design, response to loading; structure, properties and engineering uses of metals, polymers, ceramics and composites.
Prerequisite: CIVL 111
Undergraduate Course Descriptions

CIVL 324  Prestressed Concrete  [3-1-0:3]
Historical development; methods of prestressing, elastic analysis and design; flexural and shear capacity; losses of prestress; anchorage zones; composite members; design procedures and applications.
Prerequisite :  CIVL 334

CIVL 331  Structural Mechanics  [3-1-0:3]
Failure theories, stress and strain transformations, stress concentration, fatigue; three dimensional analysis of stress and strain, fundamentals of elasticity theory, bending of beams, torsion, plates and shells.
Prerequisite :  CIVL 112

CIVL 332  Dynamic Loads and Structural Behaviour  [3-1-0:3]
Dynamic loads on structures caused by wind, earthquakes, impact, moving loads and vibration. Dynamic behaviour of structures under this loading and design methods to resist these forces.
Prerequisite :  CIVL 334

CIVL 333  Structural Stability  [3-1-0:3]
Euler buckling, uniform and non-uniform sections, eccentric loading; continuous struts; stability of frames; energy and approximate methods; thin walled strut; lateral buckling of beams; bending and buckling of thin plates.
Prerequisite :  CIVL 335

CIVL 334  Structural Theory and Design IIIA  [3-2-0:3]
Matrix and finite element analysis of structures, cable and suspension bridges, structural dynamics; design of reinforced concrete building frames, structural walls, slabs, retaining structures; introduction to prestressed concrete.
Prerequisite :  CIVL 232

CIVL 335  Structural Theory and Design IIIB  [3-2-0:3]
Thin-walled structures, bending of plates, elastic stability, plastic analysis; elastic and plastic design method of steel structures, beams, stanchions, buckling, beam-columns, girders, frames, limit state design; timber construction.
Prerequisite :  CIVL 232

CIVL 336  Bridge Design  [3-1-0:3]
Historical development; design philosophies; loadings; articulation; design of slab, slab-and-beam bridge decks, orthotropic plates and grid frames, plate web and box girder bridges.
Prerequisites :  CIVL 334 and CIVL 335

CIVL 337  Numerical Methods in Structural Analysis  [3-1-0:3]
Review of matrix methods; linear systems, solution of large systems of linear equations; applications of finite elements in structural analysis modelling of structural systems.
Prerequisite :  CIVL 334

CIVL 343  Air Atmospheric Pollution: Processes and Control  [3-0-1:3]
Application of fluid mechanics and chemistry to air pollution problems; includes transportation, dispersion, chemical conversion, scavenging and deposition of pollutants in the atmosphere.
Prerequisites :  CIVL 141 and CIVL 251

CIVL 344  Solid Waste Management  [3-1-0:3]
Practical aspects of problem solving with discussion on current collection methods, systems, and equipment, available disposal techniques and facilities, material recovery and recycling systems.
Prerequisite :  CIVL 141

CIVL 345  Environmental Analysis of Aqueous Systems  [3-0-3:3]
Sampling and laboratory analytical procedures used in the examination of water and wastewater; introduction to "wet" chemical methods and instrumental methods of analysis.
Prerequisite :  CIVL 242

CIVL 351  Environmental Hydraulics and Hydrology  [3-2-0:3]
Planning, analysis and design of municipal water and wastewater systems and sewage outfalls; includes community planning, loading and demand forecasting, hydraulics, stormwater management, and drainage system design.
Prerequisite :  CIVL 252

CIVL 352  Water Resources Systems  [3-2-0:3]
Broadening of hydraulic/hydrologic concepts; includes water resources systems, mathematical skills for analysing natural and engineered water resource systems, planning and design of water resource systems using representative examples.
Prerequisite :  CIVL 351

CIVL 353  Groundwater Hydraulics and Pollution Transport  [3-1-0:3]
Study on groundwater hydraulics; includes steady flow in aquifers, aquifer and well testing, regional flow; study on groundwater pollution transport; includes transport processes, and advection-dispersion models.
Prerequisites :  CIVL 101 and CIVL 252
Undergraduate Course Descriptions

CIVL 361  Transportation Facilities Design  [3-1-0:3]
Geometric and structural design of transportation facilities; alignment design of travelways; capacity and functional design of travelways and terminals; pavement design and construction; economic and other design considerations.
Prerequisites :  CIVL 232 and CIVL 261

CIVL 362  Transportation System Operations  [3-1-0:3]
Principles of transportation system operations; traffic characteristics and methods of measurement; safety and operations; models of transportation operations and congestion applied to urban streets, freeways, and mass transit services.
Prerequisite :  CIVL 261

CIVL 372  Geotechnical Engineering III  [3-2-0:3]
Theory of consolidation and its application to foundation design; methods of minimising settlements and effect of settlement on structures; bearing capacity of soils; footing design; lateral earth pressures; retaining-wall design; pile and pile foundation; slope stability, seepage.
Prerequisite :  CIVL 272

CIVL 373  Environmental Geotechnology  [3-1-0:3]
Soil and site characterisation in relation to natural and man-made hazards; waste containment; and waste site remediation techniques.
Prerequisites :  CIVL 141 and CIVL 271

CIVL 397  Civil Engineering Project I  [0-0-5:2]
Applications of civil engineering principles to the design, planning, experimental or analytical investigation of current engineering design and research problems.
Prerequisite :  Completion of the second-year Civil and Structural Engineering programme.

CIVL 398  Civil Engineering Project II  [0-0-8:3]
Continuation of CIVL 397 in the Spring Semester.

DEPARTMENT OF COMPUTER SCIENCE

Explanations of prerequisites and exclusions can be found on page 23.

COMP 101  Computing Fundamentals  [2-0-2:3]
[Previous Course Code: COMP 181]
Introduction to computers and computing tools primarily for non-Engineering students. Computer hardware and software; data communications. Window managers; word processing; electronic mail; spreadsheets; presentation graphics; database management; statistical analysis.
Exclusion :  BINF 101

Introduction to computers and programming techniques. Computer hardware and software. Programming in a high-level programming language. Algorithms and problem solving; subprograms; recursion; simple data structures; abstract data types; debugging techniques.

COMP 105  Pascal Programming  [0-1-1:2]
Self-paced learning of the Pascal programming language for students with prior programming experience in a structured programming language other than Pascal.
Prerequisite :  COMP 102

COMP 106  C Programming  [1-0-2:2]
Extensive study of the C programming language: program structure, functions, control flow, pointers, arrays, structures, file input and output; use of programming tools in the UNIX environment; relevant programming techniques.
Prerequisite :  COMP 102

COMP 111  Software Tools  [2-0-2:3]
Using, primarily, the UNIX environment and shell programming techniques as a platform for developing software tools. Laboratory exercises will also give hands-on practice with tools that increase programmer productivity such as document preparation tools, window managers, and Internet facilities.
Prerequisite / Corequisite :  COMP 102

COMP 171  Data Structures and Algorithms  [3-0-1:3]
Basic data structures in the design and implementation of algorithms. Lists, stacks, queues, trees, graphs, hash tables: their specification, representation and manipulation; applications to sorting and searching; external data organisation; memory management. Applications of data structure and algorithms such as compilers.
Prerequisite :  COMP 102
COMP 180  Computer Organisation  [3-0-1:3]

[Previous Course Code: COMP 191]
The internal organisation and operation of digital computers; levels of design of computer systems: digital logic design, microprogramming, machine language, assembly language, and operating systems; introduction to advanced computer architectures such as RISC and parallel computers.
Prerequisite : COMP 102

COMP 211  Introduction to Software Engineering  [2-0-1:2]
Methods and tools for planning, designing, implementing, validating, and maintaining large software systems. Laboratory work to build software systems as a team using appropriate software engineering tools and techniques.
Prerequisites : COMP 102 and COMP 111

COMP 221  Fundamentals of Artificial Intelligence I  [3-1-0:3]
Foundations underlying design of intelligent systems. Relations between logical, statistical, cognitive, biological paradigms; basic techniques for heuristic search, theorem proving, knowledge representation, adaptation; applications in vision, language, planning, expert systems.
Prerequisite : COMP 171

COMP 231  Database Management Systems  [3-0-1:3]
Principles of database systems; conceptual modelling and data models; logical and physical database design; query languages and query processing; database services including concurrency, crash recovery, security and integrity. Hands-on DBMS experiences.
Exclusion : BINF 226
Prerequisite : COMP 171

COMP 241  Interactive Systems Design  [2-0-1:2]
User interfaces design. Graphics-based user interfaces. User-centred design methods, usability. Related hardware, algorithms, software, programming packages, standards, look and feel of software systems. Aesthetic considerations, fonts, colour, sound, etc. Application specific considerations.
Prerequisite : COMP 171

COMP 251  Principles of Programming Languages  [3-0-1:3]
[Previous Course Code: COMP 201]
Comparative studies of programming languages, programming language concepts and constructs; introduction to non-imperative programming paradigms: object-oriented, functional, logical, concurrent programs; basic concepts in program translation and interpretation, implementation issues: storage allocation, and runtime organisation.
Prerequisites : COMP 111 and COMP 171

Principles, purpose and organisation of systems software; processes, tasks, scheduling, interprocess communication, synchronisation, mutual exclusion; memory management; device management; file systems, security and protection, multi-CPU systems, computer networking and distributed computing.
Prerequisites : COMP 171 and COMP 180

COMP 271  Design and Analysis of Algorithms  [3-1-0:3]
Algorithms design techniques: divide and conquer, dynamic programming, greedy algorithms, backtracking, local search algorithms; string processing, graph algorithms, arithmetic algorithms, algorithm analysis techniques; introduction to parallel algorithms.
Prerequisite : COMP 171

COMP 321  Fundamentals of Artificial Intelligence II  [3-0-1:3]
Prerequisite : COMP 221

COMP 331  Information Systems Analysis and Design  [2-1-0:2]
Introduction to information systems analysis and design; systems and organisations, systems life cycle, requirement analysis, systems design, software development, file and database design; project management, implementation and evaluation, hardware and software selection.
Exclusion : BINF 221
Prerequisite : COMP 231

COMP 341  Computer Graphics  [3-0-2:3]
Object identification and characterisation, operations and transformations on these objects; display devices and primitives; geometric modelling, viewing in 3D, hidden lines and surfaces, illumination models; curve and surface representations.
Prerequisite : COMP 271

COMP 351  Systems Modelling  [2-1-0:2]
Basic concepts and techniques in modelling complex systems; elements of probability, statistics, Markov processes, queuing theory, operational analysis and simulation. Model parametrisation, verification and validation.
Exclusion : COMP 211 prior to 1992
Prerequisites : MATH 241 or MATH 244, and COMP 252
Undergraduate Course Descriptions

COMP 361 Computer Networks and Communication [3-0-1:3]
Principles of network architectures and communications protocols; the ISO reference model; local area networks; internetworking and gateways; network naming and addressing; flow and congestion controls; security and protection.
Prerequisites: MATH 241 or MATH 244, and COMP 351

COMP 371 Theory of Computation [3-1-0:3]
Theory of automata and formal languages: finite automata, context-free languages; turing machines, recursive function theory, Church's Thesis, uncomputability, computational complexity, P and NP, NP-Complete problems.
Prerequisite: COMP 271

COMP 381 Design and Analysis of Computer Architectures [3-1-0:3]
[Previous Course Code: COMP 391]
Analysis, synthesis and evaluation of different computer architectures. Emphasis on computer design with respect to price/performance and their relation to architectural choices such as pipelining, memory hierarchy, input/output, instruction set design, vector processing, and multiprocessing.
Prerequisite: COMP 180

COMP 395 Computer Engineering Project I [0-0-9:3]
[Also ELEC 395]
Each Computer Engineering student is required to take COMP/ELEC 395 and 396. The project is conducted under the supervision of a Computer Science or Electrical and Electronic Engineering faculty member.

COMP 396 Computer Engineering Project II [0-0-9:3]
[Also ELEC 396]
Continuation of COMP 395.

COMP 397 Final Year Project I [0-0-3:1]
A project in an area of specialisation in Computer Science under the guidance of a faculty member. Objectives are to integrate the classroom material from several courses, and to apply them to solve practical problems.

COMP 398 Final Year Project II [0-0-9:3]
Continuation of COMP 397.

DEPARTMENT OF ECONOMICS

Explanations of prerequisites and exclusions can be found on page 23.

ECON 110 Microeconomics [3-1-0:4]
Theory of the firm in a free enterprise system; theory of consumer demand; market structures and resource allocation; selected topics on government regulation.
Exclusions: ECON 111, ECON 191, and SOSC 112

ECON 111 Microeconomics [3-1-0:4]
Theory of the firm in a free enterprise system; theory of consumer demand; market structures and resource allocation; selected topics on government regulation. More topics treated in greater depth and more quantitatively than ECON 110.
Exclusions: ECON 110, ECON 191, and SOSC 112
Prerequisite: C or above in AL Mathematics or C in Economics

ECON 112 Macroeconomics [3-1-0:4]
[Previous Course Code: ECON 121]
Theory of national income determination and business fluctuation; monetary and fiscal policies; selected topics in macroeconomic policies and open economy macroeconomics.
Exclusion: SOSC 112

ECON 191 Highlights in Microeconomics [3-1-0:4]
Application of economic theory to important real-world problems; reading of selected excerpts from important books and articles; discussions of methodology and current controversies.
Exclusions: ECON 110, ECON 111, and SOSC 112
Prerequisite: B or above in AL Economics

ECON 213 Intermediate Microeconomics [4-0-0:4]
[Previous Course Code: ECON 211]
Consumer theory; theory of the firm; equilibrium analysis in alternative market structures; general equilibrium and welfare economics; topics in information economics.
Prerequisite: ECON 110 or ECON 111 or ECON 191

ECON 214 Managerial Microeconomics [4-0-0:4]
Demand estimation, business and economic forecasting; production, innovation and cost; market structure, strategic behaviour and pricing; decision making under uncertainty; government regulation of business activities; case studies.
Prerequisite: ECON 110 or ECON 111 or ECON 191

ECON 215 Intermediate Macroeconomics [4-0-0:4]
[Previous Course Code: ECON 221]
Inflation, unemployment, national income, and business cycles; consumption, investment, and growth; money and interest rate; interactions among various sectors of the macroeconomy; critical evaluation of different approaches to macroeconomic analysis.
Prerequisite: ECON 112
Undergraduate Course Descriptions

ECON 216 Managerial Macroeconomics [4-0-0:4]
Analysis of macroeconomic variables such as national income, interest rates, unemployment, inflation, investment, consumption; government fiscal, monetary and trade policies; implications for managerial decision making; case studies.
Prerequisite: ECON 112

ECON 232 Business Forecasting and Econometrics [4-0-0:4]
Topics on the application of statistical methods to economic inquiry; emphasis on applied regression analysis for business forecasting and financial planning.
Prerequisites: ECON 110 or ECON 111 or ECON 191, and BINF 111

ECON 311 Industrial Organisation and Competitive Strategy [4-0-0:4]
Market structures and their implications for industry performance and strategic decision-making by firms; entry deterrence, advertising, R&D investments; horizontal and vertical integration, strategic alliances, joint ventures and multi-market interaction.
Prerequisites: ECON 110 or ECON 111 or ECON 191, and Calculus

ECON 313 The Economics of Organisation and Management [4-0-0:4]
Internal organisation of the firm; theory of contracts and the principal-agent problem; incentive and monitoring schemes; intra-firm cooperation, coordination and conflict; centralised and decentralised corporate structures; case studies.
Prerequisite: ECON 110 or ECON 111 or ECON 191

ECON 315 Environmental and Natural Resource Economics [4-0-0:4]
Application of economic theory to environmental and natural resource management; economic analysis of externalities; common property problem, public policies towards pollution control; exhaustible resources and limits to economic growth.
Prerequisite: ECON 110 or ECON 111 or ECON 191

ECON 317 Urban and Transportation Economics [4-0-0:4]
Examination of urban spatial problems using economic theory; studies of congestion in residential housing and transportation; air pollution and zoning; transportation infrastructure; Hong Kong's land use and housing policy.
Prerequisite: ECON 110 or ECON 111 or ECON 191

ECON 319 International Business and Multinational Firms [4-0-0:4]
The relevance of political, technological, and economic environments for international business; political risk; national and regional trade policies; international monetary problems and exchange rate volatility; joint ventures, and strategic alliances.
Prerequisites: ECON 110 or ECON 111 or ECON 191, and ECON 112

ECON 321 China's Foreign Trade and Investment [4-0-0:4]
Evolution of China's foreign trade policy and the organisation of trade; commodity composition and geographical distribution; economic reform and policy towards foreign investment and joint ventures; opportunities for Hong Kong.
Prerequisite: ECON 110 or ECON 111 or ECON 191

ECON 323 Labour Economics and Human Resources [4-0-0:4]
Occupational choice; labour market analysis and determination of earnings; unions and collective bargaining; employment and job turnover; family, fertility and population issues; training, health, and human capital.
Prerequisite: ECON 110 or ECON 111 or ECON 191

ECON 325 Law and Economics [4-0-0:4]
The economic approach to law; externalities, transaction costs, and the "Coase Theorem"; the problem of the commons; the social cost of crime and law enforcement; case studies.
Prerequisite: ECON 110 or ECON 111 or ECON 191

ECON 332 Advanced Econometric Methods [4-0-0:4]
Commonly used methods in estimating and forecasting economic relationships; the general linear model; estimation under non-standard conditions; dynamic specifications; qualitative choice models; simultaneous linear equations; various computer applications.
Prerequisite: ECON 232 or equivalent

ECON 333 Monetary Economics [4-0-0:4]
Theories of money supply and demand; role of money in business fluctuations, inflation, and growth; banking, financial intermediation, and money supply; targets and instruments of monetary policy; rules versus discretion.
Prerequisite: ECON 112

ECON 335 International Economics [4-0-0:4]
Real and monetary aspects of the international economy; basis for trade and investment; tariff and non-tariff trade barriers; trade and industrial policies; international monetary systems and the mechanisms of adjustment.
Exclusion: SOSC 211
Prerequisites: ECON 110 or ECON 111 or ECON 191, and ECON 112

ECON 337 Economics of Regulation and Antitrust Policy [4-0-0:4]
Impact of industrial structure and government regulation on firm behaviour and industry performance; interaction between regulatory agencies and regulated industries; safety regulation, public utility regulation, transportation regulation, and antitrust policy.
Prerequisite: ECON 110 or ECON 111 or ECON 191
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 339</td>
<td>Public Finance</td>
<td>[4-0-0:4]</td>
<td>Types of expenditures; sources of government revenue and alternative tax policies; public investments versus income transfers; alternative methods of deficit financing; fiscal policy impact on income distribution, growth, and welfare. Prerequisite: ECON 110 or ECON 111 or ECON 191</td>
</tr>
<tr>
<td>ECON 341</td>
<td>Political Economy</td>
<td>[4-0-0:4]</td>
<td>Economic models of voting and government structure; influence of voters, special interest groups, legislators, and the bureaucracy on government expenditure, taxation, and economic policies; rent seeking behaviour and welfare economics. Prerequisite: ECON 110 or ECON 111 or ECON 191</td>
</tr>
<tr>
<td>ECON 343</td>
<td>Economic Development and Growth</td>
<td>[4-0-0:4]</td>
<td>Theories of externally and internally induced growth; roles of population, human and physical capital, international trade and investment, technology, and government policies; demographic and economic transition; comparison of development strategies. Prerequisites: ECON 110 or ECON 111 or ECON 191, and ECON 112</td>
</tr>
<tr>
<td>ECON 347</td>
<td>Hong Kong's Economy</td>
<td>[4-0-0:4]</td>
<td>Hong Kong's post-war economic performance and prospects for further growth and development; analyses of key sectors; income and wealth distributions; Hong Kong, South China, and strategies for economic upgrading. Prerequisites: ECON 110 or ECON 111 or ECON 191, and ECON 112</td>
</tr>
<tr>
<td>ECON 351</td>
<td>Comparative Economic Systems</td>
<td>[4-0-0:4]</td>
<td>The free enterprise systems of the U.S., Western Europe, Japan, and the NICs; economic reform and transition of centrally planned economics; efficiency of alternative economic systems; the Asian Pacific region. Prerequisites: ECON 110 or ECON 111 or ECON 191, and ECON 112</td>
</tr>
<tr>
<td>ECON 393</td>
<td>Undergraduate Workshop</td>
<td>[4-0-0:4]</td>
<td>Workshop for undergraduates to present research findings and to attend presentation by students and faculty. Prerequisite: Third-year status.</td>
</tr>
<tr>
<td>ECON 395</td>
<td>Independent Study</td>
<td>[1-3 credits]</td>
<td>Faculty directed independent study for 1-3 credits. Prerequisite: Third-year status.</td>
</tr>
<tr>
<td>ECON 399</td>
<td>Special Topics in Economics</td>
<td>[2-4 credits]</td>
<td>Special topics in the current development of theoretical and empirical economics; topics vary with instructor. Prerequisite: Third-year status.</td>
</tr>
</tbody>
</table>

**DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING**

Explanations of prerequisites and exclusions can be found on page 23.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC 001</td>
<td>Electronic and Information Technology</td>
<td>[2-1-0:3]</td>
<td>Microelectronics, laser technology, computer networking, control and robotics, fuzzy logic, digital signal processing, multimedia and video technology, and wireless communication; and business issues such as intellectual property protection and management, electronic revolution and business strategies, and managing a high technology company.</td>
</tr>
<tr>
<td>ELEC 102</td>
<td>Electronic Circuits</td>
<td>[3-1-3:4]</td>
<td>Linear circuits; operational amplifiers; nonlinear circuit applications; non-linear circuit elements such as diode, JFET, MOSFET, BJT from circuit point of view; differential and multistage amplifiers; output stages and power amplifier. Prerequisite: ELEC 112 Textbook: A.S. Sedra and K.C. Smith, Microelectronic Circuits, Third Edition</td>
</tr>
<tr>
<td>ELEC 112</td>
<td>Linear Circuit Theory</td>
<td>[3-1-3:4]</td>
<td>Basic concepts of circuit theory; tableau, nodal and modified nodal analysis and mesh analysis; Telegen theorem, Thevenin and Norton equivalent circuits; linearity and superposition; network representations: phasor method, Fourier and Laplace transform; state equations; first order circuits; two-port network. Prerequisite: AL Mathematics Textbook: Johnson, Hillum and Johnson, Basic Electric Circuit Analysis, Second Edition</td>
</tr>
<tr>
<td>ELEC 151</td>
<td>Digital Circuits and Systems</td>
<td>[3-1-3:4]</td>
<td>Information representation; design of combinatorial and sequential logic circuits; introduction to logic families (TTL and CMOS); in-depth treatment of one logic family; asynchronous sequential circuits; programmable logic devices; special digital systems. Laboratory assignments will make extensive use of the latest computer-aided design (CAD) tools for design, simulation and testing. Textbook: Mano, Digital Design</td>
</tr>
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</table>
ELEC 152 Microprocessors and Applications [3-1-6:5]
[Previous Course Code : ELEC 252]
Microprocessor assembly language programming; microcomputer system connection and timing; interrupts; digital and analogue interfacing; DMA; peripherals; C programming; laboratory work will be based on two standard microprocessor families.
Textbook : Douglas V. Hall, Microprocessors and Interfacing, Programming and Hardware, Second Edition

ELEC 202 Analogue Integrated Circuit Analysis and Design [3-1-3:4]
Bipolar, CMOS and JFET modelling; transistor current sources; active loads; emitter followers; common-emitter, common-base configurations; differential amplifiers; Class A and Class B amplifiers; operational amplifiers; frequency response; feedback circuits; matching; CAD tools - SPICE.
Prerequisite : ELEC 102 or ELEC 101 prior to 1993

ELEC 211 Signals and Systems [3-1-0:3]
Linear time-invariant systems; principle of superposition and convolution; pole-zero plots; second order systems; frequency response; Bode and Nyquist plots; stability analysis; Routh-Hurwitz and Nyquist stability criterion.
Prerequisites : ELEC 112 and MATH 151

ELEC 212 Digital Signal Processing [3-1-0:3]
Discrete-time signal and systems; z-transform; discrete Fourier transform and FFT; sampling of analogue signals and sampling rate conversion; IIR and FIR filter design techniques; multirate digital signal processing; response of linear systems to random processes.
Prerequisite : ELEC 211

ELEC 214 Communication Systems [3-0-0:3]
[Previous Course Codes : ELEC 313, and ELEC 213]
Analogue and digital communication systems; signal and noise analysis; signal transmission and filtering; baseband, AM, PM, and FM transmission; phase-locked loops; sampling theorem; coded pulse modulation; multiplexing; telecommunication systems; information and coding theory.
Prerequisite : ELEC 112
Textbook : A.B. Carlson, Communication Systems

ELEC 221 Semiconductor Materials and Devices [3-1-0:3]
[Previous Course Code : ELEC 121]
Semiconductor fundamentals. Introduction to semiconductor device electronics: P-N junctions, the bipolar junction transistor (BJT), the junction field-effect transistor (JFET), metal-oxide-semiconductor (MOS) capacitors and the MOS field-effect transistor (MOSFET).
Prerequisite : AL Physics

ELEC 241 Electromagnetics and Distributed Circuits [3-1-3:4]
Electromagnetic wave concepts; Faraday's Gauss's and Ampere's laws; Maxwell's equations; distributed circuits; transmission lines; plane waves; microwave networks; radiation and antenna fundamentals; geometrical and physical optics.
Prerequisites : MATH 101 and MATH 151

ELEC 301 CMOS VLSI Design [3-0-3:4]
CMOS process and design rules; MOS device electronics; CMOS circuit and logic circuit characterisation and performance estimation; VLSI design and verification tools. Laboratory work will be centred on industry standard tools.
Prerequisites : ELEC 151 and ELEC 221

ELEC 303 ASIC Design and Testing [2-0-3:3]
Types of Application Specific Integrated Circuits; ASIC design methodologies and tools. Field Programmable Gate Arrays (FPGA), MASK programmable Gate Array and Standard Cell; ASIC design using hardware description language; ASIC testers and testing techniques. Students will be asked to design and test an ASIC.
Prerequisite : ELEC 151
Textbook : S.D. Brown et.al, Field Programmable Gate Arrays

ELEC 304 Analogue VLSI [3-0-0:3]
Combining analogue building blocks to design opamps, comparators, amplifiers, transistors and gain stages; analogue VLSI circuits for signal processing and data conditioning; A/D and D/A converters; switched-capacitor and continuous-time filters, oscillators, mixers and PLL; applications in fibre-optic networks, telecommunications, computers, personal communications, audio and HDTV.
Prerequisite : ELEC 202
ELEC 310 Random Variables and Stochastic Processes [3-0-0-3]
An essential course for signal analysis, estimation and processing, control and network communications. Theory of probability, random variables, density functions, transformation of random variables, characteristic functions, stochastic processes, discrete processes, Wald equation, Markov chain, queuing theory.

ELEC 314 Digital Communications [3-0-0-3]
Representation of signals; gaussian processes; optimum receiver design; equivalent signal sets; non-white channel noise; maximum likelihood receiver; coherent and non-coherent signalling; PRK, PSK, FSK, OOK; spread spectrum techniques; CDMA for cellular communications.
Prerequisite: ELEC 214
Textbook: J.G. Proakis, Digital Communications

ELEC 315 Computer Communication Networks [3-0-0-3]
Overview of telecommunication networks: network architecture and switching techniques. Introduction to queuing theory. Study of OSI model: physical layer, data link layer, network layer, and transport layer. Local area networks: random access, polling, ring and bus networks.
Prerequisite: ELEC 211
Textbook: Jean Walrand, Communication Networks

ELEC 317 Digital Image Processing [3-0-0-3]
Two-dimensional systems and mathematics preliminaries; image perception; image sampling and quantisation; image transform; image representation by stochastic models; image enhancement, filtering and restoration.
Prerequisite: ELEC 211

ELEC 321 Integrated Circuit Devices [3-0-0-3]
This course provides a detailed account of semiconductors devices which are found in integrated circuits such as p-n junction, Metal-semiconductor contact, Metal-Oxide-Semiconductor capacitor, MOSFET and bipolar junction transistor. Computer-aided simulator models for integrated circuit devices.
Prerequisite: ELEC 221
Textbook: S.M. Sze, Physics of Semiconductor Devices

ELEC 322 Fundamentals of Integrated Circuit Technology [3-0-0-3]
Step-by-step IC fabrication sequences; wafer characterisation; surface preparation; resist coating and removal; vapour deposition and evaporation; wet processing; thermal processing; mask fabrication and advanced lithography. Physical principles of these processes will also be covered.
Prerequisite: ELEC 221
Textbook: D.J. Elliott, Integrated Circuit Fabrication Technology

ELEC 323 Optical and Quantum Electronics [3-0-0-3]
An introduction to the fundamentals of optical and quantum electronics. Topics include basics of quantum mechanics, optical radiation and light-emitting diodes, optical detection and photodetectors, noise in optical detection and generation, laser and applications.
Prerequisite: ELEC 241
Textbook: J. Wilson and J.F.B. Hawkes, Optoelectronics

ELEC 331 Data and Image Compression [3-0-0-3]
Prerequisite: ELEC 211
Textbook: M.Rabbani and P.W. Jones, Digital Image Compression Techniques

ELEC 332 Information Theory and Error-Correcting Codes [3-0-0-3]
Self and mutual information measures; Shannon's theory; discrete memoryless channel models; channel capacity; Huffman algorithm; algebraic block codes: Hamming, Reed-Muller, cyclic, BCH, Reed-Solomon, Goppa; burst error-correcting codes; convolutional codes.
Prerequisites: ELEC 214 and MATH 311
Textbook: M.Y. Rhee, Error Correcting Coding Theory

ELEC 342 Fibre Optics and Applications [2-0-3-3]
Optical fibres as data transmission media; guided-wave optics; semiconductor light sources; photodetectors and their fabrication technologies; application of these components to data transmission and telecommunication.
Prerequisite: ELEC 241
Textbooks: P.K. Cheo, Fibre Optics: Devices and Systems; and D.L. Lee, Electromagnetic Principles of Integrated Optics
ELEC 343  RF Engineering  [3-0-0-3]
Mobile cellular systems: specifications, cell coverage, antennas, cochannel and
noncochannel interferences, frequency management and channel assignment, handoffs.
Satellite systems: orbital aspects, space craft, link design, modulation and multiplexing,
multiple access. Broadcasting systems: AM, FM, TV.
Prerequisites  :  ELEC 214 and ELEC 241
Textbooks  :  W.C.Y.Lee, Mobile Cellular Telecommunications Systems; and
T.T. Ha, Digital Satellite Communications

ELEC 344  Microwave Circuits  [2-0-3-3]
Techniques of analogue circuit technology in the high-frequency regime. S-parameter
design of high-frequency active circuits; computer-aided analysis and design of micro-
wave circuits. MIC structures such as microstrip and various types of waveguides;
Monolithic Microwave integrated circuits.
Prerequisite  :  ELEC 241

ELEC 371  Automatic Control Systems  [3-0-0-3]
Introduction to linear time-invariant systems. Formulation of mathematical models. State-
space equations and system stability. Analysis and synthesis of linear feedback control
systems. Time-domain and frequency-domain performance measures. Design by root
Prerequisites  :  ELEC 102 or ELEC 101 prior to 1993, and ELEC 112, or MECH
102
Textbook  :  G.F.Franklin, J.D.Powell, A.Emami-Naeini, Feedback Control of
Dynamic Systems, Second Edition

ELEC 374  Introduction to Robotics  [2-0-3-3]
Introduction to the fundamental concepts of robotics. The course will cover rigid body
motions, forward and inverse kinematics of open-chain manipulators, manipulator
Jacobsins, force relations, dynamics and position control robot manipulators. Force
control and trajectory generation. Collision-avoidance and motion planning. Robot
programming languages.
Exclusion  :  MECH 371
Prerequisites  :  COMP 102, MATH 151 and MATH 152
Textbook  :  J.Craig, Introduction to Robotics: Mechanics and Control

ELEC 377  Digital Control Systems  [2-0-3-3]
Digital computers in design and implementation of feedback control systems. Sampling,
z-transform, digital filters and discretisation of continuous compensation. Design of digital
control systems using transform techniques and state-space methods. Pole placement
and introduction to LQR design. Least square identification of unknown physical systems.
Prerequisite  :  ELEC 371

ELEC 361  Medical Imaging  [3-0-0-3]
Introduction to image processing and imaging techniques for medical applications. Image
representation, image enhancement, rank filter; image restoration, inverse filtering;
projection theorem, computed tomography, magnetic resonance imaging, ultrasound,
photon emission tomography imaging and diffraction tomography.
Prerequisite  :  ELEC 241
Textbook  :  R.H.T. Bates and M.J.Mcdonnell, Image Restoration and Recon-
struction

ELEC 383  Principle of Biomedical Instrumentation  [2-0-3-3]
Basic principles of biomedical instrumentation; basic description of biomedical signals,
their characteristics and modern measurement techniques; biomedical sensors, signal
processing and biomedical electronics. Students will be asked to complete projects to gain
practical experience.
Prerequisite  :  ELEC 102 or ELEC 101 prior to 1993

ELEC 395  Computer Engineering Project I  [0-0-9-3]
[Also COMP 395]
Each Computer Engineering student is required to take COMP/ELEC 395 and 396. The
project is conducted under the supervision of a Computer Science or Electrical and
Electronic Engineering faculty member.

ELEC 396  Computer Engineering Project II  [0-0-9-3]
[Also COMP 396]
Continuation of ELEC 395.

ELEC 397  Final Year Project I  [0-0-18-6]
Each undergraduate student is required to take ELEC 397 and 398. The project is
conducted under the supervision of a faculty member.

ELEC 398  Final Year Project II  [0-0-18-6]
Continuation of ELEC 397.
DEPARTMENT OF FINANCE

Explanations of prerequisites and exclusions can be found on page 23.

FINA 111  Financial Management  [4-0-0:4]
[Previous Course Code: FINA211]
An introductory course in financial management. Topics include the concepts and techniques of valuations of cash flows; capital budgeting; risk and return of assets; capital structure and dividend policy.
Prerequisites  : ACCT 101; ECON 110 or 111 or 191; and MGMT 111

FINA 221  Investment Analysis and Portfolio Management  [4-0-0:4]
Analysis of the investment strategies for individual investors and institutions; applications of modern portfolio theory for personal and institutional investment; analysis of common stocks, bonds, and options and futures.
Prerequisite  : FINA 111

FINA 232  Financial Markets  [4-0-0:4]
The organization and functions of money and capital markets; money instruments; financial institutions; and markets for various securities, such as government and corporate bonds, and mortgage securities.
Prerequisite  : FINA 111

FINA 321  Advanced Financial Management  [4-0-0:4]
Advanced theories and techniques of corporate valuation; capital structure; leasing; mergers and acquisitions, options, warrants and convertible bonds.
Prerequisite  : FINA 111

FINA 331  Management of Financial Institutions  [4-0-0:4]
Management of the different types of financial institutions; commercial and investment banking; lending criteria and regulatory issues; market microstructure.
Prerequisite  : FINA 111

FINA 332  Derivative Securities  [4-0-0:4]
Forwards, futures and options on commodities, equities, bonds, etc. Speculation and hedging strategies; risk shifting. Option pricing using Black-Scholes and computational techniques.
Prerequisite  : FINA 111

FINA 342  International Finance  [4-0-0:4]
The foreign exchange market, eurocurrency markets, international bond markets and equity markets in various countries. Currency options, futures, swaps and corporate risk management. Transfer pricing and tax strategies.
Prerequisite  : FINA 111

FINA 351  Insurance Markets and Institutions  [4-0-0:4]
Design and operation of insurance markets and institutions. Moral hazard, adverse selection and risk sharing mechanisms. Design and pricing of insurance contracts.
Prerequisite  : FINA 111

FINA 353  Real Estate Finance  [4-0-0:4]
Real estate markets and investments, appraisal, and real estate development; institutional aspects of real estate finance; sources of mortgage capital; optimal financing strategies.
Prerequisite  : FINA 111

FINA 361  Fixed Income Securities  [4-0-0:4]
Pricing of bonds and term structure of interest rates, duration analysis and immunisation techniques. Risk management using interest rate swaps, options, futures, collars, caps, etc.
Prerequisite  : FINA 111

FINA 399  Special Topics in Finance  [2-4 credits]
This course covers current developments in the field of finance. Topics to be selected by instructors.
Prerequisite  : FINA 111

DIVISION OF HUMANITIES

Explanations of prerequisites and exclusions can be found on page 23.

HUMA 100  Special Topics in Humanities  [3-0-0:3]
This course focuses on a coherent collection of topics selected from the humanities. A student may repeat the course for credit, if the topics studied are different each time.

HUMA 101  Chinese Institutional History  [3-0-0:3]
Provides a historical review of Chinese institutions such as land economy, trade and urban economy, the economy and modernisation, social structure, empires and rulers, bureaucracy, local government, pre-modern rebellions, and revolutionary China.

HUMA 102  Introduction to the History of Hong Kong and Macau  [3-0-0:3]
A regional review focusing on the role and influence of Hong Kong and Macau on the history of southern China; an examination of Portuguese and British occupation and administration.
HUMA 103 The Modernisation of Japan [3-0-0:3]
Examines Japan's development from Tokugawa feudalism to its military and economic role in the 19th and 20th centuries, and focuses on the effects of these changes upon modern development.

HUMA 104 Introduction to Literature [3-0-0:3]
An introduction to the nature, origin, development and use of literature, this course identifies the relevance of literary study in modern society and seeks to relate poetry and other types of literature to the general pursuit of truth.

HUMA 105 Cultural and Ethical Values [3-0-0:3]
Examines, compares and contrasts ethical traditions within a variety of cultures and attempts to assess their relevance or irrelevance to the contemporary situation.

HUMA 106 Introduction to Chinese Philosophy [3-0-0:3]
This course aims to familiarise students with some important concepts and doctrines of the two main streams of Chinese philosophy, Confucianism and Taoism.

HUMA 107 Indigenous Modes of Thought in Pre-Buddhist Chinese History [3-0-0:3]
The purpose of this course is to carry out a critical analysis of a variety of canonical texts of the late Zhou and early Han periods. Special emphasis is placed on humanism as a comparative problematique in pre-Buddhist Chinese and Judaico-Christian traditions.

HUMA 108 Buddhism and the Chinese Intellectual Tradition [3-0-0:3]
The dynamics of intercultural interaction and choice-making; Buddhism as an Indian religion and its encounters with indigenous Chinese traditions.

HUMA 109 Philosophy and Life [3-0-0:3]
Introduces students to philosophical reasoning about issues important to human life. We study the ideas of some major Eastern and Western philosophers and discuss their relevance to the contemporary world.

HUMA 110 Approach to Poetry [3-0-0:3]
The study of poetry as a primary literary genre; this course attends to the rise, development and diversification of poetry in both the Chinese and Western traditions. Guided reading in masterpieces from classical and modern periods.

HUMA 111 Introduction to Anthropology [3-0-0:3]
An introduction to the principles and key concepts of anthropology. It will study the biological and cultural past and present of the human species in a comparative and holistic way.

HUMA 112 China and the West in the Rhetoric of Comparativism [3-0-0:3]
This course will examine the mutual perceptions of China and the West in terms of comparativism as a type of consciousness, the complexities of which will be explored and problematised as a form of rhetoric. Exclusion: HUMA 109 prior to 1992

HUMA 113 Environmental Ethics [3-0-0:3]
Multi-media, multi-disciplinary examination of environmental issues in Hong Kong and the world. Focus will be on sustainable development, environmental technologies, etc; searches for solutions which people can use in their professional lives.

HUMA 114 World Religions [3-0-0:3]
Introduces the academic study of religion and surveys some of the world's religions. Concludes with discussion of proposals for how different religions should understand and relate to each other.

HUMA 115 Approaches to Fiction [3-0-0:3]
Introduction to the art of fiction and methods of interpretation. Close reading of a wide variety of short stories.

HUMA 116 Twentieth-Century Chinese Fiction [3-0-0:3]
A historical survey of modern Chinese fiction from the early 20th-century to the present. Emphasis on the evolution of themes and modes of representation in various social, cultural and literary climates.

HUMA 117 Film and Fiction [3-0-0:3]
This course is a socio-cultural reading of filmic adaptations of representative Chinese stories and novels of the twentieth century.

HUMA 118 East Asia and the West: Cultures in Contact [3-0-0:3]
From Marco Polo to Toyota. A topical analysis of the history of cultural, economic and diplomatic relations between East Asia and the Western world, with emphasis on the experience from the 16th to the 20th century.
**HUMA 120  China in the 20th Century**  
[3-0-0:3]  
[Previous Course Code: HUMA 100G]  
An analysis of recent Chinese history from the Revolution of 1911 to the Tiananmen Incident of 1989. This course examines the interplay of imperialism, nationalism and socialism which shaped China's struggle for survival in the modern world.

**HUMA 121  Modern East Asia**  
[3-0-0:3]  
A survey of social, political and cultural changes in China and Japan from the 1800's to the present. This course will compare the different paths of development the two nations have taken since the coming of the West.

**HUMA 122  Love Lyrics East and West**  
[3-0-0:3]  
Selected readings of the best love poems in the world from ancient times through the contemporary period, discussing various perspectives on love in relation to historical, cultural, and gender differences.

**HUMA 123  Modern Chinese Poetry**  
[3-0-0:3]  
A historical survey of modern Chinese poetry from the May Fourth to the contemporary period, focusing on major poets in China, Taiwan, and Hong Kong.

**HUMA 124  Masterpieces of Chinese Literature**  
[3-0-0:3]  
[Previous course Code: HUMA 100]  
Significant works of various genres in the Chinese literary tradition will be placed in their historical context and studied in terms of their literary qualities and influence.

**HUMA 125  Introduction to East Asian Religions**  
[3-0-0:3]  
The various religions found in the East Asian context will be examined in historical and cultural perspective, including Buddhist, Taoist, Confucian, and Shinto traditions.

**HUMA 126  Religious Traditions of Japan**  
[3-0-0:3]  
An historical and cultural exploration of the religious traditions of Japan, focusing primarily upon Buddhism. We will highlight major figures, topics, and events from ancient history to the new religious movements of the modern day.

**HUMA 127  History and Thought of Ch' an and Zen Buddhism**  
[3-0-0:3]  
We will explore the history and thought of the Ch'an/Zen Buddhist tradition as it developed over the centuries in various cultural climates, including its inception in China, growth in Japan, and emergence in the West.
HUMA 206  The Information Age  [3-0-0:3]
Examines what it means to live in an "information age" from issues such as mass media,
to computers, and biotechnology. It will look at the new category of "information"
philosophically, legally, and culturally.

HUMA 207  Modern American Literature  [3-0-0:3]
This course is a survey of major figures and movements in 20th century American
literature. Works of both fiction and poetry will be considered in their critical, cultural and
historical contexts.

HUMA 208  Religion and Culture  [3-0-0:3]
The study of religion as a cultural system. This course focuses on the relationships
between religion and the other socio-cultural institutions, and examines various anthro-
pological approaches to the study of religion.

HUMA 209  Development of Anthropological Thought  [3-0-0:3]
An examination of the history and development of anthropological thought and practice
from mid-19th century to the present.

DEPARTMENT OF INDUSTRIAL ENGINEERING

Explanations of prerequisites and exclusions can be found on page 23.

INDE 101  Introduction to Industrial Engineering  [2-0-0:1]
From time study to man-machine systems design, from Detroit production line to
computer-aided manufacturing systems, this course introduces students to the philoso-
phies, methodologies, and scope of industrial engineering.

INDE 110  Computing in Industrial Applications  [3-1-1:3]
Introduction to microprocessor technologies and computer hardware with industrial
applications. Computer systems for industrial control. Local area networks and communica-
tion. C programming primarily by self-study.

Second- and Third-year level courses are indicative only.

INDE 210  Operations Research I  [3-1-0:3]
Introduction to deterministic optimisation modelling and algorithms. Topics include linear
mathematic programming, network flows, and nonlinear models.

INDE 213  Applied Ergonomics  [2-0-3:3]
Introduction to and practical experience with ergonomics concepts and principles of
workplace and task design and development. Physiology, bio-mechanics, workplace
design, and environment stressors.

INDE 215  Manufacturing Processes I  [2-1-0:2]
Machine tools, tools and tooling. Machining and welding. Experiments in cutting tool
performance involving tool geometry, speed, surface finish, tool life and production
economics associated with those variables.

INDE 220  Industrial Organisation and Management  [3-0-0:3]
Organisations and their environments. Stability and flexibility. Individual and group
behaviour. Perception, motivation, influence, communication, job design, group proc-
ces. Leadership behaviour, satisfaction, and productivity.

INDE 223  Engineering Economy  [3-0-0:3]
Application of microeconomics to engineering and managerial decision making. Cash
flow analysis of capital investment. Present worth, rate of return, taxes and depreciation,
capital budgeting, risk, and uncertainty.

INDE 225  Industrial Control Systems  [3-1-1:3]
Introduction to automatic control, with reference to the automation of industrial machines
and processes, including linear dynamic systems, feedback control, and elements of
system analysis. Introduction to digital control.

INDE 227  Quality Engineering  [3-1-0:3]
Control chart and statistic on-line quality control methods. Off-line quality control and
parameter design. The ideas of Deming and Taguchi.

INDE 310  Integrated Production Systems I  [3-0-1:3]
Basic concepts in the design and operational control of integrated production systems.
Facility layout, material handling, material and information flow, resource and capacity
planning, and shop floor control and scheduling.

INDE 313  System Simulation  [3-2-0:3]
Design of continuous and discrete simulation models. Statistical foundations and
methodology. Generation of random variables. Simulation experiments. Test of

INDE 315  Manufacturing Processes II  [3-0-1:3]
CAD/CAM, N/C programming robots, flexible manufacturing systems, and other ad-
vanced topics in manufacturing. Demonstrations and experiments on a CNC machining
centre.
Undergraduate Course Descriptions

INDE 320  Integrated Production Systems II  [3-0-1:3]

INDE 398  Project  [0-0-9:3]
A final year project supervised by a faculty member. A project report is required and a grade is assigned. Students should choose a project topic and supervisor in the fifth semester in order to be able to select relevant elective courses.

LANG 101  Business Communication  [0-3-0:3]
A communication course, restricted to students in the School of Business and Management, which focuses on a study of the processes and skills of effective oral presentation, negotiation, and report writing in business situations where English is the medium of communication.

LANG 103  Technical Communication  [0-3-0:3]
A communication course, restricted to students from certain departments in the School of Engineering and the School of Science, which focuses on developing the skills of presenting oral and written reports relevant to the students' various disciplines.

DEPARTMENT OF MARKETING

Explanations of prerequisites and exclusions can be found on page 23.

MARK 212  Marketing Management  [4-0-0:4]
Introduction to marketing from the perspective of the decision-maker; controllable variables (product, price, promotion and distribution), uncontrollable variables (competition, law, society, technology, and economy), consumer behaviour and marketing research.

MARK 222  Marketing Research  [4-0-0:4]
Basic research tools and procedures used in marketing research, and strategic uses of marketing research information in managerial decision making.
Prerequisite  :  MARK 212

MARK 241  Promotion and Advertising Management  [4-0-0:4]
Major aspects of promotion, with emphasis on advertising: setting of advertising objectives, strategies, tactics, choice of media, budget determination and measuring advertising effectiveness.
Prerequisite  :  MARK 212

MARK 242  Consumer Behaviour  [4-0-0:4]
Psychological concepts such as perception, learning and motivation, sociological concepts such as reference groups, family and culture and theories of purchase decision processes underlying consumer buying behaviour.
Prerequisite  :  MARK 212

MARK 243  Global Marketing  [4-0-0:4]
Understanding the formulation of international/multinational marketing strategy; factors influencing international trade, assessment of market potential, threats and opportunities in the international market environment, global marketing activities.
Prerequisite  :  MARK 212
### Undergraduate Course Descriptions

**MARK 321 Strategic Marketing** [4-0-0:4]
Developing a comprehensive and integrated framework for directing and managing the marketing functions of a company; methods to analyse marketing opportunities, assess competitive advantages and forecast market changes.
Prerequisites: MARK 212, 222, and 242

**MARK 329 Special Topics** [2-4 credits]
Selected topics in current marketing thought and marketing practices; topics vary from semester to semester.
Prerequisite: MARK 212

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**DEPARTMENT OF MATHEMATICS**

Explanations of prerequisites and exclusions can be found on page 23.

**MATH 001 Beginning Calculus** [3-1-0:4]
Calculus of one variable including limits, continuity, differentiation; mean-value theorem, L'Hospital rule; maxima and minima; implicit differentiation; elementary transcendental functions; introduction to integration with applications to physical sciences, economics and business.
Exclusions: AL Pure Mathematics with grade C or better, MATH 005
Prerequisite: Acceptable standing in HKCEE-Level Mathematics
Textbooks: Boyce and DiPrima, Calculus, and Edwards & Penney, Calculus and Analytic Geometry

**MATH 002 Intermediate Calculus** [3-1-0:4]
Further development of integration; inverse trigonometric and logarithmic functions; techniques of integration; improper integrals; infinite series, Taylor's series; coordinate systems; parametric equations; introduction to differential equations.
Exclusions: AL Pure Mathematics with grade C or better, MATH 006
Prerequisite: MATH 001
Textbook: As for MATH 001

**MATH 005 Algebra and Calculus I** [3-1-0:4]
Review of aspects of algebra and analytic geometry essential to the study of calculus. Introduction of basic concepts of functions, limits, continuity and derivatives with applications to management, social science and biomedical science. Applications to optimisation.
Exclusions: HKCEE Additional Mathematics with grade C or better, AL Pure Mathematics, MATH 001
Prerequisite: Less than acceptable standing in HKCEE-Level Mathematics
Textbook: Geoffrey C. Berresford, Calculus with Applications to the Management, Social, Behavioral, and Biomedical Sciences

**MATH 006 Algebra and Calculus II** [3-1-0:4]
Continuation of MATH 005: an introduction to elementary integration theory and related techniques, functions of several variables and partial derivatives with applications.
Exclusions: HKCEE Additional Mathematics with grade C or better, AL Pure Mathematics, MATH 001, and MATH 002
Prerequisite: MATH 005
Textbook: As for MATH 005

**MATH 101 Multivariable Calculus** [3-1-0:4]
Sequences, series, gradients, chain rule. Extrema, Lagrange multipliers; line integrals, multiple integrals. Green's theorem, Stroke's theorem, divergence theorem; change of variables.
Prerequisite: AL Mathematics or MATH 002
Textbook: Lang, Calculus of Several Variables

**MATH 102 Introduction to Analysis** [3-1-0:4]
Real and complex number systems, basic topology, numerical sequences and series, continuity, differentiation, Riemann-Stieltjes integral, sequences and series of functions, and other topics if time permits.
Prerequisite: MATH 101

**MATH 103 Ordinary Differential Equations** [3-1-0:4]
Existence and uniqueness theorems of ordinary differential equations; theory of linear systems; stability theory; study of singularities; boundary value problems.
Prerequisites: MATH 101 and MATH 111
Textbook: Hirsch and Smale, Differential Equations, Dynamical Systems and Linear Algebra

**MATH 110 Concepts in Mathematics** [2-0-0:2]
Expository lectures and discussion on basic mathematical concepts and ideas, historical developments in various areas of mathematics, and selected trends and advances of mathematical sciences. (Graded either P or F).
Prerequisite: MATH 002

**MATH 111 Linear Algebra** [3-1-0:4]
Vector spaces, linear transformations, matrices, system of linear equations, bases, determinants, inner products, eigenvalues, bilinear forms, decompositions of matrices.
Prerequisite: AL Mathematics or MATH 002
Textbook: Friedberg, Insel and Spence, Linear Algebra
### MATH 151 Differential Equations and Applications [3-1-0:4]
First and second order differential equations, higher order equations, Laplace transform method; series solutions; Sturm-Liouville equation; Bessel functions and Legendre polynomials; numerical solution of initial and boundary value problems.

**Prerequisite:** MATH 002  
**Textbook:** Boyce and DiPrima, *Elementary Differential Equations and Boundary Value Problems*

### MATH 152 Applied Linear Algebra and Differential Equations [3-1-0:4]
Linear dependence; norms; solution of linear systems; orthogonal projections; eigenvalues and eigenvectors; singular value decomposition; iterative solutions; systems of first order linear equations; partial differential equations and Fourier series.

**Prerequisite:** MATH 151  
**Textbooks:** Ben Noble and James Daniel, *Applied Linear Algebra*, and Boyce and DiPrima, *Elementary Differential Equations and Boundary Value Problems*

### MATH 204 Complex Analysis [3-1-0:4]
Complex differentiability; Cauchy-Riemann equations; contour integrals; Cauchy theory and consequences; power series representation; isolated singularities and Laurent series; residue theorem; conformal mappings. Additional topics as chosen by the instructor.

**Prerequisite:** MATH 101  
**Textbooks:** Bak and Newman, *Complex Analysis*,  
Lang, *Complex Analysis*, and  
Ahlfors, *Complex Analysis*

### MATH 225 Mathematical Logic [3-1-0:4]
Propositional and predicate calculus; consequence and deduction; truth and satisfaction; Godel completeness theorem; Lowenheim-Skolem theorem; Boolean algebra; axiomatic theories.

**Prerequisite:** MATH 111

### MATH 231 Numerical Analysis [3-1-0:4]
Basic numerical analysis, including stability of computation, linear systems, eigenvalues and eigenvectors, nonlinear equations, interpolation and approximation, numerical integration and solution of ordinary differential equations, optimisation. A short course on Fortran may also be given.

**Prerequisite:** MATH 111 or MATH 152  
**Textbook:** Kahaner, Moler and Nash, *Numerical Methods and Software*

### MATH 241 Probability [3-1-0:4]
Basic probability theory. Sample spaces; random variables; normal, Poisson and related distributions; expectation; correlation; limit theorems. Applications to biology, physics, communication sciences and other fields.

**Prerequisite:** MATH 101  
**Textbook:** Ross, *A First Course in Probability*

### MATH 243 Mathematical Statistics [3-1-0:4]
Central limit theorem; point estimation; interval estimation; multivariate normal distributions; testing of hypotheses; linear models.

**Prerequisite:** MATH 241  
**Textbook:** Hoel, Port and Stone, *Introduction to Statistical Theory*

### MATH 244 Applied Statistics [3-1-0:4]
A systematic introduction to statistical inference, including the necessary probabilistic background; point and interval estimation; hypothesis testing.

**Prerequisite:** MATH 002 or AL Pure Mathematics  
**Textbook:** Hines and Montgomery, *Introduction to Probability and Statistics in Engineering and Management Science*

### MATH 245 Introduction to Operations Research [3-1-0:4]
Linear programming; simplex method; duality theory; network analysis; dynamic programming; game theory; integer programming; stochastic processes; queueing theory; inventory theory; forecasting; decision analysis.

**Prerequisite:** MATH 241 or MATH 244  
**Textbook:** Hiller and Lieberman, *Introduction to Operations Research*

### MATH 301 Real Analysis [3-1-0:4]
[Previous Course Code: MATH 201]
Stone-Weierstrass theorem; some special functions; metric spaces, uniform convergence; functions of several variables; Fourier series and additional topics chosen by the instructor.

**Prerequisites:** MATH 101 and MATH 102 preferred.  
**Textbook:** Rudin, *Principles of Mathematical Analysis*

### MATH 302 Integration Theory [3-1-0:4]
[Previous Course Code: MATH 202]

**Prerequisite:** MATH 301  
**Textbook:** H.L. Royden, *Real Analysis*
MATH 305 Introduction to Functional Analysis [3-1-0-4]
Normed space; inner product space; topological vector spaces; closed graph theorem; Hahn-Banach theorem; principle of uniform boundedness; L^p space; elementary Banach space theory; contraction principle and its applications to differential and integral equations and numerical analysis.
Exclusion : MATH 301 prior to 1992
Prerequisites : MATH 301 and MATH 302
Textbook : G.F. Simmons, Introduction to Topology and Modern Analysis

MATH 306 Partial Differential Equations [3-1-0-4]
Classification of partial differential equations; first order equations; second order linear equations; Green's functions; maximum principles; characteristics; Riemann's method; well-posed problems.
Exclusion : MATH 302 prior to 1992
Prerequisites : MATH 101 and MATH 111
Textbook : Copson, Partial Differential Equations

MATH 307 Dynamical Systems [3-1-0-4]
[Previous Course Code: MATH 303]
Modern development of dynamic systems; Hamiltonian systems; dissipative systems; bifurcations; strange attractors; chaotic systems; fractals; Hausdorff dimension; Lyapunov exponents.
Prerequisites : MATH 151; MATH 301 and MATH 352 are desirable.

MATH 310 Abstract Algebra I [3-1-0-4]
[Previous Course Code: MATH 211]
An introduction to the principles and concepts of modern abstract algebra. Topics include groups, rings, modules, fields and Galois theory.
Prerequisite : MATH 111
Textbook : Herstein, Topics in Algebra

MATH 311 Abstract Algebra II [3-1-0-4]
[Previous Course Code: MATH 212]
General properties of groups and mappings; Cayley's theorem; representation of groups; Maschke's theorem; Schur's lemma; representation of Abelian groups; the character of a group representation; group algebra and the regular character; orthogonality relations, physical applications.
Prerequisite : MATH 311
Textbooks : Jacobson, Basic Algebra I, and Jones, Groups, Representations and Physics

MATH 315 Number Theory and Applications [3-1-0-4]
Prime numbers; unique factorisation; modular arithmetic; quadratic number fields; finite fields; p-adic numbers; coding theory; computational complexity.
Exclusion : MATH 312 prior to 1992
Prerequisite : MATH 311
Textbooks : Ireland and Rosen, A Classical Introduction to Modern Number Theory, and Niven, Euckerman, Montgomery, An Introduction to the Theory of Numbers

MATH 321 Differential Geometry [3-1-0-4]
[Previous Course Code: MATH 221]
Differential forms, curvature and torsion of curves; Frenet-Serret frames; global properties of closed curves; Gaussian curvature and mean curvature; geodesics; minimal surfaces; Gauss-Bonnet theorem.
Prerequisite : MATH 101
Textbook : Do Carmo, Differential Geometry of Curves and Surfaces

MATH 323 Topology [3-1-0-4]
[Previous Course Code: MATH 223]
Topology of Euclidean spaces; winding number; knot theory; fundamental group and covering spaces; Euler characteristic; simplicia1 complexes; classification of two-dimensional manifolds; vector fields; Poincare-Hopf theorem.
Prerequisites : MATH 101 and MATH 111
Textbooks : Blackett, Elementary Topology: A Combinatorial and Algebraic Approach, and Armstrong, Basic Topology

MATH 325 Algebraic Topology [3-1-0-4]
[Previous Course Code: MATH 321]
Homotopy theory; covering spaces and vibrations; simplicia1 and CW complexes; manifold theories; homology theories; universal coefficients and Kunneth formulas; Hurewicz theorem; applications to fixed point theory and other topics.
Exclusion : MATH 321 prior to 1992
Prerequisite : MATH 323

MATH 331 Numerical Solutions of Partial Differential Equations [3-1-0-4]
An introduction to finite difference and finite element methods for the solution of elliptic, parabolic and hyperbolic partial differential equations; will include the use of computer software for the solution of differential equations.
Prerequisites : MATH 151 and MATH 231
MATH 333 Introduction to Scientific Computation [3-1-0:4]
A variety of projects drawn from different areas of scientific application to demonstrate the use of computers as a tool to solve real problems. Mathematical concepts, scientific contents, numerical techniques, computer programming and graphics are integrated into a coherent perspective.
Prerequisite : MATH 231

MATH 335 Applications of Mathematical Software [3-1-0:4]
Scientific computation analytically and numerically using standard mathematical and symbolic software packages. Topics include: matrix computation, definite and indefinite integration, perturbation expansions, solutions of ordinary and partial differential equations.

MATH 351 Functions of a Complex Variable and Applications [3-1-0:4]
[Previous Course Code: MATH 251]
Differentiation and integration in the complex plane; Cauchy's integral formula; Taylor series; Laurent series; analytic continuation; contour integration; conformal mapping; special functions; integral transforms; asymptotic methods.
Prerequisite : MATH 151
Textbooks : Fisher, Complex Variables, and Churchill and Brown, Complex Variables and Applications

MATH 352 Applied Partial Differential Equations [3-1-0:4]
[Previous Course Code: MATH 252]
Methods to solve the Laplace equation, the wave equation and the diffusion equation; separation of variables; integral transforms; Green's function; characteristics; variational method.
Prerequisite : MATH 351
Textbook : Sneddon, Elements of Partial Differential Equations

MATH 395 Scientific Computation Project I [0-0-9:3]
A scientific computation project under the supervision of a faculty member from any department. Projects may be from fluid mechanics, structural dynamics, chemistry, statistics, etc.

MATH 396 Scientific Computation Project II [0-0-18:6]
A scientific computation project under the supervision of a faculty member from any department. Projects may be from fluid mechanics, structural dynamics, chemistry, statistics, etc.

MATH 398 Independent Study Project [2-3 credits]
Conducted under the guidance of a faculty member, the scope may include (i) identifying a non-textbook problem and proposing methods of solution, and (ii) acquiring a specific research skill. The course may be repeated for credit, but the total number of credits may not exceed 6.

MATH 399 Undergraduate Thesis [0-0-9:3]
The student can work in any area of mathematics under the guidance of a faculty member. The thesis either surveys a research topic or describes a small research project completed by the student.

DEPARTMENT OF MECHANICAL ENGINEERING

Explanations of prerequisites and exclusions can be found on page 23.

MECH 101 Mechanics of Solids [3-1-0:3]
Introduction to mechanics of rigid and deformable bodies; 3-dimensional force equilibrium, geometric compatibility and constitutive behaviour. Applications of beams, shafts and other simple structures of engineering importance.
Exclusion : CIVIL 112

MECH 102 Statics and Dynamics [3-1-0:3]
Study of statics, kinematics and dynamics of particles and rigid bodies in two- and three-dimensional spaces. Applications of Newton's Laws and energy methods to solve engineering problems.
Exclusion : CIVIL 113

MECH 121 Fluid Mechanics I [3-1-0:3]
Basic equations of fluid mechanics; hydrostatics; conservation of mass, momentum, and energy; Bernoulli's equation; incompressible inviscid flows; dimensional analysis; pipe flow; channel flow; boundary layers; vorticity and irrotational flows.
Exclusion : CIVIL 251
Prerequisites : MATH 101 and MATH 151

MECH 131 Thermodynamics [3-1-0:3]
Work, heat, energy change, equilibrium and reversibility; the first law and second law of thermodynamics; thermodynamics of coupled systems, entropy; the properties of pure substance, solid and gaseous phases.
Prerequisite : MATH 101

MECH 152 Design and Communication [2-0-0:2]
[Previous Course Code : MECH 251]
Design Methodology; design for manufacturing; design for assembly; material selection; design communication.
MECH 181 Measurement and Instrumentation [1-2-4-3]
Experimental techniques for measurement of fundamental system variables such as
force, pressure, temperature, flow, and acceleration; physical principles of transducers
and measurement circuitry, data acquisition and analysis techniques.

MECH 182 Experimental Methods [1-2-4-3]
Experimental course for all engineering students. Techniques for measurement of
temperature, pressure, flow, force, acceleration, and data acquisition will be taught.
Laboratory experiments will provide hands-on experience.

MECH 191 Computer Models of Physical Systems [3-0-0-3]
Reduction of physical and engineering systems to idealised computer models; selection
of numerical algorithms to explore model behaviour; linear and nonlinear equations, curve
fitting, integration, finite differences, finite elements, and initial-value problems.
Prerequisite: Working knowledge of FORTRAN, or C expected.

MECH 201 Introduction to Structural Mechanics [3-1-0-3]
Beam analysis and design subjected to axial, torsional, flexural and combined loadings;
principle of virtual work; energy and computational methods. Theory and application of
finite element methods in structural analysis.
Prerequisite: MECH 101

MECH 221 Fluid Mechanics II [3-1-0-3]
Introduction to the following topics: Compressible flow, shock wave, turbulence flow
instability, flow with body forces, bluff body aerodynamics and wind tunnel.
Exclusion: CIVIL 252
Prerequisite: MECH 121

MECH 231 Heat and Mass Transfer I [3-1-0-3]
Steady-state and transient heat conduction in solids, radiative heat transfer; heat and
momentum transfer associated with laminar and turbulent flow; mass transfer in stationary
systems, in laminar and turbulent flows.
Prerequisites: MECH 131 and MECH 221

MECH 241 Materials Technology II [3-1-0-3]
Diffusion in solid, elastic and plastic deformation; failure of engineering materials;
selection of engineering materials.
Exclusion: MECH 241 prior to 1992
Prerequisites: MECH 101 and MECH 241

MECH 242 Materials Technology II [3-1-0-3]
Diffusion in solid, elastic and plastic deformation; failure of engineering materials;
selection of engineering materials.
Exclusion: MECH 241 prior to 1992
Prerequisites: MECH 101 and MECH 241

MECH 243 Chemical Physics of Materials [3-1-0-3]
Behaviour of electron in solids; lattice dynamics; thermal, electrical, optical, and magnetic
properties; semiconductors and superconductivity.
Prerequisite: MECH 241

MECH 252 Elements of Mechanical Design [2-0-4-3]
Examination and practice in the application of mechanical design elements, including
bearings, shafts, cams, followers, linkages, gear trains, power transmission elements,
motors and prime movers and their control elements.
Prerequisite: MECH 102

MECH 253 Computer Aided Design [2-0-4-3]
Introduction to computer-aided design and manufacturing systems; computer-aided
engineering; solid modeling; finite element analysis; CAD/CAM applications.

MECH 261 Control Principles [3-1-1-4]
Introduction to block diagrams, signal flow graphs, state-space systems, transient
response using convolution integral and root locus, frequency response methods.
Application of performance indices, error criteria and controller realisation methods.
Prerequisite: MECH 102

MECH 262 System Dynamics [3-1-0-3]
Introduction to system equations, simple discrete models for mechanical, thermal,
hydraulic, and electrical systems; block diagrams, signal flow charts, and state-space
systems; Laplace transform; transient and steady state response in time-domain;
frequency response methods.
Prerequisite: MECH 102

MECH 271 Manufacturing Processes and Systems [2-0-3-3]
Manufacturing processes for metals, polymers, ceramics and composite materials;
manufacturing systems, automation technology, design and manufacturing integration,
computer applications; principles and techniques for quality assurance.

MECH 272 Seminar on Design and Manufacturing [0-2-0-2]
[Previous Course Code: MECH 172]
Speakers will be invited from industry. The purpose is to give students first-hand
knowledge of the methodology and philosophy of design and manufacturing in local
industry.
MECH 281 Materials Laboratory [1-2-4:3]

MECH 283 Laboratory I (Thermofluid Experiments) [1-0-6:3]
To demonstrate fluid and thermodynamic principles and to provide hands-on training for students. Experiments include free jet, energy losses in pipes and bends, free and forced convection, radiative heat transfer, etc.
Prerequisite : MECH 182

MECH 284 Laboratory II (Solids and Materials Experiments) [1-0-6:3]
This course has two parts. The first covers practices of instrumentation and sensor technology on experimental design and implementation for solids. The second part covers the study of material microstructure.
Prerequisite : MECH 182

MECH 290 Engineering Internship [3 credits]
Participation in approximately three months of practical work in manufacturing, engineering, and research and development at an industrial plant or government agency.

MECH 291 Numerical Methods for Engineering [3-0-0:3]
Introduction to basic techniques for efficient solution of numerical problems. Root finding, integration, function approximations, differential equations, direct and iterative methods in matrix theory, optimisation with constraints and numerical stability analysis.

MECH 301 Fracture Mechanics [3-1-0:3]
Linear-elastic fracture mechanics; plastic deformations; R-curves; crack opening displacement; fatigue and creep.
Prerequisites : MECH 101 and MECH 201

MECH 302 Noise and Vibration Control [3-1-0:3]
Free and forced vibration of single- and multi-degree of freedom undamped and damped systems; modal analysis and matrix formulation of vibration of continuous systems; sound and noise generation and transmission.
Prerequisite : MECH 102

MECH 321 Environmental Engineering [3-0-0:3]

MECH 331 Heat and Mass Transfer II [3-0-0:3]
More advanced discussion of conduction, radiation free and forced convection, condensation, boiling, heat exchange design, and heat transfer in nuclear reactors.
Prerequisite : MECH 231

MECH 332 Building Services [3-1-0:3]
Air conditioning, refrigeration, ventilation, solar energy, lift services, fire regulation, smoke detector, fire services, intelligent building and lighting.
Prerequisites : MECH 221 and MECH 231

MECH 333 Energy Conversion [3-0-0:3]
Thermodynamics of combustion, chemical equilibrium, refrigeration, and mixtures of gases. Analysis of power generation, propulsion systems. Performance of modern steam plants, gas turbines, internal combustion engines and refrigeration plants.
Prerequisites : MECH 131 and MECH 221

MECH 341 Ceramics [3-0-0:3]
Effects of structures, mechanical and physical properties in ceramics; ceramics defects, and phase equilibria.
Prerequisites : MECH 241 and MECH 242

MECH 342 Polymers [3-0-0:3]
Prerequisite : MECH 242

MECH 343 Materials Characterisation [3-0-0:3]
Analysis of materials by diffusion methods and microscopy. Instrumentation and laboratory techniques for X-ray diffraction and electron microscopy.
Prerequisite : MECH 242

MECH 344 Materials Processing [3-0-0:3]
Description of metal, polymer and ceramics processing; solidification, powder metallurgy and mechanical forming.
Prerequisite : MECH 241

MECH 351 CAD/CAM [3-2-4:3]
Modelling systems; data structures; NC technology; NC machining; application interfaces; computer graphics; project.
**MECH 371 Introduction to Robotics** [2-0-3:3]
Rigid body motion; forward and inverse kinematics; manipulator Jacobians; force relation; dynamics and position control robot manipulators; force control and trajectory generation; collision avoidance and motion planning; robot programming language.
Exclusion: ELEC 374

**MECH 397 Design Project** [0-0-10:4]
Practises engineering design through a design project specifically chosen to integrate significant portions of material covered in the prerequisite courses. Introduction to human machine interactions, economics, and patent laws.
Prerequisites: MECH 102, MECH 131, MECH 241 and MECH 252

**MECH 398 Project Laboratory** [1-0-6:3]
[Previous Course Code: MECH 381]
Emphasis on interplay between analytical and experimental methods in the solution of research and development problems. The communication (written and oral) of results is a strong component of the course.
Prerequisites: MECH 182, MECH 283 and MECH 284

**DEPARTMENT OF MANAGEMENT**

Explanations of prerequisites and exclusions can be found on page 23.

**MGMT 111 Business Statistics** [3-1-0:4]
[Previous Course Code: BINF 111]
Collection, tabulation and presentation of numerical data; concepts of probability and probability distributions; sampling; statistical estimation and hypothesis testing; correlation and regression analysis.

**MGMT 221 Organisational Behaviour** [4-0-0:4]
Human behaviour and behavioral issues in organisations studied from the perspective of the individual member and that of the manager.
Exclusion: SOSC 371

**MGMT 222 Organisational Development** [4-0-0:4]
The processes of organisational change and development. Formation and change of organisational cultures; the history of and approaches to organisational development; problems arising from growth; approaches, strategies, and techniques for hard and soft system change.
Prerequisite: MGMT 221

**MGMT 223 Multinational Corporations** [4-0-0:4]
Analysing the economic, social, cultural, legal and technological environments of multinational corporations.
Prerequisite: MGMT 221

**MGMT 224 Business Ethics and Policy** [4-0-0:4]
Problems and challenges of managing business ethically. Social responsibility, ethics of consumer production and marketing, gender and race, pollution, health and safety, information and communication, politics, trans-national considerations and ethical policy.

**MGMT 231 Human Resources Management** [4-0-0:4]
Manpower planning, job analysis and design, recruitment, interviewing and testing, performance appraisal, wage and salary systems, other forms of compensation, health and safety at work, discrimination, succession planning, downsizing and controlling labour costs.
Prerequisite: MGMT 221

**MGMT 232 Employment Relations and Law** [4-0-0:4]
Law for the HRM practitioner; contracts and their enforcement, discipline; industrial relations, unionisation, collective bargaining, conflict, participation, multiselling, labour markets, flexible work systems, quality of working life and comparative industrial relations.

**MGMT 233 Training and Development** [4-0-0:4]
Basic concepts of learning and their application to training and development of different types of employees, from job related skills to career development. Training provision outside the corporation, cross-national comparisons, "competence" and the "learning organisation" mode.

**MGMT 251 Management Science** [3-1-0:4]
An introduction to technical methods for managerial problem solving; the steps in problem solving using models, methods of decision analysis, linear programming, project management, waiting lines and simulation.

**MGMT 261 Production and Operations Management** [4-0-0:4]
Production and operations service viewed from the strategic, tactical and operation levels; capacity planning, process selection, location and layout, material and resource requirements, scheduling, and total quality control.

**MGMT 321 Corporate Strategy** [4-0-0:4]
Major techniques and approaches to the development of corporate strategies. Underlying concepts; analytical techniques; internal and external competitor analysis; evaluation of options; implementation and the strategic process.
Prerequisite: MGMT 221
MGMT 322  Comparative Management  [4-0-0:4]
The conceptual and theoretical issues in understanding the management systems of
different countries from a comparative perspective.
Prerequisite  :  MGMT 221

MGMT 329  Special Topics in Management  [4-0-0:4]
Current development issues in the field of organisation and management; topics selected
by instructors.

MGMT 331  HRM Field Study  [4-0-0:4]
Supervised study and analysis of the human resources policies and practices of an
organisation. Consultancy brief, establishing relations with the organisation, identifying
problems and researching them, reporting and making recommendations to the organi-
sation.

MGMT 339  Special Topics in Human Resources Management  [4-0-0:4]
Recent development issues in various areas of human resources management will be
covered.

MGMT 349  Special Topics in International Business  [4-0-0:4]
Current issues in international business will be studied in this course.

MGMT 351  Deterministic Management Science Models  [4-0-0:4]
Management problem-solving using integer, goal, non-linear and dynamic programming;
emphasis on formulation and solution of problems.
Prerequisite  :  MGMT 251

MGMT 352  Stochastic Management Science Models  [4-0-0:4]
Decision analysis, Markov processes, queuing, reliability and simulation; modelling,
software for solution, and issues of practical application emphasised.
Prerequisite  :  MGMT 251

MGMT 353  Advanced Business Statistics  [4-0-0:4]
Practical application of statistics to problems of business, with particular emphasis on
regression.
Prerequisite  :  MGMT 111

MGMT 354  Forecasting  [4-0-0:4]
Review of regression and its application to forecasting problems; moving averages,
exponential smoothing, Box-Jenkins ARIMA models and transfer function models;
forecasts of economic, financial and business time series.
Prerequisite  :  MGMT 111

MGMT 359  Special Topics in Management Science  [4-0-0:4]
Current developments in the field of management science.

MGMT 361  Modern Manufacturing  [4-0-0:4]
Methods of modern manufacturing; management production decisions, total quality
management, integration of production with other functional areas, computer-integrated
manufacturing, focused manufacturing, manufacturing cells and flexible manufacturing.
Prerequisite  :  MGMT 261

MGMT 362  Service Operations  [4-0-0:4]
The importance of the service sector, and the link between marketing and service; service
system models, facility layout, distribution and logistics systems, and applications to
service quality improvement.
Prerequisite  :  MGMT 261

MGMT 369  Special Topics in Production and Operations Management
Current developments in the field of production and operations management.

DEPARTMENT OF PHYSICS

Explanations of prerequisites and exclusions can be found on page 23.

PHYS 001  Contemporary Physics  [3-0-3:3]
Important ideas and developments in physics are discussed as well as their impact on
technology, the economy, politics and quality of life.
Exclusion  :  AL Physics
Course Level  :  Hewitt, Conceptual Physics, Sixth Edition

PHYS 011  General Physics I  [3-0-3:4]
Basic principles treated quantitatively but without calculus. Intended for non-physical
science and non-engineering students. Topics include kinematics, gravitational and
electric forces and fields, momentum, angular momentum, energy, thermal physics, fluid
mechanics, sound waves. Laboratory emphasises instrumentation, measurement, and
interpretation of data.
Prerequisite  :  AL Physics
Course Level  :  Blatt, Principles of Physics, Third Edition
PHYS 102  General Physics II  [3-0-3:4]
Basic principles treated quantitatively but without calculus. Intended for non-physical science and non-engineering students. Topics include electricity and magnetism, optics, relativity; quantum physics, particle structure of matter. Laboratory emphasises instrumentation, measurement, interpretation of data.
Prerequisite : AL Physics
Course Level : Blatt, Principles of Physics, Third Edition

PHYS 121  Electricity and Magnetism  [3-0-3:4]
A core course intended for prospective physical science and engineering students. Topics include electrostatics, behaviour of matter in electric fields, magnetic fields, Faraday's law, Maxwell's equations, electromagnetic oscillations and waves, relativity.
Prerequisites : AL Physics and AL Mathematics
Course Level : Purcell, *Electricity and Magnetism*, Vol. 2

PHYS 124  Vibrations and Waves  [3-0-3:4]
A core course intended for prospective physical science and engineering students. Topics include harmonic oscillations, transverse and longitudinal waves in gas and solid, voltage and current waves on transmission lines and electromagnetic waves in dielectrics and conductors, Fourier methods, non-linear oscillations, and wave mechanics.
Prerequisites : AL Physics and AL Mathematics

PHYS 126  Phenomena of Microphysics  [3-0-0:3]
[Previous Course Code : PHYS 201]
Introduction to the physics of atoms, solids, nuclei and elementary particles, emphasising the description of phenomena using the results of elementary quantum and statistical physics. Intended for physics and engineering students.
Prerequisites : AL Physics and AL Mathematics
Course Level : Taylor and Zafiratos, *Modern Physics for Scientists and Engineers*

PHYS 214  Mathematical Methods in Physics  [4-0-0:4]
[Previous Course Code : PHYS 134]
Physical applications of analytic and numerical methods are studied in such topics as differential equations, Fourier series, Laplace transforms, matrices and vectors. Intended for physics students.
Prerequisite : MATH 101

PHYS 221  Intermediate Classical Mechanics  [4-0:0:4]
A core course for physics students. Newtonian mechanics of particles and systems of particles, including rigid bodies; oscillating systems; gravitation and planetary motion; moving coordinate systems; Euler's and Hamilton's equations; normal modes and small oscillations.
Prerequisite : PHYS 124
Course Level : Marion, *Classical Dynamics* or Davis, *Classical Mechanics*

PHYS 222  Continuum Physics  [4-0-0:4]
Local conservation laws; stress, strain, and rate-of-strain tensors; elastic and viscous response; waves in solids and fluids; dislocations; ideal fluids, potential flow, Bernoulli's equation, vorticity and circulation, lift; viscous incompressible flow and the Navier-Stokes equations, Reynolds' number, Poiseuille flow in a pipe, Stokes drag on a sphere; boundary layers, Blasius equations; flow instabilities, Rayleigh-Bernard convection and the onset of chaotic flow, introduction to turbulent flow.
Prerequisite : PHYS 221

PHYS 223  Intermediate Electricity and Magnetism I  [3-0-0:3]
[Previous Course Code : PHYS 325]
Electrodynamics: applications of Maxwell's equations, propagation in various media, radiation, relativistic electrodynamics, transmission lines and wave guides, interference and diffraction phenomena.
Exclusion : PHYS 224 prior to 1992
Prerequisites : PHYS 124 and PHYS 214
Course Level : David J. Griffiths, *Introduction to Electrodynamics*, Second Edition

PHYS 224  Intermediate Electricity and Magnetism II  [3-0-0:3]
[Previous Course Code : PHYS 325]
Electrodynamics: applications of Maxwell's equations, propagation in various media, radiation, relativistic electrodynamics, transmission lines and wave guides, interference and diffraction phenomena.
Prerequisite : PHYS 223
Course Level : Marion and Heald, *Classical Electromagnetic Radiation*, or equivalent

PHYS 234  Elementary Quantum Mechanics I  [4-0-0:4]
A core course intended for physics majors. Introduction to concepts and techniques of quantum mechanics.
Prerequisite : PHYS 221
Course Level : Saxon, *Elementary Quantum Mechanics*, or Dicke and Wicke, *Introduction to Quantum Mechanics*
PHYS 241 Optics [3-0-3:4]
Ray tracing, matrix optics, wave optics, superposition of waves and interference, coherence, Fresnel and Fraunhofer diffraction, polarisation, Fourier optics, holo
graphy, phase and group velocity, material dispersion, propagation of Gaussian beams.

PHYS 242 Fibre Optics [3-0-3:4]
Electromagnetic wave propagation in waveguides, fabrication of optical fibres, step index fibre, fields, modes, propagation and dispersion in monomode and multimode fibres, couplers and connectors, fibre optic communication system, and fibre optic sensors.

PHYS 250 Introduction to Materials Science [3-0-0:3]
An integrated study of the nature and behaviour of metals, ceramics and polymers. Topics include crystal structures, phase diagrams, microstructures and microscopy, defec
ts, phases and interfaces in materials systems, phase transformations, deformation, anneal
ing and failure of materials.

PHYS 261 Electronic Circuits [2-0-6:4]
An experimental survey of some devices and circuits. Analogue electronics: operational amplifiers and bipolar transistors, applications; simple filters, diodes, and field-effect transistors. Digital electronics: combinatorial logic devices, applications to programming and microcomputer interfaces.
Prerequisite : PHYS 121
Course Level : Diefenderfer, Principles of Electronic Instrumentation

PHYS 311 Advanced Experimental Physics [2-0-6:4]
Limited to third-year physics students. Selected topics in concepts and techniques; three to six diverse experiments, depending on difficulty, selected from a list which includes optics, spectroscopy, electrical circuits, electronics and ionics, magnetic resonance, x-rays, solid state, cosmic rays, nuclear physics. Independent work is stressed.
Prerequisite : PHYS 224

PHYS 321 Thermodynamics and Statistical Physics [4-0-0:4]
A core course. Concepts of temperature, laws of thermodynamics, entropy, thermody
amic relations, free energy; applications of phase equilibrium, multicomponent systems, chemical reactions, and thermodynamic cycles; applications of statistical mechanics to physical systems: Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics; ele
timentary transport theory.
Prerequisite : PHYS 234
Textbook : Kittel and Morse, Thermal Physics

PHYS 331 Elementary Quantum Mechanics II [4-0-0:4]
Continuation of PHYS 234. Applications of quantum mechanics to atoms and molecules.
Prerequisite : PHYS 234

PHYS 332 Introductory Solid State Physics [3-0-0:3]
An introduction to modern solid state physics, including lattice structure, lattice vibrations, thermal properties, electron theory of metals and semiconductors, magnetic properties, and superconductivity.
Prerequisite : PHYS 224
Course Level : Kittel, Introduction to Solid State Physics, Sixth Edition

PHYS 335 Quantum and Optical Electronics [3-0-0:3]
Light source and laser theory, principles of light detectors and radiometry, photomultipliers, photodiodes, charge couple devices, imaging detectors, ultrafast detectors, noises of detection, optics resonator, solid state, gas and semiconductor lasers, light emitting diodes, active, passive and additive pulse mode-locking, and ultrashort pulse lasers.

PHYS 336 Fundamental of Nonlinear Optics and Photonics [3-0-3:4]
Optics of anisotropic media, acousto-optics, electro-optics, photonics switches, bistable optical devices, optical coupling, nonlinear optics: second harmonic generation, paramet
ric generation, and phase conjugation.

PHYS 342 Nuclear and Particle Physics [3-0-0:3]
Behaviour of high-energy particles and radiation; elementary particles; basic properties of accelerators and detectors; general symmetries and conservation laws.
Prerequisite : PHYS 234
Course Level : Griffiths, Introduction to Elementary Particles, and Krane, Introductory Nuclear Physics

PHYS 351 Structure and Properties of Materials [3-0-0:3]
The physics of real materials: the structure of crystalline and amorphous solids; x-ray diffraction and electron microscopy; the thermodynamics and kinetics of phase transfor
mations; crystallographic defects and their relation to mechanical properties.
Prerequisite : PHYS 126 or PHYS 234

PHYS 354 Device Materials [4-0-0:4]
Materials for electronic circuits, magnetic materials, ferroelectrics and piezoelectrics for sensors and transducers, memory materials and technology; silicon, silicon dioxide and aluminium, MetalOxideSilicon structure, display materials; CRT and liquid crystal for flat display.

PHYS 361 Microcharacterisation [2-0-3:3]
Basic physical principles underlying modern analytical techniques for characterising materials from volumes less than a cubic micron. Discussion centres on the physics of the interaction processes, the instrumentation involved, and the advantages and limita
tions of each technique.
Prerequisite : PHYS 126 or PHYS 234
PHYS 381  Computational Physics I  [3-0-3:4]
Introduction to numerical methods with emphasis on solving physical problems using packages: differential equations, with application to fluid dynamics, plasma physics and other E&M problems; linear systems and eigenvalue problems; importance sampling and Monte Carlo methods, with application to classical statistical mechanics, molecular dynamics and others.
Course Level: Numerical Recipes, The Art of Scientific Computer

PHYS 382  Computational Physics II  [3-0-3:4]
The course is composed of two parts: (1) introduction to advanced techniques in the computer simulation of physical systems, including deterministic and random processes; (2) an independent computational project on a selected physical problem.
Prerequisite: PHYS 381

PHYS 398  Independent Study Project  [0-2-6:4]
[Previous Course Code: PHYS 390]
This undergraduate research activity is conducted under the supervision of a faculty member and a written report is required. One of the following activities is expected: identify a non-textbook problem and suggest approaches to its solution, solve a non-textbook problem, or acquire a specific research skill.

DIVISION OF SOCIAL SCIENCE

Explanations of prerequisites and exclusions can be found on page 23.

SOSC 100  Special Topics  [3-0-0:3]
This course focuses on a coherent collection of topics selected from social science. A student may repeat the course for credit, if the topics studied are different each time.

SOSC 112  Introduction to Economics  [3-0-0:3]
Provides an overview of both macroeconomics and microeconomics. There will be a number of applications presented to demonstrate how tools of economics can be used for making private decisions and evaluating government policy.
Exclusions: ECON 110, 111, 112, and 191

SOSC 115  The Chinese Economy  [3-0-0:3]
[Previous Course Code: SOSC 100X]
The course will focus on three broad issues: What are the distinctive features of the Chinese economy? How does the economic system work? And, how have China's external economic relations evolved?

SOSC 122  Cultural Geography  [3-0-0:3]
[Previous Course Code: SOSC 1010]
Introduces and uses the major organizing concepts of human geography to look at human geographic behaviour in terms of our culture and spatial organisation of the earth's surface.

SOSC 123  Economic Geography  [3-0-0:3]
[Previous Course Code: 100E]
Provides an introductory overview of modern economic geography. It will deal with problems and debates concerning economic location and behaviour in geographical space.

SOSC 136  Theories of Gender and the Study of Women in China  [3-0-0:3]
The relationship between feminism and anthropology: debates on biological sex versus social gender; feminist issues in anthropological analysis; debates on political-economy and gender equality; and religious and symbolic realms of gender identity and power; an in-depth study of the changing status of women in China.

SOSC 150  Introduction to Social Science  [3-0-0:3]
[Previous Course Code: SOSC 105]
This course has two parts. The first part reviews the aims, fields and methods of the social sciences. The second part gives a more detailed examination of culture, socialisation and social institutions.

SOSC 151  Introduction to Politics  [3-0-0:3]
[Previous Course Code: SOSC 107]
Reviews basic concepts and approaches. It focuses on four major areas: the nature of politics, contending approaches in political science, political theory, and political behaviour and institutions.

SOSC 152  Comparative Politics  [3-0-0:3]
[Previous Course Code: SOSC 108]
Compares the political systems of industrialised, socialist and developing countries. Key issues will include ideology, political culture, political leadership, political institutions, political processes and policy making.

SOSC 153  International Politics  [3-0-0:3]
[Previous Course Code: 100U]
Examines (1) relations among nation-states and between nation-states and international organisations, (2) major issues in international relations, namely, human rights, post-cold war national security issues and international economics.
SOSC 154  Democracy, Liberty, and Justice  [3-0-0:3]
[Previous Course Code: SOSC 100V]
In this course we will discuss the philosophical underpinnings of democratic government, alternative conceptions of individual liberty and theories of distributive justice.

SOSC 155  The Government and Politics of Hong Kong  [3-0-0:3]
Study and analysis of the politics of Hong Kong, with an emphasis on the role of political institutions: the Governor, the civil service, the Executive Council, the Legislative Council, Urban and Regional Councils, District Boards, pressure groups, political parties, elections, relations with China, Britain's policy towards Hong Kong, and the politics of democratisation.

SOSC 156  Politics, Law and Society  [3-0-0:3]
Deals with the ways in which social groups and law influence politics, providing a detailed examination of the American example because the United States is the most law-based liberal democratic society, but will make references to other systems, such as Britain and China.

SOSC 170  Introduction to Sociology  [3-0-0:3]
[Previous Course Code: 100F]
This course provides extensive and critical understanding of societies. Several important fields in sociology will be selected and discussed along with the problems often found in our society.

SOSC 171  Social Change and Development  [3-0-0:3]
[Previous Course Code: SOSC 100 P]
The objective of this course is to understand the origins, the processes, and the consequences of social and political development in modern world.

SOSC 172  Hong Kong Society  [3-0-0:3]
[Previous Course Code: SOSC 100N]
The purpose of this course is to use sociological perspectives to understand aspects of Hong Kong society. Topics covered will include relationships among intimates and strangers, gender, consumerism, inequality, organisations and moral choices.

SOSC 173  Social Interaction  [3-0-0:3]
An introduction to the social psychological perspectives in sociology, topics such as gender relations, deviance, friendship, intimacy, obedience and moral choice are studied. Special emphasis will be given to Hong Kong and its unique cultural mix.

SOSC 174  Society and Health  [3-0-0:3]
This course examines sociological theories applied to health and sickness. Topics include: social and demographic factors of health and illness, career paths to seek help; cultural and belief systems; the distribution of stress and differential coping styles; and organisational characteristics of health delivery system.

SOSC 190  Cultural Psychology  [3-0-0:3]
[Previous Course Code: SOSC 100J]
Relationship between culture and self: cultural influences on human development, role of education and the family, cultural identity and moral values, intercultural relations.

SOSC 191  Gender, Culture, and Society  [3-0-0:3]
Social psychological perspectives on gender identity, roles, and relations; the cultural construction of gender.

SOSC 211  International Economic Relations  [3-0-0:3]
[Previous Course Code: SOSC 111]
The objective of this course is to provide a systematic analysis of the theory of trade and financial relationships between nations, and the major related policy issues.  
Exclusion  COEN 335
Prerequisites  ECON 111 and ECON 112 or SOSC 112

SOSC 212  World Economic Development  [3-0-0:3]
[Previous Course Code: SOSC 100G]
Provides an overview of the evolution of development thinking and alternative strategies for development and pays particular attention to international aspects of development.  
Prerequisite  ECON 111 and ECON 112 or SOSC 112

SOSC 222  The Human Geography of Pacific Asia  [3-0-0:3]
[Previous Course Code: SOSC 100R]
This course looks at the changes in the national-formations of East and Southeast Asia with the aim of enhancing understanding of the evolution of the Pacific Asia regional economy.

SOSC 223  The Geography of Japan  [3-0-0:3]
[Previous Course Code: SOSC 100B]
Explores the creation of contemporary Japanese cultural geography from the perspective of diffusion and adaptation of new concepts and technologies.
SOSC 224 Nine Nations of North America [3-0-0:3]
[Previous Course Code: SOSC 100C]
Explores the "real" functioning geography of a North America split into nine nations, each with their own distinctive economies, cultures and political interests.

SOSC 236 Gifts, Money and Power: Theories of Exchange [3-0-0:3]
Explores systems of exchange: distinctions between gift and commodity exchange; gift and ceremonial exchange; exchanges which redistribute wealth in dowry and bridewealth payments; gender identity in exchanges among kin or between affines; and money economies through waged labour.

SOSC 250 Political Economy of China [3-0-0:3]
[Previous Course Code: SOSC 100W]
This course explores the evolution of China's state-socialist system from 1949 to the present and provides an analytical basis for the understanding of the on-going economic and social changes in China.
Prerequisite: 2nd and 3rd year students preferred.

SOSC 251 Politics and Government of South Korea [3-0-0:3]
[Previous Course Code: SOSC 100A]
Aims at an understanding of three dimensions of politics and policies of South Korea. The first dimension is concerned with an evolutionary process of transition from authoritarianism to democracy; the second with strategies, processes and outcomes of economic modernisation; the third with foreign policy responses to the external environment.
Course materials keep a balance between theoretical and empirical approaches.

SOSC 252 Territorial Politics in Contemporary China [3-0-0:3]
Offers a territorial perspective on Chinese politics by focusing upon the dynamics of central-provincial interaction. From the perspectives of both Hong Kong and Guangdong, territorial politics constitutes an indispensable approach of comprehending contemporary Chinese politics and post-Mao reforms.

SOSC 253 Political Development [3-0-0:3]
Concerned with the political, economic and social factors that cause less developed countries to develop or that impede their development. It will also focus on the vast regions of the world, and will cover both the empirical cases and the principal theories of development.

SOSC 254 Chinese Revolution: Historical and Theoretic Perspectives [3-0-0:3]
Describes and analyses how the political actors in China perceived the revolutionary situations, and what programmes, strategies and tactics they adopted to pursue their goals; appraises the conceptual frameworks and theories of revolution with which scholars analyse the processes and results of the Chinese revolution.

SOSC 270 Social Inequality and Social Mobility [3-0-0:3]
Examines the basic concepts and theories sociologists use to describe and explain social inequality and the process of status mobility.

SOSC 271 The Social Context of Science, Technology and Business Enterprise [3-0-0:3]
[Previous Course Code: SOSC 100B]
The object of this course is to understand how social organisation influences science, technology, and business enterprise. We shall focus discussions on issues relating to culture, organisations and ethics.

SOSC 272 Population and Society [3-0-0:3]
[Previous Course Code: SOSC 100A]
Introduces the main concepts in the field of population studies, contemporary issues concerning the interrelationships between population and social and economic development and examples of applications of a knowledge of population to wider social concerns.

SOSC 273 The Rise of East Asian Industrial Civilisation [3-0-0:3]
[Previous Course Code: SOSC 100M]
This course is designed to help students to understand the principal social, cultural and political factors that contributed to the rise of industrial East Asia.

SOSC 274 Education, Social Mobility and Inequality [3-0-0:3]
A survey of traditional theoretical paradigms and recent conceptual and empirical work in the field -- from classic Marx-Weber debate to contemporary labour-market and organisational perspectives on the role of education and inequality in job rewards and opportunities, paying particular attention to non-Western societies, particularly in Hong Kong, China, Taiwan, and Japan.

SOSC 275 Comparative Family System [3-0-0:3]
The origin and trends of world nuclearisation of the family; cultural and symbolic as well as economic impact on kin-relatives; transformation of dyadic relations within the nuclear unit. Major studies with a focus of the Chinese family systems will be looked at.

SOSC 290 Political Psychology [3-0-0:3]
[Previous Course Code: 100L]
Psychological perspectives on political behaviour: leadership, political participation, political socialisation, political conflict/change. Prerequisite: Prior course in psychology or political science.
Undergraduate Course Descriptions

SOSC 291 The Social Psychology of Intergroup Relations [3-0-0:3]
Social psychological theories of intergroup relations, and conflict resolution and their application to real-world social conflict.
Prerequisite: Prior course in either sociology or psychology.

SOSC 322 Pan-Pacific Symbiosis [3-0-0:3]
[Previous Course Code: SOSC 100S]
Explores the 150 years of the Japanese-American relationship considering: coercion, conflict and cooperation; competitive advantage; mutual development; culture and politics.

SOSC 350 International Law [3-0-0:3]
This course introduces the main features of public international law, the system of law which governs relations between states. It will focus on treaties, cases and analyses from a variety of states and international organisations. References will be made to the British, American, and Chinese interpretations of international law.

SOSC 370 Sociological Theory [3-0-0:3]
[Previous Course Code: SOSC 100H]
Aims to generate a discussion about how sociological theory can help us understand social life in new and challenging ways. We shall look at four influential theoretical perspectives: utilitarianism, functionalism, Marxism and symbolic interactionism.

SOSC 371 Organisational Behaviour [3-0-0:3]
[Previous course code: SOSC 100Q]
Provides an overview of the major economic, political, psychological and sociological perspectives on organisational behaviour, and examines the linkages between theory and real life organisational issues.
Exclusion: MGMT 221
Prerequisite: 2nd and 3rd year students preferred.

SOSC 372 Demographic Analysis [3-0-0:3]
[Previous Course Code: SOSC 100T]
This course is intended to offer an introduction to principles and methods needed to conduct a formal analysis of population structure, population dynamics, and population-related issues, such as marketing site selection in the private sector and management problems in the public sector.

SOSC 373 The Rise and Fall of Communism: A Comparative Study [3-0-0:3]
Communism is studied from three perspectives: as a philosophical doctrine, a political movement, or a social system. Attention will be paid to the major phases in the evolution of Communist systems. Theories on Communism are introduced, and the validity of these theories is examined in the light of changes in the former Communist world.

POSTGRADUATE COURSE DESCRIPTIONS

Course descriptions are arranged in alphabetical order, based on course codes.

DEPARTMENT OF ACCOUNTING

Explanations of prerequisites and exclusions can be found on page 23.

ACCT 500 Accounting Foundations [2-0-0:2]
Introduction to accounting concepts and relations; basic interpretation of financial statements. (MBA core course)

ACCT 501 Accounting for Management and Financial Decisions [2-0-0:2]
Application of accounting concepts and relationships in the recognition and solution of management problems; use of accounting statements and reports for financial planning and control; financial statement analysis. (MBA core course)

ACCT 522 Advanced Managerial Accounting [4-0-0:4]
Accounting concepts and procedures for the evaluation of business performance; theoretical development of analytical techniques and their applications.
Background: ACCT 321

ACCT 552 Legal Environment of Business [2-0-0:2]
Hong Kong constitutional law; contracts and torts; employment law; public regulation of the market. (MBA core course)

ACCT 561 Research Methodology in Accounting [2-4 credits]
[Previous Course Code: ACCT 681]
Nature of accounting research; identification of problems; research design and evaluation techniques.

ACCT 581 Advances in Financial Accounting [2-4 credits]
[Previous Course Code: ACCT 701]
Critical examination of financial accounting principles and standards; the history of accounting; contemporary problems and developments; review of accounting literature.

ACCT 582 Advances in Managerial Accounting [2-4 credits]
[Previous Course Code: ACCT 722]
Review of contemporary literature in the field of managerial accounting; in-depth study of the theory of managerial accounting.

ACCT 588 Field Study I [2-0-0:2]
A supervised study of an organisation, including the establishment of client-consultant relationships, identification of strategic questions, design of studies, collection and analysis of data, development and reporting of recommendations. (MBA core course)
### Postgraduate Course Descriptions

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 589</td>
<td>Field Study II</td>
<td>[3-0-0:3]</td>
<td>Continuation of ACCT 588. (MBA core course)</td>
</tr>
<tr>
<td>ACCT 690</td>
<td>Special Topics</td>
<td>[2-4 credits]</td>
<td>Selected topics in an identified area of accounting. This course may be repeated for credit if based on a different selection of topics.</td>
</tr>
<tr>
<td>ACCT 799</td>
<td>Doctoral Thesis Research</td>
<td></td>
<td>Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.</td>
</tr>
</tbody>
</table>

### DEPARTMENT OF BIOCHEMISTRY

Explanations of prerequisites and exclusions can be found on page 23.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BICH 521</td>
<td>Intermediate Biochemistry</td>
<td>[3-0-0:3]</td>
<td>Structural and functional properties of proteins and enzymes; aspects of generation and storage of metabolic energy, genetic information and hormonal action.</td>
</tr>
<tr>
<td>BICH 535</td>
<td>Food Biochemistry</td>
<td>[3-0-0:3]</td>
<td>Lectures conducted concurrently with those of BICH 355. An oral presentation and a written essay on a special topic are also required.</td>
</tr>
<tr>
<td>BICH 541</td>
<td>Immunochemistry</td>
<td>[3-0-0:3]</td>
<td>Lectures conducted concurrently with those of BICH 301. An oral presentation and a written essay on a special topic are also required.</td>
</tr>
<tr>
<td>BICH 551</td>
<td>Biochemical Instrumentation</td>
<td>[0-0-4:3]</td>
<td>Principles and application of modern instrumentation in fermentation, cell culture, and the preparation and characterisation of nucleic acids and proteins.</td>
</tr>
</tbody>
</table>

### DEPARTMENT OF BUSINESS INFORMATION SYSTEMS

Explanations of prerequisites and exclusions can be found on page 23.

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BINF 511</td>
<td>Management Information Systems</td>
<td>[3-0-0:3]</td>
<td>An introduction to information systems in organisations from the perspective of the general manager. This course presents the managerial and strategic uses of information systems, the information technology that underlies these systems, and the ways such systems are developed and managed. Exclusion : BINF 512</td>
</tr>
<tr>
<td>BINF 512</td>
<td>Highlights in Management Information Systems</td>
<td>[2-0-0:2]</td>
<td>This is a condensed version of BINF 511 with a focus on the managerial and strategic uses of information systems within an organisation. Open only to part-time MBA students.</td>
</tr>
</tbody>
</table>
BINF 523 Information Systems Development Methodologies [3-0-0:3]
This course overviews the principles of structured systems development methodologies; advanced systems analysis and design methodologies and technologies including CASE (Computer-Aided Software Engineering) tools, 4GL and Database Management Systems are discussed.
Prerequisite: BINF 511 or BINF 512

BINF 524 Information Systems Planning and Management [3-0-0:3]
Managing Information Systems within organisations; role of the chief information officer; frameworks for understanding IS functions; issues of planning, budgeting, end-user computing, operation management, and organisational structures.
Prerequisite: BINF 511 or BINF 512

BINF 530 Telecommunications and Information Networking [3-0-0:3]
Hong Kong's telecommunication infrastructure and regulatory environment; basic functions of data communication systems and the software and hardware capabilities of these systems; issues related to data communication management, information networking, and EDI.
Prerequisite: BINF 511 or BINF 512

BINF 588 Field Study I [2-0-0:2]
A supervised study of an organisation, including the establishment of client-consultant relationships, identification of strategic questions, design of studies, collection and analysis of data, development and reporting of recommendations. (MBA core course)

BINF 589 Field Study II [3-0-0:3]
Continuation of BINF 588. (MBA core course)

BINF 610 Special Topics [2-4 credits]
Study of selected areas of information systems and information technology; individual projects and reports.
Postgraduate Course Descriptions

BIOL 516 Ecological Methodology [2-2-0:4]
[Previous Course Code : BIOL 607]
Lecture and tutorial-based course for advanced students in ecology; selected readings and discussions in basic and applied aspects of population dynamics, community interaction, environmental impact assessment, and resource management. Emphasis is on the ecological methodology.
Exclusion : BIOL 607
Background : BIOL 216

BIOL 517 Advanced Topics in Molecular Biology [2-2-0:4]
[Previous Course Code : BIOL 601]
Recent advances in molecular biology will be discussed in lectures and in tutorial sessions; various current research topics in eukaryotic gene regulation, molecular genetics and genetic diseases.
Exclusion : BIOL 601
Background : BICH 211, or/and BIOL 204

BIOL 519 Advanced Topics in Cell Biology [2-2-0:4]
[Previous Course Code : BIOL 609]
Selected discussion of various current research topics on the structure and function of eukaryotic cells; the course will be conducted in a combination of lectures and tutorials.
Exclusion : BIOL 609
Background : BIOL 204

BIOL 524 Principles of Neuroscience [2-2-0:4]
[Previous Course Code : BIOL 503]
Principles underlying the structure and function of the nervous system, integrating molecular, cellular systems, and computational approaches. Topics include chemical neurotransmission, sensory processes, control of movement, neuroendocrinology, neuronal plasticity in development and learning.
Exclusion : BIOL 503
Background : BIOL 104, or/and BIOL 202

BIOL 528 Recent Development in Plant Molecular Biology and Plant Physiology [2-2-0:4]
[Previous Course Code : BIOL 608]
Plant genetics and genetic engineering in plants; elucidation of plant mechanisms at the molecular level; identification and manipulation of genes controlling important plant functions; current literature in the field will be discussed.
Exclusion : BIOL 608
Background : BIOL 225 or BICH 211

BIOL 603 Special Topics in Neuroscience [2-2-0:4]
In-depth discussion of topics of current interest to the participants; student seminars, occasional guest lectures, and discussions; topics drawn from current research areas in molecular neurobiology, developmental neurobiology, neurophysiology, and computational neuroscience.
Background : BIOL 324

BIOL 604 Special Topics in Developmental Biology [2-2-0:4]
Recent progress in developmental biology; cellular and molecular basis in model systems; small group tutorials.
Background : BIOL 309

BIOL 605 Special Topics in Microbiology [4-0-0:4]
Advanced small-group tutorials. Selected readings and discussion of various current research topics on basic and applied aspects of microbiology.

BIOL 606 Special Topics in Marine Invertebrates [2-2-0:4]
Course covers various current research topics on basic and applied aspects of marine biology with emphasis on marine economic species.
Prerequisite : BIOL 513

BIOL 611 Postgraduate Seminars I [0-2-0:2]
[Previous Course Code: BIOL 501]
Advanced seminar series presented by visiting scientists, HKUST academic staff or postgraduate students on selected topics in biological sciences. Fall Semester.

BIOL 612 Postgraduate Seminars II [0-2-0:2]
[Previous Course Code: BIOL 502]
Same as BIOL 611, but in the Spring Semester.

BIOL 616 Fisheries Biology and Management [2-2-0:4]
Advanced small-group tutorials. Selected reading and discussion of fish stock discrimination, population dynamics, fisheries oceanography, stock assessment, multi-species interaction, fisheries economics and social/political problems in fisheries management.
Prerequisite : BIOL 513 or BIOL 516

BIOL 699 MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.
Biological Sciences

BIOL 799 PhD Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

Programme in Biotechnology

Explanations of prerequisites and exclusions can be found on page 23.

BTEC 567 Industrial Biotechnology [0-1-6:3]
Study of industrial biotechnology through the examples of value-added and specialty products development in the field of biotechnology. A case study approach will be adopted with interaction with industry including lectures given by industrial experts.

BTEC 695 Biotechnological Research [0-1-9:4]
The student will conduct a course project in a biotechnological field under the supervision of a faculty member of a participating department at the end of the semester, the student is required to submit a written report and provide an oral presentation of the project.

BTEC 696 Biotechnological Research [0-1-9:4]
The student will conduct a course project in a biotechnological field under the supervision of a faculty member of a participating department at the end of the semester, the student is required to submit a written report and provide an oral presentation of the project.

BTEC 697 Biotechnological Research [0-1-9:4]
The student will conduct a course project in a biotechnological field under the supervision of a faculty member of a participating department at the end of the semester, the student is required to submit a written report and provide an oral presentation of the project.

BTEC 698 Biotechnological Research [0-1-9:4]
The student will conduct a course project in a biotechnological field under the supervision of a faculty member of a participating department at the end of the semester, the student is required to submit a written report and provide an oral presentation of the project.

Department of Chemical Engineering

Explanations of prerequisites and exclusions can be found on page 23.

CENG 501 Process Modelling, Simulation and Control [1-1-4:4]

CENG 502 Advanced Computer Applications in Chemical Engineering [1-1-4:4]
Advanced topics of computer applications selected from current research areas: e.g. transputer control of conventional and non-traditional processes, parallel processing of complex models, intelligent knowledge based systems, neural network applications.

CENG 511 Polymerisation Reactor Engineering [3-0-0:3]

CENG 521 Advanced Separation Processes [3-0-0:3]

CENG 540 Advanced Transport Phenomena [3-0-0:3]

CENG 541 Transport Phenomena in Non-traditional Processes [2-1-0:3]
Advanced topics of transport phenomena selected from current research areas: e.g. polymer melt processing, characterisation of complex fluids, biological systems, novel multiphase flow reactors, environmental control processes. Computational fluid dynamics simulation.

CENG 551 Processing of Polymers and Polymer Composites [3-0-3:4]
CENG 553 Physical and Rheological Behaviour of Polymers [3-0-0:3]

CENG 556 Biochemical Reactor Engineering [3-0-3:4]
Kinetics of substrate utilisation, product formation and biomass production in cell cultures. Design and analysis of biological reactors; sterilisation reactors; immobilised biocatalysts; fermentation reactors; animal and plant cell reactor technology.

CENG 562 Enzyme Catalysis, Transport Processes and Downstream Processing [3-0-3:4]
Applied enzyme catalysis: enzyme kinetics, enzymes in solution, immobilised enzyme technology. Transport phenomena in bioprocesses: gas-liquid mass transfer, mass transfer correlations and interfacial area, oxygen transfer rates, scale-up, scale-down and modelling. Downstream processing.

CENG 564 Biomedical Engineering [3-0-0:3]
Interfacial phenomena in biological systems: artificial organs, implantable devices and prosthetics, blood oxygenation systems, gas-exchange in the lung. Transports in biological systems: organ systems, intracellular systems, protein transport and dynamics.

CENG 566 Food Processing [3-0-0:3]

CENG 571 Environmental Control for Process Industries [3-0-3:4]
Wastes from the process industries. Behaviour of toxic chemicals in atmospheric, soil and aquatic environments. Adsorption/desorption, air stripping, steam stripping, supercritical extraction. Pyrolysis, biological, catalysed and uncatalysed reactions. Integrated environmental control.

CENG 572 Environmental Control Process Selection and Design [3-0-3:4]
Selection of control technology for problems of air and water pollution in the process industries. In-depth design studies of selected processes. Advanced waste water and hazardous waste treatment. Emerging technologies.

CENG 573 Environmental Management [3-0-3:4]

CENG 574 Aerosols in Air Pollution [3-0-3:4]

CENG 600 Special Topics [1-3 credits]
Examples: biodegradation and recycling of plastics, harnessing renewable sources of energy.

CENG 651 Topics in Surface Chemistry and Experimental Methods [3-0-1:3]
Fundamentals and applications of heterogeneous catalysis. Surface reaction mechanisms. Adsorption, Wetting. Modern surface characterisation techniques: e.g. XPS, AES, LEED, SIMS and TEM.

CENG 680 Chemical Engineering Seminar and Reading [0-1-0:1]
Series of seminar topics presented by students, faculty and guest speakers; may be repeated for credit.

CENG 698 MSc Project [6 credits]
An independent project carried out under the supervision of a faculty member.

CENG 699 MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

CENG 799 Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.
DEPARTMENT OF CHEMISTRY

Explanations of prerequisites and exclusions can be found on page 23.

CHEM 511  Advanced Organic Chemistry I  [3-0-0:3]
Mechanism and theory in organic chemistry. Molecular orbital theory, structure-reactivity relationship, isotope effects, solvent effects, neighbouring group participation, and reactive intermediates.
Background : CHEM 111 and CHEM 112

CHEM 512  Advanced Organic Chemistry II  [3-0-0:3]
Stereochemistry and conformational analysis; reactions and structure of various classes of organic compounds; synthetic organic chemistry; modern methods of synthesis including both specific methodology and the planning of multistep complex synthesis.
Prerequisite : CHEM 511

CHEM 515  Physical Methods for Organic Structural Determinations  [3-0-0:3]
Discussion on use of nuclear magnetic resonance spectroscopy (1H and 13C), electronic absorption (UV-visible and chiroptical) spectroscopy, vibrational (Raman/infrared) spectroscopy, mass spectroscopy, electron spin resonance spectroscopy, and other physical techniques to determine structural and dynamic properties of organic molecules.

CHEM 516  Medicinal Chemistry  [3-0-0:3]
Drug design; structure-activity relations; chemistry and biological effects of major classes of physiologically active and psycho-active drugs.

CHEM 517  Organometallic Chemistry  [3-0-0:3]
Bonding/structure/reactivity of organometallic compounds; ligand substitution reactions; oxidative and reductive elimination reactions; insertion reactions; reactions of coordinated ligands; applications to catalytic processes and organic synthesis.
Prerequisites : CHEM 511 and CHEM 531

CHEM 521  Computational Quantum Chemistry  [3-0-0:3]
Semi-empirical and ab initio methods in contemporary computational quantum chemistry; computation of molecular properties such as molecular geometry, energetics, force field, dipole moment, charge distribution, vibrational normal modes, and thermodynamic function.
Prerequisite : CHEM 522

CHEM 522  Statistical Thermodynamics  [3-0-0:3]
The fundamentals of thermodynamics are reviewed and statistical methods used to derive relationships between microscopic properties of molecules and such macroscopic properties as the thermodynamic functions.
Background : CHEM 221 and CHEM 222

CHEM 523  Quantum Chemistry  [3-0-0:3]
Fundamentals of quantum mechanics reviewed. Energy levels selection rules needed to understand and use various types of molecular spectroscopy, such as UV-visible, Raman / infrared, electron spin resonance and nuclear magnetic resonance, derived.
Background : CHEM 222
Textbook : Levine, Quantum Chemistry, Fourth Edition

CHEM 525  Photochemistry of Organic and Organometallic Materials  [3-0-0:3]
Fundamental concepts and theories of molecular photochemistry presented with a mechanistic emphasis on organic photochemistry. Material covered includes polymeric systems with organic and inorganic structures. Applications to microelectronics and chemical industry.

CHEM 527  Chemical Dynamics  [3-0-0:3]
Reaction dynamics. Experimental techniques for studying the time evolution of chemical systems and mathematical methods for describing these systems. Various theories for estimating reaction rate constants.
Background : CHEM 222

CHEM 531  Advanced Inorganic Chemistry I  [3-0-0:3]
Symmetry/group theory; molecular orbitals/electronic states; ligand field theory; electronic structure of metal complexes; theory of bonding and structure of inorganic compounds and the chemistry of the elements; major physical methods used in the determination of molecular structure and bonding.
Background : CHEM 132

CHEM 532  Advanced Inorganic Chemistry II  [3-0-0:3]
Mechanisms of inorganic and organometallic reactions; reaction dynamics and structure-reactivity relationships in inorganic reactions; important aspects and examples of homogeneous catalysis; Fe bioinorganic chemistry and photosynthesis.
Prerequisite : CHEM 531
**CHEM 533** Symmetry Principles and Group Theory in Chemistry  
[3-0-0:3]  
Principles of molecular symmetry and point group and their application to problems of structure, reaction and spectroscopy.  

**CHEM 534** Chemical X-ray Crystallography  
[3-0-0:3]  
Applications of X-ray diffraction methods to the determination of crystal structures, including crystal symmetry, reciprocal lattice, intensity of diffraction, the phase problem, and refinement of structure parameters.

**CHEM 541** Advanced Analytical Chemistry I  
[3-0-0:3]  
A survey of the theories and applications of contemporary separation methods for chemical analysis. Emphasis on techniques such as high performance liquid chromatography, gas chromatography, planar chromatography, countercurrent chromatography, and supercritical fluid chromatography.

**CHEM 542** Advanced Analytical Chemistry II  
[3-0-6:5]  
Analogue and digital electronics, microcomputers, interfacing, instrumentation. Applications to spectroscopy, electrochemistry, and chromatography.

**CHEM 554** Advanced Materials for Electronics and Photonics Applications  
[3-0-0:3]  
[Previous Course Code: CHEM 624]  
Chemistry of resist materials for microelectronics, electronic packaging materials, electrically conducting polymers and polymer applications for non-linear optics.

**CHEM 600** Chemistry Seminar  
[0-1-0:1]  
[Previous Course Code: CHEM 700]  
Series of seminar topics presented by students, faculty and guest-speakers; may be repeated for credit.

**CHEM 601** Special Topics in Bio-inorganic Chemistry  
[3-0-0:3]  
[Previous Course Code: CHEM 536]  
Structures, properties and functions of the first series of transition metal ions; unresolved issues from current literature.

**CHEM 602** Special Topics in Physical Chemistry  
[3-0-0:3]  
[Previous Course Code: CHEM 552]  
Mechanisms of Raman, resonance Raman, surface-enhanced Raman, surface-enhanced resonance Raman and surface-enhanced hyper Raman scattering.  
Prerequisite: CHEM 523

**CHEM 699** MPhil Thesis Research  
[Previous Course Code: CHEM 710]  
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

**CHEM 799** Doctoral Thesis Research  
[Previous Course Code: CHEM 800]  
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

**DEPARTMENT OF CIVIL AND STRUCTURAL ENGINEERING**

Explanations of prerequisites and exclusions can be found on page 23.

**CIVIL 511** Simulation in Civil Engineering  
[3-0-0:3]  
Use of computer simulation in the analysis of civil engineering systems with emphasis on the simulation of stochastic water resource systems.  
Background: COMP 102, MATH 241 and MATH 243 (or MATH 244)

**CIVIL 521** Advanced Reinforced Concrete  
[3-0-0:3]  
Presents an up-to-date treatment of reinforced concrete theory and practice; includes ultimate limit state design for bending, shear, torsion, combined bending and compression, serviceability requirements, plates and slabs, art of detailing.  
Background: CIVL 321

**CIVIL 522** Advanced Prestressed Concrete  
[3-0-0:3]  
Basic concepts, design for serviceability and time dependent analysis, ultimate strength limit states, anchorage zones, statically indeterminate structures, two-way slabs, compression and tension members.

**CIVIL 531** Advanced Structural Analysis  
[3-0-0:3]  
Advanced techniques for structural analysis; includes structural modelling, analysis of complex frameworks, shear walls, shear cores, tubular and outrigger-braced structures, nonlinearity and stability, special topics on tall building design.  
Background: CIVL 333
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL 532</td>
<td>Structural Dynamics</td>
<td>[3-0-0:3]</td>
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<tr>
<td></td>
<td>Basics, lumped mass systems with various degree of freedom, energy methods, modal analysis, frequency domain, numerical methods, continuous systems, earthquake engineering, wind loading and aerodynamic effects on buildings.</td>
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<tr>
<td>CIVL 541</td>
<td>Physical and Chemical Wastewater Treatment</td>
<td>[3-0-0:3]</td>
<td>CIVL 242</td>
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<tr>
<td></td>
<td>Principles of treatment for removing contaminants from drinking and municipal wastewaters; includes equalisation, neutralisation, precipitation, coagulation and flocculation, sedimentation, filtration, air stripping, carbon adsorption, disinfection.</td>
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<tr>
<td>CIVL 542</td>
<td>Biological Waste Treatment</td>
<td>[3-0-0:3]</td>
<td>CIVL 242</td>
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<tr>
<td></td>
<td>Principles of secondary, biological treatment processes; includes sewage sand filters, trickling filters, activated sludge plants, lagoons, ponds, rotating biological contactors, aerobic and anaerobic digesters, and biological nutrient removal.</td>
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<tr>
<td>CIVL 543</td>
<td>Aqueous Chemistry</td>
<td>[3-0-0:3]</td>
<td>CIVL 242</td>
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<tr>
<td></td>
<td>Chemistry applied to reactions occurring in water and wastewater, includes inorganic solution chemistry, chemical equilibrium, acids/bases, coordination chemistry, chemical kinetics, colloid chemistry, solubility and precipitation, oxidation-reduction potential.</td>
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<tr>
<td>CIVL 544</td>
<td>Process Design of Water and Wastewater Treatment Systems</td>
<td>[3-0-0:3]</td>
<td>CIVL 242</td>
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<tr>
<td></td>
<td>Complete design of water or wastewater treatment plants with emphasis on careful iterative accounting in terms of solids mass balances, flow sidestreams, hydraulics and pumping.</td>
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<tr>
<td>CIVL 545</td>
<td>Hazardous Waste Treatment and Disposal</td>
<td>[3-0-0:3]</td>
<td>CIVL 242</td>
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<td></td>
<td>Technical and regulatory aspects of the handling and disposing of hazardous wastes; includes waste collection, treatment, storage and disposal facilities, remediation of contaminated soils, treatment of liquid wastes, waste minimisation.</td>
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<tr>
<td>CIVL 546</td>
<td>Engineering Design For Landfill System</td>
<td>[3-0-0:3]</td>
<td>CIVL 241 and CIVL 271</td>
</tr>
<tr>
<td></td>
<td>Geoenvironmental aspects of landfill lining and cover systems; includes clay mineralogy, construction of liners and covers, construction quality assurance, effects of chemicals, transport of chemicals, permeability tests, landfill operation.</td>
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<tr>
<td>CIVL 547</td>
<td>Industrial Wastewater Treatment</td>
<td>[3-0-0:3]</td>
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<td></td>
<td>Procedures for industrial surveys; includes waste sampling, waste characterisation, treatability studies, selection of treatment methods for achieving cost effective operation, case studies of selected types of industrial waste treatment.</td>
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<tr>
<td>CIVL 551</td>
<td>Advanced Pipeline Analysis and Design</td>
<td>[3-0-0:3]</td>
<td>CIVL 251</td>
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<td></td>
<td>Advanced topics and applications in the analysis and design of pipelines and pipe networks; includes numerical techniques for solving incompressible and compressible flow equations.</td>
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<td>CIVL 552</td>
<td>Water Resources Systems Analysis</td>
<td>[3-0-0:3]</td>
<td>ECON 111 and MATH 281</td>
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<td></td>
<td>A systems approach to the area of water resources management; includes water resources systems within the context of public investment systems, criteria and design of water management schemes.</td>
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<tr>
<td>CIVL 553</td>
<td>Effluent Dispersion in the Ocean</td>
<td>[3-0-0:3]</td>
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<td></td>
<td>Ocean disposal of large quantities of effluent such as those generated by a city; includes water quality standards and the design of disposal systems.</td>
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<tr>
<td>CIVL 554</td>
<td>Toxic Releases in the Atmosphere</td>
<td>[3-0-0:3]</td>
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<td></td>
<td>Concepts for estimating the hazards posed by toxic releases to the atmosphere; includes micrometeorology, a variety of release scenarios and the role of wind tunnel simulations.</td>
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<tr>
<td>CIVL 555</td>
<td>Water Resources System Modelling</td>
<td>[3-0-0:3]</td>
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<td></td>
<td>Physical processes in water resources systems, their mathematical representation and numerical solutions; includes Newton's second law, equations of mass and energy conservation applied to closed-conduit, open-channel and groundwater flow problems.</td>
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<tr>
<td>CIVL 557</td>
<td>Advanced Soil Mechanics</td>
<td>[3-0-0:3]</td>
<td>CIVL 371</td>
</tr>
<tr>
<td></td>
<td>Selected topics from recent advances in theoretical and experimental development in soil mechanics; includes stress-strain behaviour of soil, consolidation settlement, drained and undrained strength slope stability problems.</td>
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<tr>
<td>CIVL 572</td>
<td>Advanced Foundation Design</td>
<td>[3-0-0:3]</td>
<td>CIVL 372</td>
</tr>
<tr>
<td></td>
<td>Current practice of foundation design and analysis; includes design and analysis of bulkheads, deep excavation, tieback systems, tunnelling in soft ground, buried conduits, lateral pile loading, pier foundations.</td>
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</tr>
</tbody>
</table>
CIVL 573  Analytical and Numerical Methods in Geomechanics  [3-0-0:3]
Recent advances in analytical and numerical methods in Geomechanics; includes elasticity, classical plasticity, the use of finite element method for elastoplastic analysis, diffusion and consolidation problems, Fourier transform.
Background :  CIVL 371 and CIVL 331

CIVL 574  Geotechnical Design Using Geosynthetics  [3-0-0:3]
A state-of-the-art examination of the use of geosynthetics in geotechnical engineering practice; includes properties and test methods for geosynthetics, design for separation, filtration, drainage and reinforcement.
Background :  CIVL 371 and CIVL 372

CIVL 600  Special Topics  [3-0-0:3]
Selected topics of current interest. May be repeated for credit if different topics are covered.

CIVL 680  Civil and Structural Engineering Seminar  [0 credit]
Discussion of current graduate research, and guest lectures on recent advances in civil and structural engineering. Students are expected to attend regularly.

CIVL 698  MSc Project  [6 credits]
An independent research project carried out under the supervision of a faculty member. This compulsory project for MSc students will normally be completed at the end of the course of study.

CIVL 699  MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

CIVL 799  Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

CIVL 5773  Analytical and Numerical Methods in Geomechanics  [3-0-0:3]
Recent advances in analytical and numerical methods in Geomechanics; includes elasticity, classical plasticity, the use of finite element method for elastoplastic analysis, diffusion and consolidation problems, Fourier transform.
Background :  CIVL 371 and CIVL 331

CIVL 574  Geotechnical Design Using Geosynthetics  [3-0-0:3]
A state-of-the-art examination of the use of geosynthetics in geotechnical engineering practice; includes properties and test methods for geosynthetics, design for separation, filtration, drainage and reinforcement.
Background :  CIVL 371 and CIVL 372

CIVL 600  Special Topics  [3-0-0:3]
Selected topics of current interest. May be repeated for credit if different topics are covered.

CIVL 680  Civil and Structural Engineering Seminar  [0 credit]
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CIVL 799  Doctoral Thesis Research
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COMP 501*  Organisational Computing Systems  [3-0-0:3]
Technology integration as applied to organisational computing systems. Interdisciplinary nature; enabling technologies; human-computer interaction; information management; organisational communication; organisational work; designing organisational computing systems; impact and evaluation.

COMP 514  Software Engineering  [3-0-0:3]
Concepts and principles which underlie current and emerging methods, tools, and techniques for software development, validation and maintenance; case studies.

COMP 521  Artificial Intelligence  [3-0-0:3]
Introduction to selected research topics in artificial intelligence, such as machine perception, knowledge-based systems, machine translation, problem solving, constraint satisfaction, truth-maintenance systems.

COMP 522  Machine Learning  [3-0-0:3]
Introduction to machine learning paradigms and techniques. Induction from examples, conceptual clustering, explanation-based learning, analogical and case-based reasoning, statistical pattern recognition, connectionist learning and genetic algorithms.
Background :  COMP 321

COMP 523  Artificial Neural Networks  [3-0-0:3]
Theory and applications of neurocomputing. Artificial neural networks as biologically inspired computational models for supervised learning, unsupervised learning, reinforcement learning, associative memory, optimization, etc. and their theoretical foundations.
Prerequisite :  COMP 527

COMP 524  Computer Vision  [3-0-0:3]
Introduction to techniques for automatically describing visual data and tools for image analysis; perception of spatial organisation; models of general purpose vision systems; computational and psychological models of perception.

COMP 525  Expert Systems  [3-0-0:3]
Introduction to expert systems. Problem specification, knowledge acquisition, knowledge representation, inference techniques, uncertainty management, explanation, tools and languages for building expert systems; examples of existing systems.
COMP 526  Natural Language Processing  [3-0-0:3]
Techniques for parsing, interpretation, context modelling, plan recognition, generation. Emphasis on statistical approaches, neuropsychological and linguistic constraints, large text corpora. Applications include machine translation, dialog systems, cognitive modelling, knowledge acquisition.

COMP 527*  Pattern Recognition  [3-0-0:3]
Introduction to pattern recognition techniques, Bayes decision theory, discriminant functions, perception, potential functions, parametric and nonparametric techniques; supervised and unsupervised learning; clustering; feature selection; syntactic pattern recognition.
Background: MATH 111 and MATH 244

COMP 531*  Data and Knowledge Base Systems  [3-0-1:3]
Introduction to data and knowledge base systems. Data models including relational model, semantic, object-oriented, and logic-based models. Transaction processing and query optimisation. Distributed data and knowledge base systems.

COMP 533  Information Retrieval  [3-0-0:3]
Systems that provide relevance (similarity) based retrieval rather than exact matching. Topics: IR system architecture, IR models, performance, evaluation, relevance feedback, clustering, other reductional indexing approaches, analysis applications, future trends.

COMP 534  Distributed Data and Knowledge Base Systems  [3-0-0:3]
An introduction to distributed data and knowledge base systems. Topics include architectures, database design, query processing and optimisation, concurrency control and recovery, and techniques for heterogeneous systems.

COMP 541  Multilingual Computing  [3-0-0:3]
Classifying systems of writing, script families, major scripts. Fonts: representation, rendering, etc. Attributes of systems of writing: bound and unbound graphemes, case and other modes, conjunctions, character classes. Operations over scripts.

COMP 551*  Compiler Design  [3-0-1:3]
Overview of compiler organisation, compiler building software tools; use of regular expressions and context-free grammar in programming language specification; parsing, semantic analysis, code generation and optimisation.

COMP 552*  Operating Systems  [3-0-1:3]
Previous Course Code: COMP 512
Operating system design and construction techniques; concurrent programming, operating system kernels, correctness, deadlock, memory management, process scheduling, file systems, security; programming methodologies for operating systems.

COMP 553  Distributed Systems  [3-0-0:3]
Issues in the design of distributed systems. Clock synchronisation, state detection, mutual exclusion; naming and authentication; coordination of distributed processes; design environment for specification, testing and analysis; case studies.

COMP 570  Algorithm Design and Analysis  [3-0-0:3]
This course covers advanced topics in algorithm design and analysis, including probabilistic algorithms, geometric algorithms, parallel algorithms: shared memory and network connected, graph algorithms, and advanced topics in complexity theory.

COMP 572  Computability and Logic  [3-0-0:3]
Computable functions, Church's thesis, unsolvable problems; recursively enumerable sets and degrees, computational complexity; predicate calculus, including the completeness, compactness, and Lowenheim-Skolem theorems; formal theories and Goedel incompleteness theorem.

COMP 581  Advanced Computer Architectures  [3-0-0:3]
Design and evaluation of high performance computers. Memory hierarchies, virtual memories and caches, pipeline, vector processing, compilers and operating systems as they affect computer architectures, performance evaluation, supercomputer case studies.

COMP 582  Parallel Processing  [3-0-0:3]
Design and analysis of parallel computer systems; distributed and shared memory; classification, programming models, interconnection networks, performance evaluation, fault-tolerance, parallel algorithm design, mapping problems; case studies.

COMP 583*  Computer Engineering Graph Theory  [3-0-0:3]
Graph theory and techniques with applications to computer engineering problems; optimisation techniques; resource allocation, logic design verification, distributed fault testing and diagnosis, network communication routing.
COMP 584 Optical Computing  [3-0-0:3]
Design of computer systems and communication networks using optical devices; nonlinear optical devices, optical switching and interconnection networks, different routing protocols in optical links, pipelining in waveguides, optical addressing.

COMP 585 Fault Tolerant Computing  [3-0-0:3]
Fault-tolerance issues in designing computer systems; fault detection and testing, algorithms for designing test sets; design for testability; error detecting and correcting codes; characterising fault-tolerance, reliability, availability.

COMP 588* Concurrency and Real-time Systems  [3-1-0:3]
Concurrency and synchronisation issues in computer systems; deadlock, contention, real-time interrupt driven systems, hardware and software synchronisation mechanisms, synchronous, asynchronous, and self-timed systems.

COMP 610 Topics in Software Engineering  [3-0-0:3]
This course covers selected topics in software engineering that are of current interest to the Department and are not covered by existing courses.

COMP 611 Topics in Object-Orientation  [3-0-0:3]
Topics include object-oriented computing concepts, object-oriented analysis and design, object-oriented data models and databases; impact on software reuseability; exemplary languages and systems; and other selected research topics.

COMP 620 Topics in Image Processing and Image Understanding  [3-0-0:3]
Topics include image processing design, analysis and implementation. Image representation and data structures; algorithm design and complexity issues; software development environments, parallel architectures and algorithms for image processing.

COMP 621 Topics in Artificial Intelligence  [3-0-0:3]
Advanced topics in AI: neural networks, machine intelligence, logic programming, machine learning, neurocomputing, natural language processing, etc.

COMP 630 Topics in Database Systems  [3-0-0:3]
This course covers selected topics in database systems that are of current interest to the Department and are not covered by existing courses.

COMP 631 Topics in Knowledge Base Systems  [3-0-0:3]
This course covers selected topics in knowledge base systems that are of current interest to the Department and are not covered by existing courses.

COMP 632 Topics in Information Retrieval  [3-0-0:3]
This course covers selected topics in information retrieval that are of current interest to the Department and are not covered by existing courses.

COMP 640 Topics in Interactive Computing  [3-0-0:3]
This course covers selected topics in interactive computing that are of current interest to the Department and are not covered by existing courses.

COMP 641 Topics in Graphics  [3-0-0:3]
This course covers selected topics in graphics that are of current interest to the Department and are not covered by existing courses.

COMP 650 Topics in Computer Systems  [3-0-0:3]
This course covers selected topics in computer systems that are of current interest to the Department and are not covered by existing courses.

COMP 651 Topics in Computer Systems Analysis  [3-0-0:3]
Advanced topics in computer systems analysis; issues in development and solution of system models; model parametrisation, verification and validation; recent developments in techniques and tools for system evaluation.

COMP 660 Topics in Computer and Communication Networks  [3-0-0:3]
This course explores the nature, design and implementation of computer communication protocols; and in particular, the design principles of OSI protocols. A survey of protocol specification, verification and testing will be given.

COMP 670 Topics in Theoretical Computer Science  [3-0-0:3]
This course covers selected topics in theoretical computer science that are not covered by existing courses. Topics include, but not limited to, computational complexities and computability, graph algorithms, combinatorial optimisation.

COMP 680 Topics in Computer Engineering  [3-0-0:3]
Selected topics in computer engineering that are of current interest to the Department and are not covered by existing courses.
COMP 690  Computer Science Seminar I  [0-1-0:1]
A regular seminar presenting research problems currently under investigation. Students are expected to attend regularly. (Graded either P or F).

COMP 691  Computer Science Seminar II  [0-1-0:1]
A regular seminar presenting research problems currently under investigation. Students are expected to attend regularly. (Graded either P or F).

COMP 692  Computer Science Seminar III  [0-1-0:1]
A regular seminar presenting research problems currently under investigation. Students are expected to attend regularly. (Graded either P or F).

COMP 695  Advanced Seminar in Computer Science  [0-1-0:1]
An in-depth study of a current topic in computer science. Offerings are announced each semester.

COMP 697  Independent Studies  [1 to 3 credits]
An independent research project carried out under the supervision of a faculty member.

COMP 698  MSc Research Project  [0-0-12:4]
An independent research project carried out under the supervision of a faculty member. A project report is expected and will be read by two faculty members, one of whom is the supervisor. (Graded either P or F).

COMP 699  MPhil Thesis Research  [Previous Course Code: COMP 600]
Students are required to complete a master's research thesis. A successful defence of the thesis leads to Pass or Pass with Distinction. No course credit is assigned.

COMP 799  Doctoral Thesis Research  [Previous Course Code: COMP 700]
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to Pass or Pass with Distinction. No course credit is assigned.

DEPARTMENT OF ECONOMICS

Explanations of prerequisites and exclusions can be found on page 23.

ECON 511  Managerial Microeconomics  [3-0-0:3]
Demand theory, analysis and estimation; production and cost analysis; market structures, strategic behaviour and interaction; output and pricing decisions in practice; special topics in managerial economics; case studies. (MBA core course)

ECON 512  Managerial Macroeconomics  [3-0-0:3]
Aggregate demand and supply, investment, employment, and inflation; monetary and fiscal policies; international trade and investment; trade policy and exchange rate policy; linkages between economies. (MBA core course)

ECON 521  Microeconomic Theory I  [4-0-0:4]
Theory of the firm, theory of consumer behaviour, duality; theory of the market, game theory; neoclassical and alternative approaches.
Prerequisite : One year of calculus

ECON 522  Microeconomic Theory II  [4-0-0:4]
Introduction to general equilibrium theory and welfare economics; economics of information and uncertainty; game theory; theory of contract and organisation; topics in modern microeconomics.
Prerequisite : ECON 521

ECON 525  Macroeconomic Theory I  [4-0-0:4]
Classical and Keynesian macroeconomic models; microfoundation of macroeconomics; dynamic and stochastic models of the economy; the role of expectations of future events; various approaches to the study of business cycles.
Prerequisite : One year of calculus

ECON 526  Macroeconomic Theory II  [4-0-0:4]
Theories of consumption, investment, money, and asset prices/returns; inflation and unemployment; fiscal and monetary policies; factors affecting the twin deficits; economic growth.
Prerequisite : ECON 525

ECON 530  Econometrics  [4-0-0:4]
Ordinary least squares, maximum likelihood and generalised least squares; multicollinearity and serial correlation; heteroscedasticity; errors in variables; limited dependent variables; simultaneous equation systems.
Prerequisites : One year of calculus
ECON 531 Time Series Analysis [4-0-0:4]
Estimation and application of trend models, smoothing, Box-Jenkins and time series models.
Prerequisite: ECON 530

ECON 535 Mathematics for Business and Economics [4-0-0:4]
Application of mathematics to economic and business analysis; mathematical analysis and linear algebra; optimisation methods.

ECON 536 Dynamic Optimisation Methods in Business and Economics [4-0-0:4]
Basic methods in dynamic optimisation; differential and difference equations; calculus of variations, control theory, dynamic programming; other methods useful for modern economics; computer applications of these methods.
Prerequisite: ECON 535

ECON 540 International Trade Theory [4-0-0:4]
Theories of trade, including Ricardian, Heckscher-Ohlin, Chamberlainian, and technology-gap models; tariffs and non-tariff trade barriers, welfare, income distribution; factor mobility; political economy of protection and trade negotiation.
Prerequisite: Postgraduate microeconomic theory course

ECON 541 Open Economy Macroeconomics [4-0-0:4]
Determination of national income in an open economy; balance of international payments and indebtedness; adjustments under fixed and flexible exchange rate systems; international monetary system and macroeconomic policy coordination.
Prerequisite: Postgraduate macroeconomic theory course

ECON 551 Comparative Economic Systems I [4-0-0:4]
Varieties of capitalism in the US, Western Europe, Japan and in newly industrialised countries; economic transition in Eastern Europe and the former Soviet Union, economic reform in China.
Prerequisites: ECON 511 and ECON 512

ECON 552 Comparative Economic Systems II [4-0-0:4]
Continuation of ECON 551

ECON 561 Industrial Organisation I [4-0-0:4]
Theory of imperfect competition, its consequences for market structure, performance and strategic behaviours; entry deterrence, advertising, R & D merger, vertical integration, alliance formation; empirical and experimental evidence.
Prerequisite: ECON 521

ECON 562 Industrial Organisation II [4-0-0:4]
Causes and effects of oligopoly; anti-competitive business practices; regulation of monopolies such as public utilities; anti-trust policies; behaviour of regulatory agencies and regulated firms.
Prerequisite: ECON 561

ECON 565 Public Economics I [4-0-0:4]
Effects of taxation and other sources of government revenue on resource allocation and income distribution; theory of optimal taxation; time consistency of taxation policy; public debt.
Prerequisites: ECON 521 and ECON 525

ECON 566 Public Economics II [4-0-0:4]
Market failures and public expenditure, public sector pricing and production; provision of public goods; infrastructure investment and project evaluation; theory of public choice.
Prerequisite: ECON 565

ECON 570 Monetary Economics I [4-0-0:4]
Classical dichotomy and neutrality of money; money supply and financial intermediation; money demand; monetary equilibrium; money, inflation and growth; money and the business cycle; money in the theory of finance.
Prerequisites: ECON 521 and ECON 525

ECON 571 Monetary Economics II (Monetary Policy) [4-0-0:4]
Optimum quantity of money; targets and instruments of monetary policy; rational expectations and policy effectiveness; rules versus discretion; dynamic inconsistency and reputational equilibrium.
Prerequisite: ECON 570

ECON 575 Advanced Econometrics I [4-0-0:4]
Nonlinear regression methods; asymptotic distribution theory; time series analysis; discrete and limited dependent variables; Bayesian inference in econometrics.
Prerequisite: ECON 530
ECON 576 Advanced Econometrics II [4-0-0:4]
Various topics which may include generalised method of moments (GMM), semi-parametric and non-parametric estimation, discrete choice models and analysis of panel data; applications in dynamic economic models.
Prerequisite: ECON 530

ECON 580 Economic Growth and Development I [4-0-0:4]
Neo-classical and other models of economic growth; problems and mechanics of development, effects of technological and institutional changes on development patterns.
Prerequisites: ECON 521 and ECON 525

ECON 581 Economic Growth and Development II [4-0-0:4]
Continuation of ECON 580

ECON 585 Human Resource and Labour Economics I [4-0-0:4]
Demand and supply of labour for different occupations; human capital theory; determinants of earnings differentials; job search, job training and unemployment; labour unions and labour contracts; minimum wage laws; migration.
Prerequisite: ECON 521

ECON 586 Human Resource and Labour Economics II [4-0-0:4]
Continuation of ECON 585

ECON 588 Field Study I [2-0-0:2]
A supervised study of an organisation, including the establishment of client-consultant relationships, identification of strategic questions, design of studies, collection and analysis of data, development and reporting of recommendations. (MBA core course)

ECON 589 Field Study II [3-0-0:3]
Continuation of ECON 588. (MBA core course)

ECON 590 Mathematical Economics I [4-0-0:4]
Mathematical treatment of economic theory; existence and stability of competitive equilibrium; game theory, dynamic equilibrium and other advanced topics in economics.
Prerequisite: ECON 522

ECON 591 Special Topics [2-4 credits]
Selected topics from the frontiers of research in economic theory and application.

ECON 790 Doctoral Seminars [2-4 credits]
Presentation and discussion of current research projects conducted by PhD students, faculty or visiting scholars.

ECON 799 Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Explanations of prerequisites and exclusions can be found on page 23.

ELEC 501 VLSI Design I [2-0-3:3]
CMOS transistor theory and processing technology; circuit characterisation and performance estimation; CMOS circuit and logic design; structured design and testing; layout techniques; subsystem design; VLSI system studies; CAD tools.

ELEC 502 VLSI Design II [2-0-3:3]
Continuation of ELEC 501.

ELEC 503 ASIC Design with Field Programmable Gate Arrays [2-0-3:3]
ASIC design cycle using Field Programmable Field Arrays (FPGA); specification, design, implementation and testing. Basics of FPGA's; design implementation; verification using industrial standard logic simulators; testing strategies and test vectors generation.

ELEC 504 Analog VLSI [3-0-0:3]
Analysis and design of monolithic operational and wide-band amplifiers; noise in integrated circuits; voltage reference circuits; switched capacitor filters; A/D and D/A converters. Analog Application Specific ICs.

ELEC 505 Advanced Semiconductor Device Design and Simulation [3-0-3:4]
[Previous Course Code: ELEC 521]
Semiconductor physics and devices with emphasis on bipolar and MOS devices; device structure parameters; terminal characteristics; high current and high frequency effects; transient analysis; numerical analysis and CAD models; device simulators: BIPOLE and PISCESIIIB.
ELEC 506  Semiconductor Optoelectronic Devices  [3-0-0:3]
[Previous Course Code : ELEC 522]
Overview of semiconductor optics and optoelectronic devices; optical processes in semiconductors; electromagnetic principles of optoelectronic devices; photovoltaic effects; semiconductor lasers; light-emitting diodes; photodetectors; solar cells; quantum optoelectronic devices.

ELEC 507  Microelectronics Fabrication Technology  [3-1-0:3]
[Previous Course Code : ELEC 523]
Process technologies in IC fabrication: epitaxial growth; chemical vapour and physical vapour deposition of films; thermal oxidation; diffusion; ion implantation; microlithography; wet/dry etching processes; technical subjects common to individual processes such as vacuum technology.

ELEC 508  Integrated Circuits Process Integration  [3-1-0:3]
[Previous Course Code : ELEC 524]
Combination of individual fabrication modules to produce integrated circuits. IC sub-process integration; isolation structures; metal-silicon structures; metal-silicon contacts; device-interconnection structures. Full-device-type technologies for NMOS, CMOS, bipolar and BiCMOS.

ELEC 509  Modern Optical Devices and Systems  [2-0-3:3]
Fourier-optics-based devices and systems: diffraction theory and approximations; optical transfer functions and signal processing; holography and optical computing systems. Optical waveguides and fibres: dispersion; mode coupling; loss mechanisms; fibre fabrication and characterisation; integrated optics; fibre-optic communication systems.

ELEC 510  Semiconductor Device modelling and Scaling Theory  [3-0-0:3]
Derivation of the one-dimensional device models for semiconductor devices; the impact of two dimensional device phenomena; component reliability on the scaling of semiconductor devices; survey of current issues in device physics; numerical device simulation.

ELEC 511  Power Electronics  [3-0-0:3]
Design of monolithic power integrated circuits and devices for consumer and industrial intelligent control applications: integratable power bipolar and MOS devices; power controlling circuitries; fabrication technology; limitations and protection; packaging; reliability; consumer and industrial applications.
Prerequisite : Undergraduate electronic circuit and device courses

ELEC 512  Advanced Semiconductor Device Theory  [3-0-0:3]
Review of solid state theory and simple statistical mechanics; band structure of Silicon; occupation functions; Boltzmann equation and its application to electron transport in solids; effective, mass; scattering processes; mobility; recombination processes; carrier life-times.
Postgraduate Course Descriptions

ELEC 534    Speech and Audio Processing    [3-0:0:3]
Time-frequency speech representation; vocal tract/ear model; language phonetics; speech quality measurements; digital speech coding (ADPCM, CELP, MPLPC, SBC, LD-VXC); Mozer technique; speech synthesis; speech recognition; room acoustics. 
Prerequisite    : Background in digital signal processing.

ELEC 535    Adaptive Digital Signal Processing    [3-0:0:3]
[Previous Course Code : ELEC 512]
Discrete-time stationary processes and models; FIR adaptive filtering; gradient based adaptation, steepest descent; linear least squared estimation, eigenvector based projection, recursive least-squared estimation, fast RLS algorithms, lattice filters; blind signal processing. 
Prerequisite    : ELEC 530

ELEC 536    Principles of Communication Engineering    [3-0:0:3]
[Previous Course Code : ELEC 514]
Optimum receiver principles; efficient signalling; efficient signal selection; channel capacity; coding theory; channel modeling; random amplitude and phase; fading channels; modulation; conventional PCM and PCM with error correction.

ELEC 537    Computer Communication Networks    [3-0:0:3]
Prerequisite    : Undergraduate probability theory

ELEC 538    Digital Circuit-Switched Networks    [3-0:0:3]
Current topics in digital circuit switching: introduction to circuit switching, elements of telephone traffic engineering, space and time switching, call processing in digital circuit-switched systems, overload control mechanisms, non-hierarchical routing, common channel signaling. Introductory ISDN and B-ISDN. Emphasis on modelling and quantitative performance analysis. 
Prerequisite    : ELEC 537

ELEC 539    Advanced Topics in Telecommunications    [3-0:0:3]
Introduction to the architectures and protocols of integrated broadband communication networks. Topics include: network services and requirement, networking and switching architectures for high-speed communication, traffic characterization, performance evaluation techniques, protocol issues, and case studies. 
Prerequisite    : ELEC 537

ELEC 540    Artificial Neural Networks    [3-0:0:3]
[Previous Course Code : ELEC 516]
Theory and applications of neurocomputing. Artificial neural networks as biologically inspired computational models for supervised learning, unsupervised learning, reinforcement learning, associative memory, optimisation, etc. and their theoretical foundations.

ELEC 541    Neuronal Fuzzy Logic Control    [2-0:3:3]
Fuzzy logic control and extension of neural network capability to fuzzy logic control. Fuzzy set theory; fuzzy logic; fuzzy logic control; extension of neural network to fuzzy logic control. Students are required to carry out a project.

ELEC 542    Data and Image Compression    [3-0:0:3]
Lossless and lossy compression techniques: Huffman coding; arithmetic coding; LZW algorithm; predictive coding; transform coding; subband coding; and vector quantisation. Compression standards: JPEG, MPEG, JPG etc. Applications in speech, telemetry, television, image and data base management.

ELEC 543    Information Theory and Error-Correcting Codes    [3-0:0:3]
Information theory: self and mutual information measures; Shannon’s theory on source coding and channel coding; discrete memoryless channel models; channel capacity; Huffman code. Algebraic block codes: Hamming, BCH, Reed-Solomon, et al. Burst error-correcting codes and convolutional codes.

ELEC 544    Signal Detection and Estimation    [3-0:0:3]
Introduction to detection and estimation theory, with applications to communication, control and radar systems; decision-theory concepts and optimum-receiver principles; detection of random signals in noise; coherent and noncoherent detection; parameter estimation; linear and nonlinear estimation.

ELEC 545    Electromagnetic Wave Theory and Applications    [3-0:0:3]
This course provides an advanced treatment of electromagnetic wave propagation, radiation and scattering. The objective is to describe some techniques and applications such as microstrips, geometrical theory of diffraction, time-domain finite difference techniques, radio astronomy, numerical techniques, Fresnel and Fraunhofer diffraction and inverse scattering.

ELEC 546    Linear System Theory    [3-0:0:3]
Introduces modern system theory, with applications to control, signal processing and related topics. Basic system concepts; state-space and I/O representation; properties of linear systems; controllability; observability; minimality; transfer function matrices; state and output feedback; stability; observers; optimal regulators. 
Background    : MATH 151, MATH 152 and ELEC 211
ELEC 561  Multivariable Feedback Systems  [3-0-0:3]
Analysis and synthesis techniques for multi-input and multi-output (MIMO) control systems; singular value decomposition and applications; matrix fraction description; stabilisation, tracking and disturbance rejection. Two degrees of freedom design; robustness; linear quadratic optimal control.

ELEC 562  Nonlinear Systems: Analysis, Stability and Control  [3-0-0:3]
Introduction to nonlinear dynamical systems; differential equations; second-order systems; index theory; Poincare-Bendixson theorem; stability by direct and indirect methods of Lyapunov; input-output stability; geometric theory of control for nonlinear systems; exact linearisation by nonlinear feedback.

ELEC 563  Advanced Digital Control System Design  [3-0-0:3]
Intensive introduction to digital control systems design. Students are expected to attend ELEC 377 course lectures but work on advanced problem sets and laboratory experiments.

ELEC 564  Robot Manipulation  [3-0-0:3]
Extensive introduction to robot manipulation theory from a geometric viewpoint. Rigid body kinematics; spatial and body representation of rigid body velocities; coordinate transformations; forward kinematics of open-chain manipulators; solution of inverse kinematics; robot workspaces; nonlinear decoupling control and force control.

ELEC 565  Robot Motion Planning  [3-0-0:3]
Kinematics of multifingered robotic hands: grasp statics, planning and constraints; geometry of surfaces; kinematics of contact. Robot hand dynamics. Control of multifingered robotic hands. Robot motion planning; holonomic constraints versus nonholonomic constraints; holonomic and nonholonomic motion planning.

ELEC 690  Independent Study  [1-3 credits]
[Previous Course Code: ELEC 590]
Selected topics in electrical and electronic engineering under the supervision of a faculty member.

ELEC 691  Special Topics  [1-3 credits]
Selected topics of current interest. May be repeated for credit, if different topics are covered.

ELEC 695  Departmental Seminar  [1-0-0:1]
Series of seminar topics presented by students, faculty and guest speakers; may be repeated for credit.

ELEC 698  MSc Project  [3 credits]
[Previous Course Code: ELEC 690]
Compulsory course to be taken by MSc students in their last semester. An independent project carried out under the supervision of a faculty member.

ELEC 699  MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

ELEC 799  Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

DEPARTMENT OF FINANCE

Explanations of prerequisites and exclusions can be found on page 23.

FINA 512  Corporate Finance  [3-0-0:3]
Introduction to financial management. Valuation of cash flows, capital budgeting, risk and return of assets, capital structure and dividend policy, and mergers and acquisitions. (MBA core course)
Prerequisites: Introductory courses in financial accounting, microeconomics and business statistics.

FINA 520  Cases in Corporate Finance  [4-0-0:4]
Application-oriented course building on the introductory Corporate Finance course. Cases in working capital, capital budgeting analysis and planning, corporate valuations, mergers, and financial strategies.
Prerequisite: FINA 512

FINA 521  Investment Analysis and Portfolio Management  [4-0-0:4]
The analysis of management of common stocks and fixed income securities; modern portfolio theory and asset pricing models; and an introduction to derivative securities.

FINA 531  Financial System and Markets  [4-0-0:4]
Organisation and functions of money and capital markets. Interest rates, financial innovation, market microstructure and effects of government regulation on financial markets.
Prerequisites: ECON 511 and FINA 512
FINA 532   Financial Institutions  [4-0-0-4]  
Management issues for financial institutions, with emphasis on commercial banks. Capital adequacy, liquidity and interest rate risk management; market structure; regulatory issues of financial intermediaries.  
Prerequisite  :  FINA 512

FINA 541   International Finance  [4-0-0-4]  
The international money and capital markets. Currency options, futures and swaps as means for currency risk management. Financing and investment decisions of multinational corporations.  
Prerequisites  :  ECON 511 and ECON 512

FINA 551   Options and Futures Markets  [4-0-0-4]  
Organization and functions of options and futures markets. Pricing and analysis of futures and options contracts; spot and futures price relationships; speculation, arbitrage and hedging strategies; financial engineering.  
Prerequisite  :  FINA 512

FINA 561   Real Estate Investments  [4-0-0-4]  
Real estate economics and investment strategies; elements of real estate appraisal, development, finance, and law; pricing of mortgage-backed securities.  
Prerequisite  :  FINA 512

FINA 571   Financial Management of Insurance Companies  [4-0-0-4]  
Functions and operations of insurance industry. Design and pricing of insurance contracts. Optional management of insurance company portfolio.  
Prerequisite  :  FINA 512

FINA 588   Field Study I  [2-0-0-2]  
A supervised study of an organisation, including the establishment of client-consultant relationship, identification of strategic questions, design of studies, collection and analysis of data, development and reporting of recommendations. (MBA core course)

FINA 589   Field Study II  [3-0-0-3]  
Continuation of FINA 588. (MBA core course)

FINA 690   Special Topics  [2-4 credits]  
Current developments in the field of finance. Topics to be selected by the instructor.

FINA 790   Doctoral Seminars  [2-4 credits]  
Current research topics in corporate finance, investments, financial markets and institutions, derivative securities, and empirical research in financial economics.

FINA 799   Doctoral Thesis Research  
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

DIVISION OF HUMANITIES

Explanations of prerequisites and exclusions can be found on page 23.

HUMA 502   Contemporary Chinese Poetry  [3-0-0-3]  
A critical investigation of modern Chinese poetry in China, Taiwan, and Hong Kong from the late 1970s to the present, with emphasis on literary and historical contexts and comparative studies of poetics and artistic expressions.

HUMA 503   Modern Literary Theory  [3-0-0-3]  
[Previous Course Code: HUMA 600e]  
A historical and critical survey of major literary theories of the twentieth century: American formalism, archetypal criticism, Freudian and Lacanian psychoanalysis, Russian formalism, structuralism, semiotics, phenomenology, hermeneutics, reader-response, feminism, the Frankfurt school, deconstruction, and new historicism.

HUMA 506   Theories of Discourse  [3-0-0-3]  
A one-semester course on modern and contemporary theories of language, culture and textuality as embodied in such disciplines as hermeneutics, archaeology/genealogy of knowledge and deconstructionism.

HUMA 509   Modernity and Postmodernity  [3-0-0-3]  
Examines the range of meanings of these concepts and their various uses within a variety of disciplines, including: literary theory, philosophy, political theory, religious studies, aesthetics, etc.
HUMA 510  Relativism and Dialogue in Cross-cultural Interpretation  [3-0-0:3]
Focuses on the problem of understanding between groups with divergent world-views. Theories discussed range from arguments for the total incommensurability of different cultures, to programmes for genuine intercultural dialogue.

HUMA 511  Comparative Philosophy of Religion  [3-0-0:3]
Examines Eastern and Western works of philosophy of religion, and discusses conflicting claims about religious experience, myth, ritual and ethics.

HUMA 512  Hindu and Buddhist Philosophical Debates  [3-0-0:3]
Studies classic works on epistemology and metaphysics created in debates between South Asian Buddhists and Hindus, and interprets the relevance they still have for contemporary thought.

HUMA 513  Religious Theories of Language  [3-0-0:3]
Discusses theories of language of Eastern and Western religious thinkers, including such topics as the natures and relations of ordinary, scriptural and philosophical language.

HUMA 514  Studies in Chinese-American Literature  [3-0-0:3]
This postgraduate seminar focuses on a close study of one or more major Chinese-American writers, with consideration of critical, cultural and historical contexts.

HUMA 515  Traditional Chinese Literary Theory and Criticism  [3-0-0:3]
The aim of this course is to familiarise students with the traditional Chinese theories and criticism of literature. The advantages and limitations of the various modes of discourses such as prefaces to books, poetry-talks, poems on poetry, literary anthologies, stray remarks and commentaries will also be dealt with.

HUMA 516  Women and Religion  [3-0-0:3]
This course will explore the various roles and activities of women in religious traditions around the world, including Hindu, Buddhist (in India, Tibet, Southeast Asia, China, Japan, and North America), Judaeo, and Christian.

HUMA 517  Modern Chinese Literary Criticism  [3-0-0:3]
Examines the transformation of Western literary theories in the Chinese context. Focuses on practices of individual Chinese literary theorists and the relationship between literary criticism and socio-cultural criticism from historical and comparative perspectives.

HUMA 518  Women and Literature  [3-0-0:3]
An examination of roles, identity, and social construction of women in literature and feminist theories.

HUMA 519  Buddhist Scriptures and Chinese Classics  [3-0-0:3]
Critical reading of a selected number of canonized texts in Buddhism, Confucianism and Taoism. Special emphasis will be placed on the transplantation of Indian Buddhism to China as an alternative mode of thought and its encounters with Confucianism and Taoism as a hermeneutical experience in intercultural interpelation.

HUMA 521  Chinese Popular Religion  [3-0-0:3]
Chinese popular religion is considered from a cultural anthropology perspective. The interplay between popular religion and the social, economic, political, and folk-medical systems is explored.

HUMA 522  Field Research : Theory and Practice  [3-0-0:3]
Theories, methods, and techniques in ethnographic field research are explored. Students are expected to conduct individual and group research projects.

HUMA 523  Hermeneutics  [3-0-0:3]
A study of the later works of Martin Heidegger and the writings of Hans Georg Gadamer as well as the interpretation and application of hermeneutics in a variety of disciplines.

HUMA 524  Philosophy of Technology  [3-0-0:3]
The course will look at the various philosophies of technology ranging from the early works of Eliud, Mumford and the Frankfurt School to the contemporary thinkers such as Durbin, Jonas and Borgman.

HUMA 600  Special Topics  [3-0-0:3]
This course focuses on a coherent collection of topics selected from the humanities. A student may repeat the course for credit if the topics studied are different each time.

HUMA 610  Independent Study  [3 credits]
With the approval of the Head of Humanities Division or the Chinese Studies programme directors, students may take this independent study on a particular subject under the supervision of a faculty member. The course will require readings, tutorial discussions, and submission of one or more research papers.
HUMA 631 Seminar on Comparative Literature [3-0-0:3]
[Previous Course Code: HUMA 501]
Directed research in literary topics that relate texts from at least two cultural traditions; the goal of the seminar is to establish certain methods through which literature is read affirmatively with critical sophistication.

HUMA 632 Seminar: History of the Pearl River Delta [3-0-0:3]
[Previous Course Code: HUMA 504]
In this seminar, discussions will focus on those institutions and civilisational achievements which fostered political, cultural, and economic unity in the area.

HUMA 633 Topics in Ming-Qing Social and Economic History [3-0-0:3]
[Previous Course Code: HUMA 505]
This course will examine the contemporary scholarship on the topics such as 'the Sprout of Chinese capitalism', 'technology and agricultural development', 'land tenancy', 'commerce and urbanisation', especially the factors which contributed to the Ming-Qing socio-economic developments.

HUMA 634 Seminar on Early Modern Chinese Thought I [3-0-0:3]
[Previous Course Code: HUMA 507]
A two-semester course on Neo-Confucianism as a revivalist movement, both intrasystemically as a dynamic mode of thought and intersystemically in terms of its interactions with Buddhism, Taoism and Christianity.

HUMA 635 Seminar on Early Modern Chinese Thought II [3-0-0:3]
[Previous Course Code: HUMA 508]
Continuation of HUMA 634.

HUMA 636 Seminar on Family and Lineage in South China [3-0-0:3]
[Previous Course Code: HUMA 600f]
This course studies the basic social structure of South China in its cultural context. It focuses on the creation of descent groups and their interaction with local societies and the State. Field research is required.

HUMA 637 Seminar on Lineage and Business in Modern China [3-0-0:3]
This course studies modern Chinese merchant houses by employing both archival and field resources. Emphasis is on the interaction between business and descendent institutions through the course of time.

HUMA 638 Seminar on Justice [3-0-0:3]
This course will examine the concept of justice as it has developed in different cultures. From the Greeks to analogs in Chinese, etc. It will tie justice to a cluster of concepts such as community, reason, and the self.

HUMA 639 Seminar on Chinese Urban History [3-0-0:3]
[Previous Course Code: HUMA 520]
This is a seminar on the developmental trends and characteristics of Chinese cities, urban planning and its ideas, fire fighting and law enforcement, merchant organisations and the market system, tutelary deities and the temple of the city god, and city dwellers and their culture.

HUMA 640 Seminar on Film Studies [3-0-0:3]
This seminar will focus on film theories that are historically significant (e.g., Eisenstein and Bazin) and film genres that are of current critical interest (e.g., filme noir and family melodrama).

HUMA 641 Seminar on Hong Kong Literature [3-0-0:3]
A critical and historical survey of "representative" texts and trends of Chinese literature from Hong Kong.

HUMA 642 Seminar on Chinese Anthropology [3-0-0:3]
An anthropological consideration of Chinese culture and society. Special topics in Chinese anthropological studies, such as kinship, ethnicity, religion, and regional system, are addressed.

HUMA 643 Seminar in Comparative Ethics [3-0-0:3]
Examination of different religious and philosophical traditions of ethics and the manner in which they would approach a variety of ethical issues.

HUMA 644 Seminar on Critical Theory [3-0-0:3]
This seminar will examine the emergence of the Frankfurt school of social research focusing upon the works of Adorno, Horkheimer, Benjamin and Habermas.

HUMA 645 Seminar on the Thought of Michel Foucault [3-0-0:3]
The seminar will focus upon the writing of Michel Foucault and their application in areas such as history, sociology and philosophy.
HUMA 699  MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

HUMA 799  Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

DEPARTMENT OF INDUSTRIAL ENGINEERING

Explanations of prerequisites and exclusions can be found on page 23.

INDE 600  Special Topics  [1-3 credits]
Selected topics of current interest. May be repeated for credit if different topics are covered.

INDE 680  Industrial Engineering Seminar  [1-3 credits]
Series of seminar topics presented by students, faculty and guest speakers; may be repeated for credit.

INDE 698  MSc Project  [0-0-12:6]
An independent project carried out under the supervision of a faculty member.

INDE 699  MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

INDE 799  Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

DEPARTMENT OF MARKETING

Explanations of prerequisites and exclusions can be found on page 23.

MARK 512  Marketing Strategy and Policy  [3-0-0:3]
Strategic marketing objectives and implementation of strategies through pricing, distribution channels, promotion and new-product decisions. (MBA core course)

MARK 521  Global Marketing Management  [4-0-0:4]
Opportunities, distinctive characteristics and emerging trends in foreign markets; strategies for marketing within foreign countries; impact of social, cultural, economic and political differences; organisational planning and control; development of global marketing strategies.
Prerequisite : MARK 512

MARK 522  Promotion Strategy and Management  [4-0-0:4]
Formulation of promotion policies; designing the promotion mix with emphasis on the role of advertising; objectives, strategy, budgeting, creative decisions, media planning, measuring effectiveness, organisation of advertising function.
Prerequisite : MARK 512

MARK 523  Customer Analysis  [2-0-0:2]
Nature and determinants of customer behaviour; influence of sociological and psychological factors such as personality, small groups, demographic variables, social class and culture on consumer attitudes, consumption and purchasing behaviour.
Prerequisite : MARK 512

MARK 531  Marketing Research  [4-0-0:4]
Methods of structuring, analysing and measuring major classes of marketing problems; quantitative aspects of demand, consumer reaction to product characteristics, advertising effectiveness, effectiveness of competitors' strategies.
Prerequisite : MARK 512

MARK 588  Field Study I  [2-0-0:2]
A supervised study of an organisation, including the establishment of client-consultant relationships, identification of strategic questions, design of studies, collection and analysis of data, development and reporting of recommendations. (MBA core course)

MARK 589  Field Study II  [3-0-0:3]
Continuation of MARK 588. (MBA core course)
MARK 690  Special Topics
Study of selected areas in marketing knowledge and thought; topics may vary by semester; individual projects and reports.

DEPARTMENT OF MATHEMATICS

Normally 500-level courses and 600-level topic courses have course vector [3-0-0:3].

Explanations of prerequisites and exclusions can be found on page 23.

MATH 501  Advanced Real Analysis I
Abstract integration theory; measure theory; differentiation; convex functions and inequalities; Fourier analysis; approximation theory. Elementary functional analysis, L spaces, Hilbert spaces, or such topics as harmonic analysis, distributions and Sobolev spaces selected by the instructor.

Background : MATH 302
References : Rudin, Real and Complex Analysis, and Folland, Real Analysis - Modern Techniques and their Applications

MATH 502  Advanced Real Analysis II
Continuation of MATH 501

MATH 503  Complex Function Theory
Review of basic properties of analytic functions. Phragmen-Lindelof principle; normal family; Riemann mapping theorem and Weierstrass factorization theorem; Schwarz reflection principle and analytic continuation; harmonic functions; entire functions; Hadamard factorization theorem; Picard theorems.

Background : MATH 204
References : Rudin, Real and Complex Analysis, and Conway, Functions of One Complex Variable

MATH 505  Theory of Ordinary Differential Equations
Existence and general properties of solutions; linear systems; Floquet theory; stability; Lyapunov's method; nonlinear systems; two-dimensional systems; Poincare-Bendixson theory; nonlinear oscillations.

Reference : Hale, Ordinary Differential Equations

MATH 507  Theory of Partial Differential Equations
Distributions; Fourier transforms; Sobolev spaces; Cauchy problem; Hilbert space methods; elliptical problems and regularity; hyperbolic and parabolic systems.

MATH 509  Functional Analysis
General theory of topological vector spaces; Normal spaces; Hilbert spaces; Banach algebra; spectral theory; Riesz representation theorem; nonlinear functional analysis.

Prerequisite : MATH 501 or 502
References : Rudin, Functional Analysis, and Conway, A Course in Functional Analysis

MATH 510  Nonlinear Analysis
Calculus on Banach space, Brouwer and Leray-Schauder degrees, fixed point theorems, Mountain Pass theorems, energy methods, monotone methods, local and global bifurcation theory, applications to nonlinear differential equations.

Background : MATH 305
Reference : Nirenberg, Topics in Nonlinear Functional Analysis

MATH 511  Advanced Algebra I

Reference : Jacobson, Basic Algebra, Vols I and II

MATH 512  Advanced Algebra II
Continuation of MATH 511.

MATH 521  Advanced Differential Geometry
Differential forms; integration on manifolds; tensor fields; Riemannian metric; geodesics; Gaussian curvature on surfaces, Riemannian curvature; Frobenius theorem; connections.

Reference : Spivak, A Comprehensive Introduction to Differential Geometry, Vols I, II and III

MATH 523  Differential Topology
Manifolds, tangent bundle, tubular neighbourhood, Whitney embedding theorem, regularity and Sard's theorem, degree, vector fields and Euler number, Morse theory, further topics in applications to physics and mechanics.

References : Milnor, Topology from the differentiable viewpoint, and V. Guillemin & A. Pollack, Differential Topology
MATH 524  Algebraic Topology
Fundamental group, covering space, homology and cohomology, CW-complex, manifold and duality, selected topics.
Reference : M. J. Greenberg and J. R. Harper, Algebraic Topology A First Course

MATH 525  Algebraic Geometry
Theory of algebraic curves: Riemann-Roch theorem; Abel's theorem, correspondences and Castelnuovo's inequality; elliptic, hyper-elliptic and modular curves; general theory of algebraic varieties and schemes.
Reference : Hartshorne, Algebraic Geometry

MATH 528  Mathematical Methods of Classical Mechanics

MATH 531  Advanced Numerical Methods for Elliptic Differential Equations
Finite difference, finite element and boundary integral methods; consistency and convergence of methods. Other topics may include multigrid, domain decomposition and parallel algorithms.
Background : MATH 331
Reference : Birkhoff and Lynch, Numerical Solution of Elliptic Problems

MATH 532  Advanced Numerical Methods for Hyperbolic Differential Equations
Background : MATH 331
References : LeVeque, Numerical Methods for Conservation Laws; and
Sankwar, Finite Difference Schemes and Partial Differential Equations

MATH 533  Advanced Numerical Linear Algebra
Iterative methods for solving linear systems, sparse matrix computations, matrix eigenvalue problem, SVD, parallel algorithms.
Background : MATH 231
References : Golub and van Loan, Matrix Computations; and
Bertsekas and Tsitsiklis, Parallel and Distributed Computer Numerical Method

MATH 534  Numerical Methods for Nonlinear Equations
Background : MATH 231
References : Dennis and Schnabel, Numerical Methods for Unconstrained Optimization and Nonlinear Equations; and
Keller, Lecturers on Numerical Methods in Bifurcation Problems

MATH 536  Computational Fluid Dynamics
Methodology of large scale computation to solve fluid dynamical problems. Topics include finite difference, finite element and finite volume method. Numerical solutions of potential flow, Euler equations, and Navier-Stokes Equations.

MATH 541  Advanced Probability Theory I
References : K.L. Chung, A Course in Probability Theory, and
Blingsley, Probability and Measure

MATH 542  Advanced Probability Theory II
Continuation of MATH 541.

MATH 543  Advanced Mathematical Statistics
Concept of decision theory. Unbiased equivariant, Bayes and minimax estimation. Theory of hypothesis testing, optimality criteria, unbiasedness and invariance.
References : E.L. Lehmann, Theory of Point Estimation, and
E.L. Lehmann, Testing Statistical Hypothesis

MATH 545  Stochastic Processes
Brownian motion and diffusions; Markov processes and martingales.
References : David Freedman, Brownian Motion and Diffusion; and S. Ethier and T. Kurtz, Markov Processes
Postgraduate Course Descriptions

MATH 551 Mathematical Methods in Sciences I
Theory and solution of first and second order partial differential equations; Riemann's method; quasi-linear systems; Burgers equation; Korteweg-deVries equation; potential theory; partial differential equations of the mixed type; Fredholm and Volterra integral equations; singular integral equations; Wiener-Hopf method.
Reference: Keener, Principles of Applied Mathematics

MATH 552 Mathematical Methods in Sciences II
Continuation of MATH 551.

MATH 553 Asymptotic Methods
Asymptotic expansions; methods of steepest descent and stationary phase; differential equations with a large parameter; WKB method; matched expansion method; multiple scale method; Bogoliubov-Krylov method; variational-average method.
References: Erdelyi, Asymptotic Expansions, and Hsieh, Asymptotic Methods

MATH 554 Fluid Mechanics I
Thermodynamics; Eulerian and Lagrangian descriptions of fluid motion; conservation laws; constitutive relations; vorticity and Bernoulli theorem; potential flow in two and three dimensions; water waves; sound waves; simple waves and shock waves; exact solutions of viscous flow; low Reynolds number flows; boundary layer theory and Blasius problem; hydrodynamic stability; turbulence.
References: D. Y. Hsieh, Fluid Dynamics, or W. H. Hui, Lecture Notes on Fluid Mechanics

MATH 555 Fluid Mechanics II
Continuation of MATH 554.

MATH 556 Waves in Fluids
Sound waves; water waves; solitary waves; waves in stratified fluids; waves in rotating fluids; waves in two-phase fluids; waves in plasma; waves in gravitating media; waves in superfluids.
References: Whitham, Linear and Non-Linear Waves, or Lighthill, Waves in Fluids

MATH 557 Stability and Chaos
Rayleigh-Taylor stability; Kelvin-Helmholtz stability; stability of parallel flows; Taylor-Couette stability; Rayleigh-Bernard stability; Lorenz equations; strange attractors; period doubling; chaos; turbulence.

MATH 558 Solid Mechanics I
Stress and equilibrium; kinematics of deformation; strain; compatibility relations; tensor representations; principle of virtual work; stress-strain relations in elasticity, plasticity, and viscoelasticity; uniqueness; extremum principles; energy methods; general theorems in linear elasticity; torsion; fundamental singular solutions; plane strain and stress; cavity, inclusion, crack and contact problems; complex variable techniques; thermoelasticity; stress waves.
Reference: Fung, Foundation of Solid Mechanics

MATH 559 Solid Mechanics II
Continuation of MATH 558.

MATH 560 Operations Research
Linear programming and duality theory; scheduling; allocations of resources; network theory; integer programming; PERT; function minimisation methods; theory and computational methods for nonlinear programming; decision theory.

MATH 561 Reading Course
For individual students or a group of students study specific topics under the supervision of a faculty member.

MATH 562 Topics in Analysis
Linear programming and duality theory; scheduling; allocations of resources; network theory; integer programming; PERT; function minimisation methods; theory and computational methods for nonlinear programming; decision theory.

MATH 563 Topics in Complex Function Theory

MATH 564 Topics in Algebra

MATH 565 Topics in Number Theory

MATH 566 Topics in Geometry

MATH 567 Topics in Numerical Analysis

MATH 568 Topics in Probability and Statistics

MATH 569 Topics in Mathematical Methods

MATH 570 Topics in Fluid Mechanics
Postgraduate Course Descriptions

MATH 675 Topics in Solid Mechanics

MATH 685 Topics in Applied Mathematics

MATH 695 Topics in Operational Mathematics

MATH 698 MSc Project [6 credits]
An independent project carried out under the supervision of a faculty member.

MATH 699 MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

MATH 799 Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

DEPARTMENT OF MECHANICAL ENGINEERING

Explanations of prerequisites and exclusions can be found on page 23.

MECH 501 Foundation of Solid Mechanics [3-0-0:3]
Continuum concept for deformation of solid; stress and strain; constitutive equations; solution of problems relevant to metallurgy; materials processing; geomechanics; fracture mechanics; structural analysis; energy method and numerical solution.
Background : MECH 101 and MECH 121

MECH 502 Inelastic Deformation of Solids [3-0-0:3]
Rate mechanisms in crystal plasticity, kinetics and dynamics of slip, superposition of flow stress mechanisms; inelastic and visco-plasticity deformations in nonmetals, visco-plasticity of metallic, inorganic and polymers; macro-plasticity; strain hardening and recovery; macroscopic 3-D constitutive relations for inelastic deformation.
Background : MECH 242

MECH 503 Plates and Shells [3-0-0:3]
Development of plate and shell equations; bending and membrane actions; transverse shear effects, large deflections; anisotropic plates; shallow shells, shells of revolution, and edge effects.
Background : MECH 101 and MATH 101

MECH 504 Advanced Dynamics [3-0-0:3]
Momentum and energy principles; Lagrange's equations, Hamilton's principle; systems including gyroscopic effects; steady motions and small perturbations; natural modes and frequencies for continuous and lumped parameter systems; forced vibrations; static and dynamic stability.
Background : MECH 102

MECH 505 Kinematics and Dynamics of Mechanisms [3-0-0:3]
Kinematics and dynamics of planar and spatial mechanisms; machines and robotic manipulators; graphical and computer methods for kinematic synthesis; dynamic analysis; digital simulation techniques; systems include rigid and flexible elements; active control.
Prerequisite : MECH 501

MECH 506 Acoustics [3-0-0:3]
Derivation of fluid equations; radiation; diffraction and scattering; acoustics; thermal and vorticity fluctuations; energy density and intensity; multiple expansions of source fields, spherical harmonics, radiation impedance and directivity; moving sources.
Background : MECH 102 and MATH 101

MECH 507 Noise and Vibration Control [3-0-0:3]
Vibration transmission in structures; interaction with noise fields; normal modes; phase and group velocity; energy decay; radiation impedance; input and transfer mobility of structure; statistical energy analysis, reciprocity structures and noise fields energy sharing.
Background : MECH 102

MECH 508 Random Vibrations [3-0-0:3]
Impulse and frequency response of linear time-invariant dynamic systems; stochastic processes; correlations and envelopes; measurement, identification, and response; coherence; space-time correlations and cross-spectra; digital data processing; wideband random excitation.
Background : MECH 102 and MATH 101
MECH 509 Wave Propagation [3-0-0:3]
Plane wave, dispersions, phase group velocities; impedance, energy density, intensity; characteristics; reflection, refraction, wave-guides, boundary waves, WKB method, Green's law; wave action; generation transmission, reception of waves; water-hammer, Rayleigh waves; waves in periodic structures.
Background: MECH 102 and MATH 101

MECH 521 Fluid Dynamics [3-0-0:3]
Tensor notation; derivation of Navier-Stokes equations; vorticity transport; viscous flow; flow separation; boundary layer; flow instability; turbulent boundary layer; stratified flow; rotating flow.
Background: MECH 121 and MATH 101

MECH 522 Turbulent Flow [3-0-0:3]
Emphasises engineering methods; Reynolds equations for momentum, energy, heat and species transfer; production, dissipation, scaling laws; free/bound shear flows, boundary layers, plumes, dispersion; introduction to higher closure schemes and statistical methods.
Prerequisite: MECH 521

MECH 523 Computational Fluid Dynamics [3-0-0:3]
Numerical simulation of viscous incompressible flows; finite-difference, finite-element, spectral methods; time-step size; accuracy, stability, and generality considerations, diffusion, dispersion, stream function and primitive-variable formulations; internal, external flows, and heat transfer.
Prerequisite: MECH 521

MECH 524 Pollutant Transport Processes [3-0-0:3]
Turbulent flow in rivers, estuaries, and coast waters; coastal circulation; wave-induced currents; wind-wave flow in porous media; dispersion of solutes, sediments, heat, air-water interaction; deposition and coagulation; physical, chemical, and biological processes.
Background: MECH 121

MECH 525 Air Pollution [3-0-0:3]
Air pollution sources and control; pollutant generation in combustion systems; control techniques for particulate and gaseous pollutants; pollutant transport; aerosol physics and chemistry; effects on visibility; health effects.
Background: MECH 121

MECH 526 Micrometeorology and Atmospheric Diffusion [3-0-0:3]
Atmospheric boundary layer; lapse rate; stability classification; atmospheric turbulence; dispersion modelling; boundary layer wind-tunnel.
Prerequisite: MECH 521

MECH 527 Environmental Impact Assessment [3-0-0:3]
Legal aspects; local environmental policy; prediction and assessment of impacts on air, water, noise, biological, cultural, and socio-economic environment, methods of writing EIAs.
Prerequisites: MECH 521 and MECH 525

MECH 528 Two-Phase Flow [3-0-0:3]
Boiling, cavitation, condensation, and atomisation; dynamics and thermodynamics of forced-convection two-phase flow with boiling and/or evaporation; thermal and hydrodynamic stability of two-phase flows; applications to water and liquid metal.
Background: MECH 221

MECH 529 Turbomachinery [3-0-0:3]
Momentum transfer in turbomachines; axial- and radial-flow in compressors and turbines; design considerations and cascade fluid mechanics; effects of viscosity and compressibility, three-dimensional flow, and cavitation.
Prerequisite: MECH 521
Background: MECH 231

MECH 531 Advanced Heat Transfer [3-0-0:3]
Governing equations; similarity between heat, momentum, and mass transfer; diffusion, forced and natural convections; boiling, condensation, and radiative heat transfer; transfer with phase change in liquid-solid and liquid-vapour systems.
Prerequisite: MECH 521
Background: MECH 231

MECH 532 Convective Heat and Mass Transfer [3-0-0:3]
Laminar and turbulent boundary layer heat transfer by similarity, integral and superposition methods; effects of roughness, curvature, transpiration and high turbulence; forced and free convections, free-shear flows and buoyant flows; numerical methods.
Prerequisite: MECH 521
Background: MECH 231

MECH 533 Thermo Fluid Flows in Porous Medium [3-0-0:3]
Governing equations in transport phenomena in porous medium; closure modelling; Darcian and non-Darcian flows; convective heat and mass transfer; thermal dispersion; thermally non-equilibrium models; onset of instability.
Background: MECH 231

MECH 534 Reacting Gas Dynamics [3-0-0:3]
Transport of mass, momentum, and energy; conservation equations with chemical reaction and multispecies diffusion; method of characteristics; acoustic waves, shocks, flames, detonations; chemical laser, hypersonic flows, turbulence-combustion interactions.
Background: MECH 221 and undergraduate Chemistry
MECH 535 Combustion [3-0-0:3]
Flammability and explosion limits; diffusion and premixed flames; laminar and turbulent combustion, ignition, propagation, and combustion instability; exothermic hypersonic flows; supersonic combustion; droplet, jet and coal combustion; engine combustion; modelling and numerical simulation.
Background: MECH 121 and MECH 231

MECH 536 Internal Combustion Engine [3-0-0:3]
Design and operation; study of fluid flow, thermodynamics, combustion, heat transfer and friction phenomena; fuel properties relevant to engine power, efficiency and emissions; spark ignition, diesel, stratified-charge, and mixed-cycle engines.
Background: MECH 121 and MECH 231

MECH 541 Advanced Mechanical Behaviour of Materials [3-0-0:3]
Relationships between microstructure and mechanical behaviour in crystalline materials; temperature-dependent deformation in elasticity, viscosity and creep; embrittlement, fatigue and fracture of engineering materials; strengthening mechanisms in crystalline materials.
Background: MECH 242

MECH 542 Engineering Fracture Mechanics [3-0-0:3]
Fracture modes in engineering materials from the interdisciplinary perspectives of microscopic plastic deformation/fracture mechanics and continuum mechanics; fracture mechanics and its applications to brittle and ductile fracture; fracture toughening in monolithic and composite materials.
Background: MECH 242

MECH 543 Theory of Dislocations [3-0-0:3]
Basic treatment of structure and properties of dislocations in crystals; stresses and energies of straight/curved dislocations; dynamics; effects of crystal structure; interactions between dislocations and point defects; groups of dislocations; applications.
Background: MECH 101

MECH 544 Thermodynamics of Solids [3-0-0:3]
An advanced treatment of thermodynamics of solutions, heterogeneous reactions, and associated topics and interest in metallurgy; free energy, activity, and phase equilibria.
Background: MECH 241

MECH 545 Physical Metallurgy [3-0-0:3]
Structure-property relationships in metallic alloys; phase transformation and strengthening in metals and alloys; mechanical properties: structural stability, grain size, interstitial and substitutional solutes, precipitates, second-phase particles, eutectics and composites.
Background: MECH 241

MECH 546 Materials Processing [3-0-0:3]
Description of metal, polymer and ceramics processing; solidification, powder metallurgy and mechanical forming.
Background: MECH 241

MECH 547 Composite Technology [3-0-0:3]
Filamentary composites; metal and ceramic matrix composites; properties of fibres and matrices; micromechanics, anisotropic elasticity, and laminated plate theory; failure analysis, buckling, sandwich construction, thermal, moisture, and interlaminar stresses, design concepts applications.
Background: MECH 241

MECH 548 Tribology [3-0-0:3]
Geometric, chemical, and physical surfaces characterisation; theories of friction; wear of metals, polymers, and ceramics; delamination erosion, boundary and solid film lubrication; rolling contact; magnetic recording and electrical contacts; monitoring and diagnosis.

MECH 551 Advanced Design [3-0-0:3]
Design theory; design abstraction and knowledge representation; fuzzy set theory; knowledge based systems; design for manufacturing, assembly, quality, and cost; design optimisation; database management; design analysis and evaluation; computer-aided tools.
Background: MECH 351

MECH 552 CAE Systems [3-0-0:3]
Computer graphics; data structures; geometric modelling; NC cutting path planning; process planning; mesh generation techniques for analysis; computer integrated manufacturing; intelligent CAD systems.

MECH 561 Advanced System Dynamics and Control [3-0-0:3]
Modelling and graphical description of physical systems; time and frequency domain representations; controllability; observability; stability; linear and nonlinear response; feedback; Kalman filters; modelling/performance trade-offs; applications to mechanical systems.
Background: MECH 261
Postgraduate Course Descriptions

MECH 562 Multivariable Control Systems [3-0-0:3]
Integrated state-space and frequency domain description; analysis of linear multivariable feedback systems; performance and robustness trade-offs; stability controllability, observability, poles and zeros, modal properties; closed-loop stability, multivariable Nyquist criterion, singular-value based robustness tests.
Background : MECH 261

MECH 563 Digital Control Systems [3-0-0:3]
Computer architecture; input-output interfaces and data converters; analysis and synthesis of sampled-data control systems; analysis of trade-offs in control algorithms for computation speed and quantisation effects. Laboratory projects emphasize practical digital techniques.
Background : MECH 261

MECH 566 Manufacturing Management [3-0-0:3]
Techno-economic studies; industry and the law; organisation; quality management; management accounting and finance.

MECH 577 Advanced Manufacturing Process [3-0-0:3]
Grinding processes; surface finish processes electrical discharge machining; electrochemical machinery; etching processes; laser machining; waterjet machining; moulding and casting processes.

MECH 581 Experimental Methods I [1-2-4:3]
Techniques for determining the mechanical, thermal and chemical properties of engineering systems; operational principles and applications of instruments; design, manufacturing and check-out of new sensors; experimental programme planning and the setting up of a laboratory.

MECH 582 Experimental Methods II [1-2-4:3]
Computer-based control, automation and measurements; signal conditioning, A/D and D/A conversions; digital sampling theory; data reduction schemes; data presentation and report writing.
Prerequisite : MECH 581

MECH 583 Experimental Methods in Air Pollution [2-1-4:3]
Methods of experimental design, sampling and measurement of particulate and gaseous pollutants; emphasis is on field measurement techniques, data acquisition and sampling systems; instrument calibration, and particle characterisation.
Prerequisite : MECH 525

MECH 591 Applications of Complex Variables [3-0-0:3]
Complex numbers; analytic functions; contour integrals; conformal mapping; special functions; asymptotic analysis; integral transforms; applications.
Background : MATH 101

MECH 592 Methods in Engineering Analysis [3-0-0:3]
Formulation of mathematical models for complex physical systems and computational procedures; examples chosen from mechanics, hydraulics, heat transfer, elasticity, compressible flow, etc.; numerical methods include iteration, variational, finite difference, and finite element methods.
Background : MATH 101

MECH 576 Robot Design and Control [3-0-0:3]
Geometric kinematics, statics, and dynamics of manipulators; sensors and actuators; arm design; position and trajectory control; compliant motion control; robustness and adaptation in robot control and performance trade-offs.
Prerequisites : MECH 503, and MECH 505
Background : MECH 261

MECH 572 Control for Manufacturing Automation [3-0-0:3]
Manufacturing processes modelling and control; review of classical and discrete system design methods; position servo; quality assurance, in-process sensing and automation; laboratory projects.
Background : MECH 261

MECH 573 Nondestructive Evaluation and Quality Control [3-0-0:3]
Principles and applications of nondestructive techniques for materials evaluation, with emphasis on physics, signal processing and interpretation; relation to manufacturing quality assurance tools, in-process sensing and automation; reliability, proof testing and failure analysis; laboratory projects.

MECH 574 Machine Tools and Manufacturing Systems [3-0-0:3]
Computational methods for machine tool elements; machine tool quality, automation; numerical control and positioning systems; adaptive control and flexible manufacturing systems; process planning and scheduling related to machine tools; future concept.

MECH 575 Product Design [3-0-0:3]
Transformation of new ideas into technology-based products, matching product and marketplace; product design issues; evaluation; market perception; aesthetics and human interfacing; design for manufacturability; reliability, inspectability, and reparability; pricing and legal implications.
MECH 593 Finite Element Methods [3-0-0:3]
FEM formulation; variational principles for structural and continuum mechanics; interpolation, integration; plane stress, plane strain, plate bending and three dimensional solids, practical ways of constructing and assembling element matrices; solution of large systems of algebraic equations.
Background: MECH 101

MECH 594 Perturbation Methods in Engineering Mechanics [3-0-0:3]
Asymptotic expansions; series and iteration schemes; regular and singular perturbations; methods of matched asymptotic expansions; slow variations and multiple scale analyses.
Prerequisite: MECH 591

MECH 609 Seminar [1-0-0:1]
Topics include solid and fluid mechanics, thermosciences, materials, CAD/CAM, control, manufacturing and mechanical engineering related areas. Presentations by visitors, faculty, and students.

MECH 691 Special Topics [3-0-0:3]
Selected topics of current interest. May be repeated for credit, if different topics are covered.

MECH 698 MSc Project [0-1-12:6]
An independent project carried out under the supervision of a faculty member.

MECH 699 MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

MECH 799 PhD Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

DEPARTMENT OF MANAGEMENT

Explanations of prerequisites and exclusions can be found on page 23.

MGMT 501 Introductory Statistics for Business [3-0-0:3]
Covers various discrete and continuous probability models and their applications in business problems, estimation and testing of hypotheses, simple and multiple linear regression analysis. (MBA core course)

MGMT 502 Applied Regression and Data Analysis [4-0-0:4]
Topics include multicollinearity, dummy variables, stepwise and all-possible regression, and logistic regression, with emphasis on analysing and modelling business data using statistical softwares. Multivariate regression will also be introduced.
Prerequisite: MGMT 501

MGMT 503 Multivariate Data Analysis [4-0-0:4]
Multivariate statistics (canonical correlation, discriminant analysis, MANOVA, principal components and factor analysis) are studied with the use of statistical softwares and applications to managerial problems.
Prerequisite: MGMT 501

MGMT 504 Time Series Analysis and Forecasting [4-0-0:4]
The Box-Jenkins algorithm of ARIMA model identification, estimation, and diagnosis will be studied. Transfer function modelling, state space methods, and the Kalman-filter algorithm will also be introduced.
Prerequisite: MGMT 501

MGMT 510 Managerial Model Building [4-0-0:4]
Models for management decision-making drawn from multiple regression, decision analysis, linear programming, waiting lines, PERT/CPM, and simulation; STORM and @RISK packages used for computer solution.

MGMT 512 Optimisation Models for Management [3-0-0:3]
Models drawn from integer, network, goal, nonlinear and dynamic programming with emphasis placed on modelling, software, and the practical issues of solution implementation.
Prerequisite: MGMT 510

MGMT 513 Stochastic Models for Management [4-0-0:4]
Managerial decision-making under uncertainty. Models of decision theory, Markov processes, queues and queuing networks and simulation with emphasis on modelling, software, and issues of practical application.
Prerequisite: MGMT 510
MGMT 521 Managerial Problem Solving [2-0-0:2]
The practical study of personality, leadership, motivation, individual and behaviour. Examine communication skills and offers the opportunity for assessment and feedback. Organisational contexts, teambuilding and case work. (MBA core course)

MGMT 523 Management of Organisations [3-0-0:3]
Organisation theory, structure, design, managerial work, organisational learning, performance, dramaturgy, transactional analysis, decision-making, change, turnaround, innovation, mergers and alliances, critical approaches, power and politics, postmodern organisational ethics. Strategic implementation. (MBA core course)

MGMT 524 Organisation Development [4-0-0:4]
Formation of organisational cultures, the identification of needs and readiness for change, problems of growth, change agents, techniques for hard and soft system change, evaluation of planned change.
Prerequisite : MGMT 523

MGMT 525 Entrepreneurship and Small Business Studies [4-0-0:4]
Problems faced by small firms and basic skills needed for developing new business, including entrepreneurial strategies, legal and financial considerations and effective new venture management.
Prerequisite : MGMT 523

MGMT 531 Human Resource Management [2-0-0:2]
The functional practices of human resource management. Recruitment and selection methods, job analysis and design, training need identification, career management, job evaluation, reward systems, and the practices of strategic HRM.

MGMT 532 Systems of Employee-Management Participation [4-0-0:4]
Systems of employee-management participation around the world; specific concepts including worker participation in decision making, industrial democracy, joint consultation, trade unions, and profit sharing.

MGMT 541 Management Policy [3-0-0:3]
Corporate strategy, analysis of the environment, competitor analysis, BCG, DPM, and portfolio analysis techniques, value chains, internal analysis, SWOT analysis, resource assessment, the generation and evaluation of strategic choices. (MBA core course)

MGMT 542 Strategy Formulation and Implementation [4-0-0:4]
This course focuses on formulation of management policies, strategic decision making and their implementation. Case studies on complex company situations are used for developing ideas essential to overall managerial direction.
Prerequisite : MGMT 541

MGMT 543 Comparative and International Management [4-0-0:4]
A comparative study of management practice in selected foreign countries. Topics include cross-cultural methodology for management studies, impact of social environment and culture on management functions of business enterprises.
Prerequisite : MGMT 541

MGMT 544 International Business Game [1-0-0:1]
Integrates material from core courses by using a general business simulation or game package to engage students in the application of international strategic and business practices.

MGMT 545 Managerial Communication [2-0-0:2]
Study and practice of oral and written communications in management; audience analysis; delivery skills; group writing; presentation of technical information; meeting management. (Full-time MBA core course)

MGMT 562 Operations and Technology Management [3-0-0:3]
This course analyses strategic and operating policies and decisions for systems that produce goods and services, and examines the role of comprehensive planning, inventories, resource scheduling, distribution systems, and system location. (MBA core course)

MGMT 563 Modern Manufacturing [4-0-0:4]
Coordination of production with marketing and other areas of the corporation for improved quality and effectiveness and new production possibilities, including focused manufacturing, manufacturing cells, and flexible manufacturing, is studied.
Prerequisite : MGMT 562

MGMT 564 Service Operations [4-0-0:4]
The close link between marketing and service operations is studied. Methods to monitor and improve service operations such as service system models, facility layout, distribution and logistics systems, are discussed.
Prerequisite : MGMT 562
MGMT 565 Case Studies in International Operations Management [4-0-0:4]
The impacts of the workforce, economy, culture, education, government, technology, natural resources, and communication networks on successful operations are considered. National and multi-national situations in manufacturing and service are studied.
Prerequisite: MGMT 562

MGMT 571 International Business Policy [4-0-0:4]
Topics include monitoring, assessing and forecasting the impact of macroenvironmental factors (economic, technological, political and social environments) on international business operations; integration of environmental factors into strategic business policy formulation.
Prerequisite: MGMT 541

MGMT 572 International Business Law [4-0-0:4]
This course develops an understanding of the legal environments in which international business operates; regulations governing capital and technology transfer; patent, trademark and copyright safeguards, and settlement of international trade disputes.

MGMT 573 International Business Negotiations [4-0-0:4]
This course covers a wide range of issues; establishment/dissolution of joint ventures, extent of foreign ownership, conditions for technology transfer, direct investment, licensing and other contractual arrangements.

MGMT 588 Field Study I [2-0-0:2]
[Previous Course Code: MGMT 581]
A supervised study of an organisation, including the establishment of client-consultant relationships, identification of strategic questions, design of studies, collection and analysis of data, development and reporting of recommendations. (MBA core course)

MGMT 589 Field Study II [3-0-0:3]
[Previous Course Code: MGMT 582]
Continuation of MGMT 588. (MBA core course)

MGMT 599 Special Topics in Human Resource Management [2-4 credits]
Advanced topics of current interest in human resource management.

MGMT 600 Special Topics in Statistics for Management [2-4 credits]
Advanced topics in statistics of current interest.

MGMT 610 Special Topics in Management Science [2-4 credits]
Advanced topics of current interest in management science are presented. Topics vary according to recent developments.

MGMT 660 Special Topics in Operations and Technology Management [2-4 credits]
Advanced topics in operations and technology management are studied. Topics vary according to recent developments and current interest.

MGMT 720 Special Topics in Organisational Behaviour [2-4 credits]
Prerequisite: Doctoral standing

MGMT 730 Special Topics in Human Resources Management [2-4 credits]
Prerequisite: Doctoral standing

MGMT 799 Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.
DEPARTMENT OF PHYSICS

Explanations of prerequisites and exclusions can be found on page 23.

PHYS 511 Mathematical Methods in Physics [4-0-0:4]
Review of vector analysis; complex variable theory, Cauchy-Rieman conditions, complex Taylor and Laurent series, Cauchy integral formula and residue techniques, conformal mapping; Fourier series; Fourier and Laplace transforms; ordinary differential equations, Bessel functions; partial differential equations, wave and diffusion equations, Laplace, Helmholtz and Poisson's equations, transform techniques, Green's functions; integral equations, Fredholm equations, kernels; Riemann sheets, method of steepest descent; tensors, contravariant and covariant representations; group theory, matrix representations.
Course Level: E. Butkov, Mathematical Physics

PHYS 513 Classical Mechanics [3-0-0:3]
Lagrangian and Hamiltonian formulation of classical mechanics, theory of elasticity, with modern applications in chaos and nonlinear dynamics.
Course Level: Goldstein, Classical Mechanics, Second Edition

PHYS 520 Classical Electrodynamics I [3-0-0:3]
Electrostatics, magnetostatics, Maxwell's equations, electromagnetic potentials, selected topics in electrodynamics of continuous media, special relativity, radiation theory, plasma physics and nonlinear optics.
Course Level: Jackson, Classical Electrodynamics, Second Edition

PHYS 521 Classical Electrodynamics II [3-0-0:3]
Continuation of PHYS 520.

PHYS 525 Quantum Mechanics I [4-0-0:4]
Previous Course Code: PHYS 521
The formulation of quantum mechanics in terms of states and operators; symmetries and angular momentum; stationary and time-dependent perturbation theory; Fermi's rule and variational methods; the elements of scattering theory.
Course Level: Merzbacher, Quantum Mechanics, Third Edition

PHYS 526 Quantum Mechanics II [4-0-0:4]
Previous Course Code: PHYS 522
Discussion of various applications of quantum mechanics, such as collision theory, theory of spectra of atoms and molecules, theory of solids, second quantisation, emission of radiation, relativistic quantum mechanics.
Course Level: Flygare, Molecular Structure and Dynamics

PHYS 531 Statistical Mechanics I [3-0-0:3]
Laws and applications of thermodynamics, kinetic theory, transport phenomena, classical statistical mechanics, canonical and grand canonical ensemble, quantum statistical mechanics, Fermi and Bose systems, non-equilibrium statistical mechanics.
Course Level: Huang, Statistical Mechanics

PHYS 532 Statistical Mechanics II [3-0-0:3]
Continuation of PHYS 531. Advanced topics and techniques in modern statistical mechanics, including superfluids, Ising model, critical phenomena, scaling theory, renormalisation group, Monte Carlo methods, disordered systems, localisation, random walks, fractals and multifractals, path integrals.

PHYS 540 Projects in Experimental Physics [0-1-6:3]
An individual project of modern topical interest under the supervision of a faculty member.

PHYS 551 Structure and Properties of Materials [3-0-0:3]
Physics of real materials: the structure of crystalline and amorphous solids; X-ray diffraction and electron microscopy; the thermodynamics and kinetics of phase transformations; crystallographic defects and their relation to mechanical properties.
Background: PHYS 201 or PHYS 234

PHYS 561 Microcharacterisation [2-0-3:3]
Basic physical principles underlying modern analytical techniques for characterising materials from volumes of less than a cubic micron; physics of the interaction processes, instrumentation involved, and advantages and limitations of each technique.
Background: PHYS 201 or PHYS 234

PHYS 572 Microprocessing of Materials [2-0-3:3]
Fundamentals of fabricating and patterning thin-film materials and surfaces, with emphasis on electronic materials; vacuum and plasma thin-film deposition processes; photon, electron, X-ray, and ion lithography; techniques for pattern replication by plasma and ion processes. Emphasis the physics and material science that define and limit the various processes.
Background: PHYS 201 or PHYS 234

PHYS 581 Atoms and Molecules [3-0-0:3]
Experimental and theoretical techniques in atomic and molecular physics.
Course Level: Flygare, Molecular Structure and Dynamics
Postgraduate Course Descriptions

PHYS 582 Nuclear Physics [3-0-0:3]
Broad survey of nuclear phenomena. Bulk properties of nucleus, two-nucleon problem, nuclear models, nuclear spectroscopy, radioactivity, fission, fusion and other nuclear reactions.

PHYS 583 High Energy Particle Physics [3-0-0:3]
Introduction to the physics of baryons, mesons and leptons; strong, electromagnetic and weak interactions; relevance of symmetry laws to particle physics; unification of electromagnetic and weak interactions.

PHYS 584 Quantum Field Theory [3-0-0:3]
Canonical field theory; analytic property of scattering amplitudes and dispersion relations; renormalisation and renormalisation group; symmetry and spontaneous symmetry breaking; Gauge theories.

PHYS 585 Quantum Electronics [4-0-0:4]
[Previous Course Code: PHYS 651]
Detailed treatment of the physical principles underlying lasers, related fields, and applications. Topics include the interaction of radiation and matter; theory of the laser; spectroscopy of atoms, molecules, and ions in crystals; density matrix; nonlinear optics and optical processes; theory of coherence; integrated optics.

PHYS 591 Solid State Physics I [3-0-0:3]
[Previous Course Code: PHYS 621]
Survey of the basic phenomenological knowledge of condensed matter physics, mainly dealing with solids. Topics include equilibrium properties such as structure and phase transitions, transport phenomena such as electrical and thermal conductivity.

Course Level: Ashcroft and Mermin, Solid State Physics

PHYS 592 Solid State Physics II [3-0-0:3]
[Previous Course Code: PHYS 622]
Topics chosen from broken symmetries, elementary excitations, and topological defects; critical phenomena, onset of chaos, and the renormalisation group; first order phase transitions, nucleation, and dendritic growth; broken gauge symmetries, superconductors and superfluids, fractional quantum Hall effect; disordered systems, spin glasses, localisation, and percolation theory.

PHYS 593 Quantum Field Theory [3-0-0:3]
Canonical field theory; analytic property of scattering amplitudes and dispersion relations; renormalisation and renormalisation group; symmetry and spontaneous symmetry breaking; Gauge theories.

Course Level: Itzykson and Zuber, Quantum Field Theory

PHYS 594 Theory of Many-Particle Systems [3-0-0:3]
Equilibrium and transport properties of microscopic systems of many particles studied at zero and finite temperatures; applications of thermodynamic Green's function techniques.

PHYS 595 Quantum Electronics [4-0-0:4]
[Previous Course Code: PHYS 651]
Detailed treatment of the physical principles underlying lasers, related fields, and applications. Topics include the interaction of radiation and matter; theory of the laser; spectroscopy of atoms, molecules, and ions in crystals; density matrix; nonlinear optics and optical processes; theory of coherence; integrated optics.

PHYS 596 Physics Seminars [0-1-0:1]
Series of seminar topics presented by students, faculty and guest speakers; may be repeated for credit; graded Pass or Fail.

PHYS 597 Individual Study in Physics [3 credits]
An individual in-depth study of a current topic.

PHYS 598 Special Topics [1-4 credits]
Offerings are announced each semester. Typical topics include group theory, superfluids, stellar evolution, plasma physics, low-temperature physics, X-ray spectroscopy and diffraction, nuclear magnetic resonance, non-linear dynamics, collider physics.

PHYS 599 MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

PHYS 600 Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.
DIVISION OF SOCIAL SCIENCE

Explanations of prerequisites and exclusions can be found on page 23.

SOSC 503 Modern Chinese Politics [3-0-0:3]
Reading and discussion course organised along the themes of political continuity and change in 20th-century China. Critical variables to be investigated include: political culture, elite recruitment and circulation, institutional evolution, socio-economic constraints, process of ideological construction and erosion, and the impact of external factors on internal process.

SOSC 504 Modernisation: A Socio-Psychological Perspective [3-0-0:3]
Seminar course exploring the concept and process of modernisation in the Chinese context, with special reference to the newly industrialising Chinese societies. Socio-psychological aspects of modernisation, including such topics as individual modernity, changes in social norms, and tradition vs. modernity.

SOSC 511 Social Research Methods [3-0-0:3]
The essence of the course is answering the question "how do we translate concepts and theories about human interactions and institutions into empirically testable propositions?" Primary objectives are: (1) to help students be informed consumers of contemporary social research, and (2) to enable students to initiate and execute worthwhile research projects of their own.

SOSC 512 Economic Development and Social Change in East Asian NIEs [3-0-0:3]
This graduate seminar offers a forum for discussion, comparison, and analysis of the industrialisation processes of Hong Kong, Singapore, South Korea and Taiwan.

SOSC 513 From Socialism to Capitalism: China's Road [3-0-0:3]
Seminar examining the transitional process in which China has moved from a central planning, state-socialist system to market-oriented society; the social and political implications of China's economic reform programme.

SOSC 514 Seminar on Chinese Society [3-0-0:3]
Focuses on contemporary Chinese institutions; historical context of social change and institutional factors that retard and/or buttress process of modernisation. Topics include kinship/family, rural/urban organisations, and the bureaucracy.

SOSC 515 China's Economic Growth and Reform [3-0-0:3]
Addresses three broad questions. How far has the Chinese economy advanced toward sustained growth and restructuring? What challenges lie ahead? And what salient policies have been adopted to meet these challenges?

SOSC 600 Special Topics [3-0-0:3]
A coherent collection of topics selected from the humanities/social science. A student may repeat the course for credit if the topics studied are different each time.

SOSC 610 Independent Study [3 credits]
Independent study in a designated subject under the supervision of a faculty member; may require readings, tutorial discussion, and submission of research paper(s); may be repeated for credit if different topics are studied.

SOSC 699 MPhil Thesis Research
Students are required to complete a master's research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.

SOSC 799 Doctoral Thesis Research
Students are required to complete an original and independent doctoral research thesis. A successful defence of the thesis leads to the grade Pass or Pass with Distinction. No course credit is assigned.
(Above) Dr Raymond S.C. Wong of the Department of Biochemistry, checking haploid canola plants derived from a microspore culture in a plant growth chamber and (right) Dr Wong priming an automated peptide sequencer for amino acid sequence analysis in his research laboratory.
ACADEMIC SERVICES

Teaching and research at the University are supported by a number of academic service units which are described below.

University Library

**Director**: Min-Min CHANG, BA National Taiwan; MLS Univ of Calif, Berkeley

The University Library occupies a central location close to the University’s entrance Piazza, covering five floors and commanding a spectacular sea view.

As an integral component of the academic programme, the Library supports the University’s teaching and research in science, engineering, business and management, the humanities and social sciences. There are seminar rooms for meetings and instruction, areas for group discussion, and study carrels for individual use. Audio-visual facilities, both educational and recreational, are available for use in specially equipped facilities. The Library is much more than a repository for the accumulated knowledge of civilization; it serves as the heart of our intellectual enterprise.

The rapid development of the University requires a correspondingly rapid rate of growth in its library collection. The Library opened in 1991 with a collection of approximately 120,000 books, bound periodicals and non-print materials. During the 1991-94 triennium, and thereafter, the Library plans to add about 60,000 items per year to provide support for the University’s programme development. Reaching beyond local holdings, the Library has made extensive provisions for automation. The Library Online System forms a part of the campus-wide network, and is therefore accessible from every part of the campus. Through the Online System users are able to consult a broad range of bibliographic and full-text information as well as to search CD-ROM databases. The Library is linked via telecommunications to libraries and databases in institutions locally and overseas.

In 1993, the Library occupies four levels with over 8,000 square metres of floor space and 1,000 seats. A fifth floor will open in the Fall of 1994 with another 2,000 square metres floor space and 160 seats. Phase III construction of the University campus would see the Library expand horizontally at the second and third levels to a total space of 13,000 square metres with a capacity for 1.2 million volumes.

An experienced staff assists patrons in a variety of ways, from the selection, acquisition, and cataloguing of materials to using the collection, online searches, and interlibrary loans. There are also a fully-equipped classroom and a computer laboratory for group instruction. The Library has a strong service orientation in order to effectively meet the information needs of its academic community.

Language Centre

The Language Centre has a pan-University role in the provision of language courses, both as academic disciplines and as a support service. English is the medium of instruction in the University, and a priority of the Language Centre is to assist students in all Schools to acquire the necessary language skills for them to gain the maximum benefit from their subject courses. To this end, a range of courses concentrating on listening, speaking, reading and writing with particular reference to English for academic purposes is made available in the Language Centre. Classes are taught in tutorial mode, and are supplemented by individualised consolidation exercises. On admission to the University, students are assessed on their English language proficiency. Those deemed to be in need of English language support are required to attend the Centre’s programme of language instruction.

Additionally, the Language Centre offers a course in Business Communication as part of the curriculum in the School of Business and Management; and a course in Technical Communication as part of certain other programmes.

The Language Centre has two 24-booth audio-visual language laboratories (for oral/aural work), and one 24-booth computerised language laboratory (for oral/aural work as well as text processing and editing), for use both by class groups and by individuals. The laboratories and a self-access centre are open on weekdays for staff and students to make use of the growing collection of written and taped materials in English and other languages.

Teaching Staff

**Director**: Gregory C.A. JAMES, MA, MSc Edinburgh; MPhil Reading; PhD Exeter; CertEd Wales; DipUniv Geneva; DipHRM Macau; DipRSA

**Senior Instructors**: Michael J. COURTNEY, BA East Anglia; MA Essex; CertEd Nottingham; Christopher GREEN, BA Reading; MEd Hong Kong; CertEd North Buckinghamshire Coll; AdvDip TESOL London; John C. P. MILTON, BSc Dalhousie; BA Ottawa and Toronto; MEd Brock Richard PEMBERTON, MA Cambridge and Leeds; CertEd Leicester; Keith Sai-tao TONG, BA, CertEd, AdvDipEd Hong Kong; MA Reading

**Instructors**: Sarah CARMICHAEL, BA, CertEd Reading; DipRSA; Kenneth Kwan-pang CHAN, BSc, Surrey; Austin CONWAY, BA University Coll, Dublin; MPhil, Cert Ed Trinity Coll, Dublin; Dip RSA; Lynne FLOWERDEW, BA, CertEd Liverpool; MA Birmingham; Anna GUNN, BA Sheffield; LTCL; Claire HICKLIN, MA Edinburgh; DipEd Sydney; Eliza Shuk-ching LAM TSANG, BA National Taiwan; MEd Manchester
Pansy Mi-ying LAU LAM, BA, CertEd Hong Kong
Joyce Yuen-eee LEE, BA Hong Kong; MA Chinese Univ of Hong Kong; Higher
Cert City Polytech of Hong Kong
Jonathan Hon-yan LEUNG, BA Bethel Coll; MEd, CAGS Boston; CertEd Hong Kong
Edward Siu-leung LI, BA, DipEd Chinese Univ of Hong Kong; MA Reading
Irene Wai-yeung NG, BA Chinese Univ of Hong Kong; MSc Edinburgh; CertEd Hong Kong
Ian SMALLWOOD, BA, Dip Ed Stirling; Cert TEFL Lund; Dip RSA
Anthony Kin-luk TONG, BSc Calif State (Fresno); CertEd Hong Kong;
PFDipTESL City Polytechnic of Hong Kong; MIL
Grace Hoi-yeung WONG, BA, Dip Ed Chinese Univ of Hong Kong
Anna YU Wai-yin, BA, Brigham Young Univ, Hawaii, MA, CertTESL
BrighamYoung Univ, Utah

Centre of Computing Services and Telecommunications

Director: W. Max IVEY, BS Arizona; MS Houston; PhD Arizona State

The Centre of Computing Services and Telecommunications develops and manages the computing and networking infrastructure of the University. It provides computing support to undergraduate and postgraduate teaching, and research applications in science, engineering, business and management, and humanities and social science. Besides, the Centre serves the University's administrative needs by providing an integrated information system to support the day-to-day routines as well as to satisfy the need for information in management decision making.

The HKUST computing environment is modelled after the distributed client-server architecture. The network backbone is a collection of advanced, high-speed FDDI (Fibre Distributed Data Interface) rings, each running at 100 megabits per second. The FDDI rings are interconnected by a gigaswitch, which gives an aggregate network bandwidth of 3.6 gigabits per second. The campus network is connected to Harnet (The Hong Kong Academic & Research Network) via a 1.544 megabits per second T1 circuit, and to Internet via a 64 kilobits per second circuit to the United States. Network services are available not only in offices and laboratories but also in staff quarters and student dormitories.

The Centre operates powerful server computers to provide campus-wide network services such as network printing, e-mail and electronic notice board. One important characteristic of the University's computing environment is its Chinese-English bilingual capability. Increasingly, more applications will have this dual support.

All microcomputers and powerful scientific workstations are connected to the campus network, providing desktop computing power as well as serving as windows to a vast array of information and computing resource, such as the library system and various scientific and business packages, on the University's own network or that of other institutions in Hong Kong, and through the Internet, on networks of educational and research institutions worldwide.

To support scientific computing and visualisation, CCST has developed a high performance, distributed and parallel computing environment comprising of high-end computation and graphics workstations with FDDI interface and interconnected by a super high-speed gigaswitch.

In addition to the central facilities, the Centre also manages a number of "computer barns" in various locations of the academic buildings, providing PC, Macintosh and Unix workstation facilities for undergraduate teaching and student use. Each academic department also has one or more computing facility rooms for use by postgraduate students and academic staff.

Apart from computing services, the Centre also operates the campus-wide PABX system.

Educational Technology Centre

Director: Donald M. BOEHNKER, BS, MS Cincinnati; EdD Indiana

The University is committed to high standards and up-to-date methods in undergraduate and postgraduate teaching and in the communication of research results. To this end, the Educational Technology Centre sustains a comprehensive service for all academic and research staff. It provides and maintains a wide range of instructional media resources for academic purposes. It assists academic staff in producing teaching and learning materials, including those generated with computer graphics technology, as well as slide presentations, overhead transparencies, video tapes and print materials. In addition, the Centre provides high-speed, high-volume reprographic and off-set printing services.

To underpin these production and technical services, the Educational Technology Centre organises workshops and seminars for faculty, teaching assistants, and tutors on educational issues and instructional practices in higher education, including selection and use of mediated instructional materials, production of teaching and learning packages and methods for student feedback of teaching effectiveness. The Centre also serves as a resource for information on teaching methods, instructional formats and materials related to research on teaching.

Industrial Training Centre

Acting Director: Mr. Lawrence LEE, CEng, MIEE, MHKIE

The Industrial Training Centre (ITC) is being established to provide practical training to all Engineering students and, on an elective basis, to interested students from other schools. The programme offered by the ITC would give students a broad and structured understanding of the engineering practice. Moreover, the training would also help students satisfy the training requirements of the Hong Kong Institution of Engineers (HKIE) and the UK's Engineering Council for certification/registration purposes.
An important aspect of the programme is the integration of the workshop experience with the knowledge acquired in classrooms and laboratories, so that students' understanding and appreciation of the knowledge acquired from the academic courses is enhanced. This integration of workshop training with academic knowledge is accomplished through curriculum planning and coordination between the departments and the ITC. The workshops would be designed in modular form and each department works with ITC staff to design and specify combinations of modules that would meet the needs of its students. Training periods for students range from 6 to 12 weeks, to cater for the specific requirements of various departments. The introductory phase of training would consist of basic engineering practices, safety procedures, handling of hand and power tools and machine tools in a supervised setting. Beyond the introductory phase, training would be designed to arouse the interest of students in engineering practice to stimulate their imagination, and to help them develop their talents. This can best be accomplished in a simulated industrial-like environment in which students are assigned an integrated design-and-make project requiring such intellectual level as to match their ongoing academic activities. The goal of this integrated approach is to train students to be professional engineers.

The modules would be designed to strike a proper balance between the development of skills and an appreciation of engineering processes.

Industrial training in the initial period of 1992-94 is expected to be conducted at the Hong Kong Polytechnic.
Research Centre

Director: Jay-Chung CHEN, BS Cheng Kung; MS, PhD California Inst of Tech (Professor of Mechanical Engineering)

The Research Centre has been established to encourage and conduct multidisciplinary, contractual and applied research, the results of which may lead more directly and quickly to implementation and economic benefit. Some of its objectives are to conduct mission-oriented scientific, engineering, industrial, and management research relevant to Hong Kong’s technological and socio-economic development; to establish and manage research facilities that are critical to the need for development of technology in Hong Kong; to incubate critical technologies required by government and industry; to conduct research and scientific databases; to provide institutional management and planning support for research to faculty members; to co-ordinate collaborative overseas research programmes; and to develop and maintain research sponsorship and contractual relationships.

The Research Centre has a programme of wide-ranging R&D initiatives to maintain its research vitality and to inject cutting-edge technology into its research. Research topics and projects are chosen with the collaboration and assistance of faculty and staff members. The selection process gives consideration to the impact of research results on the local community, availability of the University's skills for conducting outstanding research, involvement of postgraduate and academic faculty, and potential to strengthen existing areas of activity or to build areas of future research strength.

The following list provides a few examples of technology and research initiatives in current operation in addition to the more focused activities conducted in the research centres and institutes listed in the previous section:

- A Hong Kong ecosystems databank and processing centre
- Hong Kong/Pearl River Delta contaminated sediment research
- Satellite remote sensing technology on environmental studies
- Pollutant source identification; air quality index and prediction
- Productive electrochemical desulphurisation of fuel gas
- Abatement of diesel air pollution and clean technology
- Biological wastewater treatment — using immobilised microalgae and mangrove wetland system
- Heavy metal toxicity and its resistance in plants
- Ecotoxicology on assessment of pollution
- Landfill modelling
- Software and instrumentation for power plants
- Effect of electromagnetic fields on humans
- Revegetation of pulverised fly-ash lagoons
- Building systems
- Geotechnical engineering
- Bridge engineering
- Coastal engineering

Research Centre, Institutes and Central Research Facilities

Institute for Environmental Studies

Interim Director: Gary W. HEINKE, BASc, MASc Toronto; PhD McMaster (Professor of Civil Engineering)

Environmental science and technology has been identified as one of the applied research subjects which offers opportunity for HKUST to contribute immediately and significantly to Hong Kong. In 1989, Hong Kong Government published a white paper which described the state of the environment and its deterioration. Major environmental projects needed in the next ten years are described. Advanced technologies will be required for these projects to improve environmental conditions of air and water quality, solid waste management, and other health threatening problems. Since 1990, the Research Centre has conducted a wide-range of R & D programmes in environmental studies, particularly in air pollution and biological wastewater treatment. It has also organised several international symposia and workshops on environmental issues. The newly established Institute for Environmental Studies will conduct faculty-driven applied R & D projects. The principal investigators of these projects are faculty or research staff from Departments of Biochemistry, Biology, Chemical Engineering, Chemistry, Civil and Structural Engineering, Research Centre, and Mechanical Engineering.

The research programmes of the Institute will focus on the following areas:

- Water pollution and marine environment
- Air quality studies
- Studies of contaminated sediment in Victoria Harbour/Pearl River Delta
- Particulates and aerosols
- Application of biological and chemical technology to environment
- Wastewater and solid waste treatment
- Noise and dust abatement
- Environment monitoring technology
- Micrometeorology

Office of Contract and Grant Administration

Interim Director: Thomas E. STELSON, BS, MS, DSc Carnegie-Mellon (Professor of Civil Engineering and Pro-Vice-Chancellor for Research and Development)

This Office helps University faculty and staff in the development and operation of research and development contracts and grants sponsored by industrial, governmental,
Research Centre, Institutes and Central Research Facilities

business and philanthropic organisations. Information about potential sources of funding is distributed and assistance provided in the preparation of proposals that meet established criteria for review and evaluation. When sponsored funds are obtained, budgets are established and assistance supplied to assure that contract and grant requirements are satisfied. Complex issues of intellectual property development, proprietary rights, contractual restrictions, and operational coordinations are administered to support faculty, staff, and students in achieving maximum scholarly benefit from available funds.

Technology Transfer Centre

Director: Gareth THOMAS, BSc, University of Wales, Cardiff
  PhD, ScD, Cambridge  (Professor of Mechanical Engineering)

The Technology Transfer Centre is dedicated to bringing new and better technology to accelerate the social and economic development of Hong Kong. The involvement of University faculty, staff and facilities to evaluate, develop, commercialise, produce and market new products and processes is the goal. The creation and licensing of patents, software and copyrights is part of the process. The expansion of existing industries and the incubation and support of new industries to produce and market new products is another part of the process. The economic utilisation of technical achievements of the University for the benefit of Hong Kong is an organisational goal of the Technology Transfer Centre. Bringing the newest and the best of global technology to Hong Kong for the support of local industry is another goal.

Biotechnology Research Institute

Director: Tian Yow TSONG, BS Taiwan Chung Hsin; PhD Yale  (Professor of Biochemistry)

The mission of the Biotechnology Research Institute (BRI) is to assist Hong Kong in its economic development, and in so doing contribute to the economic well-being of the Asia-Pacific region, through the research, development and training of specialists in biotechnology. The biotechnological industry worldwide is entering into a period of unprecedented growth opportunities. Besides the rapid scientific advances that are bringing a constant stream of new processes and products, the business environment of the industry is also undergoing dramatic changes in the form of increasing globalisation, as new entrants, both national governments and corporations, seek participation. The founding of BRI could not have come at a more opportune time, to help Hong Kong strive to become one of the important centres of biotechnology in the world.

Biotechnology covers a wide range of fast-growing areas of economic importance. The seven research areas that have been targeted for development by BRI are:

1. Biomedical instrumentation and diagnostics
2. Drug delivery and development
3. Agricultural and environmental bioengineering
4. Genetic engineering of biomacromolecules
5. Biosensor
6. Immunology
7. Molecular genetics of plants

The activities of BRI include the recruitment of biotechnology related faculty, the purchase of equipment, the planning and construction of facilities, and the support of research projects in the targeted areas.

Hong Kong Telecom Institute of Information Technology

Director: Ming L. LIOU, PhD Stanford  (Professor of Electrical and Electronic Engineering)

This Institute has been founded with a grant of $100 million from Hong Kong Telecommunication Limited. The concept of the Institute is based on the recognition that in future there will be no economic development, no industry or commerce, no service or manufacturing capability of any significance without the full utilisation of telecommunication and information technology. All schools at the University are involved in the research activities of this Institute. At present, the Institute is sponsoring four major research programmes, namely Lightwave Technology, Network Technology, Wireless Communication, and Video Technology.

Undergraduate scholarships and postgraduate research assistantships are also offered through the Institute, and certain members of the academic faculty are designated as Institute Fellows.

Materials Characterisation and Preparation Centre

Director: David J. BARBER, BS, PhD Bristol  (Professor of Physics)

The Materials Characterisation and Preparation Centre is a central facility for the synthesis, study and testing of new materials and materials needed for in-house or collaborative research projects. The Centre constitutes an important resource which provides state-of-the-art instrumentation, organises workshops and training, and is a focal point for interdisciplinary research. The facility serves academics in all the Science and Engineering departments and is also available to external clients from other tertiary institutions, government bodies, and private industry. During 1993 the Centre moved to larger premises in the Phase II building, thus enabling the scope of facilities to be expanded to meet more fully the needs of the growing research community of staff and graduate students.
Microelectronics Fabrication Centre

**Director:** Tai-chin LO, BS National Taiwan; MS, PhD Univ of Illinois, Urbana-Champaign
(Senior Lecturer, Electrical and Electronic Engineering)

The mission of the MFC is to provide capabilities for the fabrication of microelectronic devices and integrated circuits in support of undergraduate and postgraduate teaching and research. Particular objectives for technology development include novel semiconductor devices, higher speed transistors and ICs, innovative microsensors and microactuators, and application specific integrated circuits (ASICs).

To achieve the objectives, half of the phase I 495-sq.metre-Centre is devoted to Class 1,000 clean rooms (containing less than 1,000 particles larger than a half micrometre per cubic foot of air) where state-of-the-art microelectronic processing equipment is located. The Centre's clean rooms are divided into four basic fabrication modules, namely, photolithography, thermal diffusion/thin-film deposition, dry/wet etching and metallisation.

While the centre is closely associated with electronics engineering, researchers in other disciplines have also found microfabrication techniques highly valuable for various applications. Research projects from Physics, Chemistry, Biology, Biochemistry, Mechanical Engineering and other engineering fields have also been utilising the facility of the Microfabrication Centre.

Sino Software Research Centre

**Interim Director:** Vincent Y.S. SHEN, BS National Taiwan; MA, PhD Princeton
(Professor and Head of Computer Science)

The Sino Software Research Centre (SSRC) was established in July 1992 with a $20 million grant from the Sino Land Co., Ltd. It has the dual aim of supporting software research that can lead to practical applications, and providing assistance in transforming those applications into useful products.

The Centre sees its primary role as that of a catalyst, helping software research projects reach the critical phase in which ideas may be translated into prototypes that can be evaluated using large-scale trials. Projects led by HKUST faculty members from any department are eligible for support.

The Centre particularly encourages research and development in areas that are relevant to the economic and social development of Hong Kong. Current areas of activity include:

- Chinese language software interface support
- Heterogeneous database management technology
- Intelligent video manipulation tools
STUDENT SERVICES

Director : Luke Sui-Kwong WONG, BA, MA Hong Kong

Through the Student Affairs Office, the University offers a range of services to students for the purpose of promoting the quality of campus life and assisting students in solving problems affecting their studies. Extra-curricular educational activities are also organised with the aim of broadening students' cultural and intellectual outlook as well as enhancing their social and interpersonal skills.

Counselling Service

Staff of the Student Affairs Office offer assistance in many areas of student concern, such as adjustment to a new environment, financial hardship, personal problems and study-related problems.

Physical Education and Sports

Developing physical health and fitness is as important as broadening the mental capacity and horizons of students. To this end, the University expects all students to participate in at least one organised sport or physical education activity during their years at the University. Professional coaches are available to organise and provide instructions in these activities. A large multi-purpose sports hall with 1,600 square metres of floor space is available for such sports as badminton, volleyball, basketball, tennis, indoor soccer, and table tennis, with other areas set aside for fencing, martial arts, aerobics, and other exercises. Outdoor facilities include a 50-metre swimming pool, an all-weather pitch, a 400-metre athletics track as well as basketball and tennis courts. Expansion of the indoor sports hall is being planned to include a number of squash courts and other exercise facilities.

Health Service

The Student Health Service provides out-patient health and dental care for students. Health education workshops and seminars will also be organised and presented for the benefit of students and staff alike.

Residential Halls

Housing is planned for 30% of full-time students, although at present a much higher percentage can be accommodated. Providing residential places to 1,722 undergraduate students and 356 postgraduate students, the halls are located on campus in five multi-storey residential buildings. Undergraduate rooms are generally shared by two students; postgraduates are housed in single rooms with air-conditioning. Each floor of the Residential Halls has a lounge area with an adjoining pantry. Other facilities in the complex include common rooms and snack rooms where residents and guests can meet and socialise. A laundry is also provided.

Student Amenities

Amenities for personal as well as organised student activities are provided in a central location. These include facilities for the pursuit of hobbies such as photographic dark rooms, music rooms and studios, the organisation of activities such as meeting rooms, workshops, office space and exhibition areas, and leisure activities for individual students and interaction among students such as common rooms, TV rooms and reading rooms.

A Student Canteen with a seating capacity for 1,800 is available. It is centrally located and a variety of services is provided. Commercial facilities include a bookshop, banking services, and a convenience store.

The campus itself, on a site of great beauty enhanced by landscaping, terraces, and pavilions, has been designed with great emphasis on the quality of life of both resident and non-resident students.

Student Activities

Extra-curricular activities are organised by the Students' Union and student societies associated with academic discipline, residential halls, sports, arts and other social interests. Students are encouraged to take part in activities as organisers and/or participants. The Student Affairs Office of the University also organises extra-curricular activities and programmes such as formal dinners, competitive sports, talks and seminars.
THE UNIVERSITY ORDINANCE

The Hong Kong University of Science and Technology Ordinance

PART I

PRELIMINARY

1. (1) This Ordinance may be cited as The Hong Kong University of Science and Technology Ordinance.

(2) This Ordinance shall come into operation on a day to be appointed by the Governor by notice in the Gazette.

2. In this Ordinance, unless the context otherwise requires:

"Chancellor" means the Chancellor of the University and also any person acting as Chancellor of the University by virtue of section 6(2);

"Court", "Council", "Senate" and "Convocation" respectively mean the Court, Council, Senate and Convocation of the University;

"financial year" means the period fixed by the University under section 18(3);

"statutes" means the statutes of the University;

"University" means The Hong Kong University of Science and Technology established by section 3;

"Vice-Chancellor" and "Pro-Vice-Chancellors" respectively mean the Vice-Chancellor and Pro-Vice-Chancellors of the University.

PART II

THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

3. There is hereby established a body corporate with perpetual succession to be known in English as The Hong Kong University of Science and Technology and in Chinese as "香港科技大学", which in its name either in English or Chinese may sue and be sued.
reduce, waive or refund such fees and charges;

(k) receive and solicit gifts, whether on trust or otherwise, and act as trustee of moneys or other property vested in it on trust;

(l) confer degrees and other academic awards including honorary degrees and honorary awards;

(m) provide, for profit or otherwise, advisory, consultancy, research and other related services;

(n) enter into a partnership or any other form of joint venture with any person;

(o) acquire, hold and dispose of interests in other corporate bodies and form or take part in forming corporate bodies;

(p) print, reproduce, or publish or arrange for the printing, reproduction or publishing of any manuscript, book, play, music, script, programme, poster, advertisement or other material, including video and audio material and software for computers, as it thinks appropriate or expedient; and

(q) provide financial assistance, by way of grant or loan, in pursuance of its objects.

PART III

THE CHANCELLOR AND THE COURT

6. (1) There shall be a Chancellor of the University who shall be the head of the University and who may confer degrees and other academic awards in the name of the University.

The Chancellor.

(2) The Governor shall be the Chancellor. In the absence of the Governor, the Acting Governor or the Governor's Deputy shall be the Acting Chancellor and shall have all the powers and duties of the Chancellor.

(3) The Chancellor may appoint a person to be the Pro-Chancellor of the University. The Pro-Chancellor may, on the authorization of the Chancellor and on his behalf, exercise any of the powers and perform any of the duties conferred or imposed on the Chancellor.

7. (1) There shall be a Court, which shall be the supreme advisory body of the University.

The Court.

(2) The functions of the Court shall be to:

(a) receive an annual report from the Vice-Chancellor;

(b) consider any reports made to it by the Council;

(c) discuss any motion made at the Court on general University policy;

(d) raise funds for the University; and

(e) promote the interests of the University in Hong Kong and elsewhere.

PART IV

THE COUNCIL

8. There shall be a Council, which:

(a) shall be the supreme governing body of the University; and

(b) may exercise any of the powers conferred and shall perform all of the duties imposed on the University by this Ordinance, other than those powers conferred and those duties imposed by this Ordinance on some other authority or person.

9. (1) The Council shall consist of:

The Council.

(a) the Vice-Chancellor;

(b) the Pro-Vice-Chancellors;

(c) the holder of each office (if any) of Dean of a Faculty and Dean of a School;

(d) the Chairman of Convocation;

(e) not more than 3 members, who shall be public officers, appointed by the Governor;

(f) not more than 3 academic members of the Senate nominated by the Senate and appointed by the Chancellor; and
(g) not more than 18 members, who shall not be public officers or employees of the University, of whom:

(i) not less than 10 shall have experience in commerce or industry in Hong Kong and not more than 5 shall be from other tertiary institutions in or outside Hong Kong;

(ii) not more than 9 shall be appointed by the Chancellor; and

(iii) not more than 9 shall be appointed by the Chancellor on the recommendation of the Council.

(2) (a) The Chancellor shall appoint, from the members appointed under subsection (1)(g) who have experience in commerce or industry in Hong Kong, 3 members as follows:

(i) 1 member as Chairman of the Council;

(ii) 1 member as Vice-Chairman of the Council; and

(iii) 1 member as Treasurer of the Council.

(b) The Vice-Chairman shall act as Chairman if the Chairman is absent from Hong Kong or is, for any other reason, unable to act as Chairman, or if the office of Chairman is vacant.

(c) If both the Chairman and the Vice-Chairman are absent from Hong Kong or are, for any other reason, unable to act as Chairman, or if the offices of Chairman and Vice-Chairman are vacant, the members may appoint one of the members appointed under subsection (1)(g) to act as Chairman.

(3) (a) A member who is appointed under section 9(1)(e) shall hold office during the pleasure of the Governor.

(b) Without prejudice to section 42 of the Interpretation and General Clauses Ordinance, a member who is appointed under section 9(1)(f) or (g):

(i) shall be appointed for a period of 3 years or such lesser period as the Chancellor may in any particular case specify, but may from time to time be reappointed; and

(ii) may at any time by notice in writing to the Chancellor resign from the Council.

10. (1) Meetings of the Council shall be held at such times and places as the Chairman may appoint.

(2) At any meeting of the Council, 50% of the members of the Council for the time being shall form a quorum.

(3) The Council may determine its own procedure.

(4) If a member has any pecuniary or other personal interest in any matter to be considered at a meeting of the Council and is present at such meeting, he shall as soon as possible after the commencement of the meeting disclose to the Council the fact and nature of the interest and shall, if required by the Council, withdraw from the meeting while the Council is considering the matter and in any case shall not vote thereon.

11. (1) The Council may create such committees as it thinks fit and any such committee may consist partly of persons who are not members of the Council.

(2) The chairman and vice-chairman of any committee appointed under subsection (1) shall be appointed by the Council from among the members of the Council.

(3) Subject to subsection (4), the Council may in writing, with or without restrictions or conditions as it thinks fit, delegate any of its powers and duties to any committee created under subsection (1).

(4) The Council shall not delegate to any committee created under subsection (1) the power:

(a) to approve the terms and conditions of service of persons in the employment of the University;

(b) to cause the preparation of the statements required under section 18(2);

(c) to make statutes under section 23;
(d) to appoint or remove from office the Vice-Chancellor or any Pro-Vice-Chancellor under section 12, or to approve the duties to be undertaken by any Pro-Vice-Chancellor under that section.

(5) Subject to the directions of the Council, each committee may determine its own procedure at its meetings.

PART V
VICE-CHANCELLOR, PRO-VICE-CHANCELLORS AND OTHER STAFF

12. (1) The Council:

(a) shall, in accordance with subsection (2), appoint a Vice-Chancellor who shall be the chief executive and academic officer of the University;

(b) may, in accordance with subsection (3), appoint not more than 3 Pro-Vice-Chancellors who shall undertake such duties as are recommended by the Vice-Chancellor and approved by the Council;

(c) may appoint such other persons to be employees of the University as it considers expedient.

(2) (a) The Vice-Chancellor shall be appointed by resolution of the Council passed by the votes of not less than three-quarters of its members for the time being.

(b) The Vice-Chancellor may be removed from office by resolution of the Council passed by the votes of not less than three-quarters of its members for the time being on the ground of his misconduct, incompetence, inefficiency or other good cause.

(c) In this subsection "members" does not include members appointed under section 9(1)(b), (c) or (f).

(4) (a) The Council may appoint any person to act as Vice-Chancellor on a temporary basis during the incapacity or absence from Hong Kong of the Vice-Chancellor or if that office is vacant for any reason.

(b) The Council may appoint any person to act as a Pro-Vice-Chancellor on a temporary basis during the incapacity or absence from Hong Kong of any Pro-Vice-Chancellor or if that office is vacant for any reason.

(c) An appointment under this subsection shall be made on the recommendation of the Vice-Chancellor, except where the Vice-Chancellor is for any reason prevented from or incapable of making such a recommendation or where that office is vacant for any reason.

13. (1) Subject to subsection (2), the Council may in writing, with or without restrictions or conditions as it thinks fit, delegate to the Vice-Chancellor any of its powers and duties.

(2) The Council shall not delegate to the Vice-Chancellor the power:

(a) to approve the terms and conditions of service of persons in the employment of the University;

(b) to cause the preparation of the statements required under section 18(2);

(c) to make statutes under section 23;

(d) to make appointments and removals from office under section 12, other than under section 12(1)(c), or to approve the duties to be undertaken by any Pro-Vice-Chancellor under section 12.
14. (1) Subject to subsection (2), the Vice-Chancellor may in writing, with or without restrictions or conditions as he thinks fit, delegate, to such person or committee of persons as he thinks fit, his powers and duties, including any power or duty of the Council delegated to him under section 13.

(2) The power conferred by this section on the Vice-Chancellor to delegate any power or duty of the Council delegated to him under section 13, and the exercise by any person or committee of persons of any such power or duty delegated by the Vice-Chancellor under this section, shall be subject to any restriction or condition imposed in respect thereof by the Council under section 13.

PART VI

SENATE, FACULTIES, SCHOOLS AND CONVOCATION

15. There shall be a Senate which shall be the supreme academic body of the University and which shall, subject to the availability of funds provided by the Council,:

(a) plan, develop and review academic programmes;

(b) direct and regulate the teaching and research conducted in the University;

(c) regulate the admission of persons to approved courses of study and their attendance at such courses; and

(d) regulate the examinations leading to the degrees and other academic awards of the University.

16. (1) There shall be such Faculties and Schools as may be constituted by the Council.

(2) There shall be a Board of each Faculty and School.

17. There shall be a Convocation.

PART VII

FINANCIAL STATEMENTS AND REPORTS

18. (1) The University shall maintain proper accounts and records of all income and expenditure.

(2) After the end of each financial year, the University shall cause to be prepared statements of income and expenditure during the previous financial year and of the assets and liabilities of the University on the last day thereof.

(3) The University may, from time to time, fix a period to be its financial year.

19. (1) The University shall appoint auditors, who shall be entitled at any time to have access to all books of account, vouchers and other financial records of the University and to require such information and explanations thereof as they think fit.

(2) The auditors shall audit the statements prepared under section 18(2) and shall report thereon to the University.

20. The Council shall, not later than 6 months after the end of each financial year, submit to the Chancellor a report on the activities of the University and copies of the statements submitted to the Chancellor.

PART VIII

GENERAL

21. (1) The Court, the Senate, and the Board of each Faculty and School may establish such committees as they think fit.

(2) Unless the statutes provide otherwise, the chairman and vice-chairman of any committee shall be members of the Court, the Senate, or the Board of the Faculty or School, as the case may be.

(3) Unless the statutes provide otherwise, any committee may consist partly of persons who are not members of the Court, the Senate, or the Board of the Faculty or School, as the case may be.

(4) Unless the statutes provide otherwise, the Court, the Senate, and the Board of each Faculty and School may, with or without restrictions or conditions as they think fit, delegate any of their powers and functions to any committee.
22. The fixing of the common seal of the University shall be:

(a) authorized by resolution of the Council; and
(b) authenticated by the signature of 2 members of the Council authorized by the Council to act for that purpose, one of whom shall not be an employee of the University.

23. (1) The Council may make statutes for the better carrying out of this Ordinance and in particular, but without prejudice to the generality of the foregoing, may make statutes in relation to:

(a) the administration of the University;
(b) the membership of the University;
(c) the academic membership of the University;
(d) the constitution of the Court and the Senate;
(e) the constitution, powers and functions of the Faculties, the Boards of the Faculties, the Schools, the Boards of the Schools and the Convocation;
(f) the regulation of the proceedings of any body referred to in paragraphs (d) and (e) above;
(g) the offices of Dean of a Faculty and Dean of a School and the powers and functions of persons holding such offices;
(h) the welfare and discipline of students and employees of the University;
(i) the conferring of degrees and other academic awards, including honorary degrees and honorary awards;
(j) the nomination of academic members from the Senate for appointment to the Council under section 9(1)(f);
(k) financial procedures;
(l) fees payable to the University as a condition of admission to any examinations held by the University or for the conferring of any degree or other academic award of the University or for attendance at any course of the University or any similar purpose; and
(m) generally, the carrying into effect of this Ordinance.

(2) Every statute made under subsection (1) shall be published in the Gazette.

24. (1) No person shall incorporate or form, or be a director, officer bearer or organizer of, work in connection with, or be a member of, any body of persons, corporate or unincorporate, that, without the written consent of the Council:

(a) holds itself out to be:
   (i) the University or any part thereof; or
   (ii) in any way connected or associated with the University;
(b) uses the title "The Hong Kong University of Science and Technology" or "香港科技大学" or a title in any language which so closely resembles the title "The Hong Kong University of Science and Technology" or "香港科技大学" as to be capable of misleading any person into believing that the body of persons is-
   (i) the University or any part thereof; or
   (ii) in any way connected or associated with the University.

(2) Any person who contravenes subsection (1) shall be guilty of an offence and shall be liable on conviction to a fine of $10,000.

25. (1) Section 2 of the Education Ordinance is amended:

(a) in paragraph (h) by deleting "or",
(b) in paragraph (i) by deleting the full stop and substituting the following:
   "or; and"
(c) by inserting after paragraph (i) the following:
   "(j) The Hong Kong University of Science and Technology established by The Hong Kong University of Science and Technology Ordinance."
(2) The Schedule to the Prevention of Bribery Ordinance is amended by inserting after item 47 the following:

"48. The Hong Kong University of Science and Technology."

(3) The definition of "educational institution" in section 2 of the Road Traffic Ordinance is amended by inserting at the end thereof the following:

"(i) The Hong Kong University of Science and Technology established by The Hong Kong University of Science and Technology Ordinance;".

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**STATUTES OF THE UNIVERSITY**

**Statute 1**

1. The Senate shall consist of:

   (a) the Vice-Chancellor, who shall be Chairman;
   (b) the Pro-Vice-Chancellors;
   (c) the Dean of each School;
   (d) the Heads of academic departments in the Schools of Science, Engineering, and Business and Management;
   (e) the Heads of academic divisions in the School of Humanities and Social Science;
   (f) the Director of Research Centre;
   (g) the Director of Technology Transfer Centre;
   (h) the Director of Planning and Coordination;
   (i) the Director of Library;
   (j) the Director of Computing Services and Telecommunications;
   (k) the Director of Student Affairs;
   (l) four other academic staff members from each School (other than the School of Humanities and Social Science) who are full-time employees of the University, and who shall be elected by the full-time academic staff members of the respective Schools, provided that during such time as the number of academic departments in any School shall be less than four, the number of appointees in respect of that School under this provision shall be the same as the number of academic departments for the time being;
   (m) one other academic staff member from the School of Humanities and Social Science who is a full-time employee of the University and who shall be elected by the full-time academic staff members of the School;
   (n) three other academic staff members who are full-time employees of the University and who shall be elected by the full-time academic staff members of the University;
   (o) one student, who shall be President for the time being of the Students' Union and who shall be registered as a full-time student of the University;
   (p) one undergraduate student who shall be registered to read full-time for a degree in the University and who shall be elected by the undergraduate students in the University similarly so registered;
   (q) one postgraduate student, who shall be registered to read for a degree in the University and who shall be elected by the postgraduate students in the University similarly so registered.

2. The Senate shall have the power to co-opt three further full-time academic staff members of the University to serve for such periods as the Senate may determine.

3. Members of the Senate elected under paragraphs 1(f), 1(m) and 1(n) shall hold office for 2 years from the date of their election and shall be eligible for re-election.
4. The member of the Senate appointed under paragraph 1(c) shall hold office during such time as "he shall hold office of President of the Students' Union.

5. Members of the Senate elected under paragraphs 1(p) and 1(q) shall hold office for 1 year from the date of their election and shall be eligible for re-election.

6. In the event that any casual vacancy shall occur, the Senate shall have power to fill the same, and any such member so appointed shall hold office for the balance of the term of the appointee whom "he is replacing and shall be eligible for re-election.

7. No person shall be eligible for membership of the Senate in more than one capacity.

8. The Senate shall meet at least once in each term or semester of every academic year, and additionally at any time at the direction of the Chairman or on the written request of any 10 members of the Senate.

9. The quorum of the Senate shall be the smallest number which is not less than 50% of the number of members for the time being.

10. The Senate may determine its own procedure, subject to the approval of the Council.

11. (a) Student members of the Senate, and of such committees and other bodies as the Senate may establish, shall not be entitled to participate in that part of meetings which are reserved areas of business nor to see papers or any other documents relating thereto.

   (b) The reserved areas of business are:

      (i) matters affecting the appointment, promotion and other affairs relating to academics and other members of the University staff as individuals;

      (ii) matters affecting the admission and academic assessment of students as individuals;

      (iii) any other matters of a like or different nature considered by the Chairman to be reserved areas of business.

The Chairman of the Senate, or the Chairman of the Committee or other body established by the Senate, as the case may be, may decide in any case of doubt whether or not a matter falls within one of the reserved areas of business and *his decision shall be final.

* Words and expressions importing the masculine gender include the female.

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Statute 2
Powers and Duties of the Senate

1. Subject to the provisions of the Ordinance and the statutes, and to the availability of the funds provided by the Council, the Senate may do all things that are necessary for, or incidental or conducive to the performance of its duties and in particular, but without prejudice to the generality of the foregoing, may:

   (a) make recommendations to the Council on the academic aspects of any matters affecting the University, and on the appropriate resource requirements;

   (b) decide what persons have qualified for the conferment of degrees (other than honorary degrees) and other academic awards;

   (c) require any student on academic grounds to terminate studies at the University;

   (d) make regulations, subject to the approval of Council, for the welfare and discipline of students;

   (e) report to the Council on academic matters referred to the Senate by the Council;

   (f) receive reports from the Vice-Chancellor on the annual estimates of expenditure of the University;

   (g) delegate any of its powers to any member of the Senate or any permanent or ad hoc committee of the Senate;

   (h) appoint academic staff members to the Board of each School of the University;

   (i) receive reports from, and to give guidance and directions to, the Board of each School.

2. Subject to the provisions of the Ordinance and the Statutes, and to the availability of funds provided by the Council, the Senate shall:

   (a) plan, develop and review academic programmes;

   (b) regulate the teaching and research conducted in the University;

   (c) regulate the admission of persons to approved courses of study and their attendance at such courses; and

   (d) regulate the examinations leading to the degrees and other academic awards of the University.
Statute 3
Board of Each School

1. The Board of each School shall consist of:
   (a) the Dean of the School who shall be Chairman;
   (b) the Professors, Readers, Senior Lecturers and Lecturers who are members of the academic departments in the School or are members of the academic divisions and the Language Centre in the School of Humanities and Social Science and who are full-time employees of the University;
   (c) such other academic staff members as may be appointed by the Senate.

2. The Board may from time to time co-opt such other persons, not being academic staff members, to serve for such periods as the Board may determine, provided that the number of such persons shall not exceed one-tenth of the whole number of members of the Board.

3. The persons appointed under paragraph 1(c) shall hold office for a period of one year or such other period as the Senate may specify in any particular case and shall be eligible for re-appointment.

4. The Board of each School shall meet at least once in each term or semester of every academic year, and additionally at any time at the direction of the Chairman.

Statute 4
Powers of the Board of Each School

Subject to the provisions of the Ordinance and the Statutes, the Board of each School shall have the power:
   (a) to advise the Senate on any matters relating to the work of the School; and
   (b) to perform any duty which the Senate may delegate to it and to do all such acts and things as may be required to perform the same.

Statute 5
Congregations

1. For the purpose of conferring degrees and other academic awards and for such other purposes as may be determined by the Council, at least one congregation of the whole University shall be held in each academic year.

2. The time, place and procedure of congregations shall be determined by the Council.

3. The Chancellor or in his absence the Acting Chancellor or in their absence the Pro-Chancellor or in their absence the Chairman of the Council or in their absence the Vice-Chairman of the Council or in their absence the Vice-Chancellor shall preside at congregations.

Statute 6
Degrees

1. The degrees which may be conferred by the University shall be:
   (a) Bachelor of Science - B.Sc.
   (b) Bachelor of Engineering - B.Eng.
   (c) Bachelor of Business Administration - B.B.A.
   (d) Master of Science - M.Sc.
   (e) Master of Philosophy - M.Phil.
   (f) Master of Business Administration - M.B.A.
   (g) Master of Arts - M.A.
   (h) Doctor of Philosophy - Ph.D.
   (i) Doctor of Engineering honoris causa - D.Eng. honoris causa
   (j) Doctor of Letters honoris causa - D.Litt. honoris causa
   (k) Doctor of Science honoris causa - D.Sci. honoris causa
   (l) Doctor of Social Sciences honoris causa - D.Soc.Sc. honoris causa

2. New degrees and academic awards may be established from time to time by the University.

3. The act of conferment of degrees shall be undertaken by the Chancellor or in his absence by the Acting Chancellor or in their absence the Pro-Chancellor or in their absence the Chairman of the Council or in their absence the Vice-Chairman of the Council or in their absence the Vice-Chancellor.

4. No degree or academic award other than an honorary degree or an honorary academic award shall be conferred on any person who has not:
   (a) completed an approved course of study;
   (b) passed the appropriate examinations or other testing or assessment procedure; and
(c) complied in all respects with the academic regulations made from time to time by
the Senate pursuant to section 15 of the Ordinance and with all other regulations
made from time to time by the University.

5. Honorary degrees and honorary academic awards may be conferred by the University
on any person who has rendered distinguished service to the University or the
community, in the advancement of learning and knowledge or otherwise, or who in the
opinion of the Council is worthy of such a degree or academic award for outstanding
human endeavour or devotion to the greater good of mankind.

6. No person shall be deprived of any degree or academic award except for good cause
and on the resolutions of both the Council and the Senate.

Statute 7
The Court

1. The Court shall consist of :-
   (a) Ex-officio members who shall be:
      (i) the Pro-Chancellor
      (ii) the Chairman of the Council
      (iii) the Vice-Chairman of the Council
      (iv) the Vice-Chancellor
      (v) the Treasurer of the Council
      (vi) the President for the time being of the University Students' Union who shall
           be a registered student at the University.
      (vii) the Head of the Alumni Organisation (if any), and
      (viii) the Head of the Non-academic Staff Association (if any).

   and

   (b) Appointed members who shall be:
      (i) four members of the Senate to be nominated from time to time by the Senate
          and appointed by the Council, and
      (ii) thirty other members to be appointed from time to time by the Council, and
      (iii) ten other members to be appointed from time to time by the Chancellor.

2. No Ex-officio member of the Council shall be eligible for appointment as an Appointed
   member of the Court.

3. The Ex-officio members shall continue as members so long as they hold the office in
   virtue of which they became members of the court. Any Appointed member may
   resign at any time by written notice to that effect addressed to the secretary to the
   Court.

4. The Appointed members shall hold office for three years from the date of their
   appointment and shall be eligible for re-appointment for one, but only one, further
   consecutive term of three years. No Appointed member may serve as a member of
   the Court for any term longer than six consecutive years. Any Appointed member who
   has served as a member of the Court for a term of six consecutive years shall be
   eligible for subsequent reappointments to the Court only after the expiration of not less
   than one year.

5. Vacancies shall be filled as they occur and as soon thereafter as conveniently may
   be.

6. The functions of the Court shall be as set out in the Ordinance.

Statute 8
Meetings of the Court

1. The Court shall meet at least once in each academic year.

2. The Pro-Chancellor shall be the Chairman of the Court and shall preside at meetings
   of the Court. In the absence of the Chairman of the Court, the Chairman of the Council
   or in their absence the Vice-Chairman of the Council or in their absence the Vice-
   Chancellor shall preside at meetings of the Court.

3. If at any time the office of Pro-Chancellor shall be vacant, the Chairman of the Council
   shall be the Acting Chairman of the Court and as such shall in all respects act as and
   perform all the functions of the Chairman of the Court.

4. The Chairman of the Court may convene a meeting of the Court at any time and from
   time to time.

5. The quorum for meetings of the Court shall be one quarter of the number of Ex-officio
   members of the Court and one quarter of the number of Appointed members for the
   time being.
UNIVERSITY COUNCIL

Members of the Council (as of 1 July 1993):

(a) The Vice-Chancellor and President
   Professor Chia-Wei WOO

(b) The Pro-Vice-Chancellors
   Professor Shain-Dow KUNG
   Mr Ian F.C. MACPHERSON, CBE
   Professor Thomas E. STELSON

(c) The Dean of each School
   Professor Yuk-Shee CHAN (Business and Management)
   Professor H.K. CHANG (Engineering)
   Professor Leroy CHANG (Science)
   Professor Hsi-Sheng CH'I (Humanities and Social Science)

(d) The Chairman of Convocation
   Vacant

(e) Public officers appointed by the Governor
   Mr Gordon SIU, JP (Secretary for Economic Services)
   Mr R. James BLAKE, JP (Secretary for Works)
   Mr T. H. CHAU, JP (Secretary for Trade and Industry)

(f) Academic members of the Senate nominated by the Senate and appointed by the Chancellor
   3 vacancies

(g) Members not being public officers or employees of the University
   Sir Sze-yuen CHUNG, GBE, JP (Chairman)
   Mr CHENG Hon-Iwan, OBE, JP (Vice-Chairman)
   The Honourable LAU Wah-sum, OBE, JP (Treasurer)
   Dr the Honourable Raymond CH'IEN
   Mr Michael G. GALE, JP
   Mrs Alice LAM LEE Kiu-yue, JP
   Dr York LlAO
   Major General Guy WATKINS, CB, OBE
   10 vacancies

UNIVERSITY SENATE

Members of the Senate (as of 1 July 1993):

(a) The Vice-Chancellor and President
   Professor Chia-Wei WOO

(b) The Pro-Vice-Chancellors
   Professor Shain-Dow KUNG (Academic Affairs)
   Mr Ian F.C. MACPHERSON, OBE (Administration and Business)
   Professor Thomas E. STELSON (Research and Development)

(c) The Dean of each School
   Professor Leroy CHANG (Science)
   Professor H.K. CHANG (Engineering)
   Professor Yuk-Shee CHAN (Business and Management)
   Professor Hsi-Sheng CH'I (Humanities and Social Science)

(d) Heads of Academic Departments in the Schools of Science, Engineering, and Business and Management

   (1) School of Science
      Professor Jeffrey T.F. WONG (Biochemistry)
      Professor Madeline WU (Biology)
      Professor Nai-Teng YU (Chemistry)
      Professor Din-Yu HSIEH (Mathematics)
      Professor Nelson CUE (Physics)

   (2) School of Engineering
      Professor Po-Lock YUE (Chemical Engineering)
      Professor C. K. SHEN (Civil and Structural Engineering)
      Professor Vincent Y.S. SHEN (Computer Science)
      Professor Peter W. CHEUNG (Electrical and Electronic Engineering)
      Dr See-Chun KOT (Mechanical Engineering) (Acting)
      Vacant (Industrial and Manufacturing Engineering)

   (3) School of Business and Management
      Professor Jevons LEE (Accounting)
      Professor Nai-Fu CHEN (Finance and Economics)
      Vacant (Business Information Systems)
      Vacant (Management)
      Vacant (Marketing)

(e) Heads of Academic Divisions in the School of Humanities and Social Science
   Professor Hong HSU (Humanities)
   Professor Hsi-Sheng CH'I (Social Science)

(f) Director of the Research Centre
   Professor Jay-Chung CHEN
STANDING COMMITTEES OF SENATE

Academic Services Co-ordinating Committee

Terms of Reference

1. To advise and make recommendations to the Senate on policies relating to the provision of University academic services, and to monitor and review the overall operation and effectiveness of such services.

2. To submit to the Chairman of Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

Powers

1. To co-opt such additional voting members as may be required but not exceeding one-third of formal committee membership.

2. To form any working groups as considered necessary.

Membership

Chairman

Appointed by Chairman of Senate

Dr Henry LIU

Members

(a) Chairman of Library Committee of Senate

Professor Hsi-Sheng CH'I

(b) Chairman of Computing Policy Committee of Senate

Professor Vincent SHEN

(c) Chairman of Advisory Committee of Educational Technology Centre

Miss Anna YU

(d) Chairman of Advisory Committee of Office of Laboratory Services

Dr Raymond S.C. WONG

(e) Chairman of Committee on Student Affairs of Senate

Professor Peter CHEUNG

Term

Two years, renewable coinciding with renewal of chairmanship of the respective committees.


**Standing Committees of Senate**

**Agenda/Rules Committee**

**Terms of Reference**

1. To be responsible for arranging the Agenda for each meeting of Senate including:
   
   (a) review of all items submitted by Senate Members and the draft Agenda prepared by the Secretary;
   
   (b) selection of items for consideration and debate to be placed in Section B of the Agenda; and
   
   (c) advice on procedures to follow in the order and conduct of Senate business.

2. To submit to the Chairman of Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

**Membership**

Chairman

Senate Chairman, ex-officio
Professor Chia-Wei WOO

Member and Secretary

Senate Secretary, ex-officio
Mr George SCOTT

Members

(a) Senate Parliamentarian
   Professor Peter DOBSON

(b) One Senate Member elected by Senate
   Professor Din-Yu HSIEH

Term

Two years, renewable

**Computing Policy Committee**

**Terms of Reference**

1. To advise and make recommendations to the Senate on all matters concerning the provision and use of computing and telecommunication services in the University, and to monitor and review the overall operation and effectiveness of such services including, but not limited to:

   (a) formulation of development plans for computing and telecommunication systems;
   
   (b) resource allocation and sharing of computing and telecommunication services;
   
   (c) policies and operating procedures for the Centre of Computing Services and Telecommunications (CCST);
   
   (d) liaison with any external advisory board that may be appointed for CCST;
   
   (e) other matters as may be required by the Senate.

2. To submit to the Chairman of the Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

**Powers**

1. To co-opt such additional voting members as may be required but not exceeding one-third of formal committee membership.

2. To form any working group as considered necessary.

**Membership**

Chairman

Appointed by Chairman of the Senate
Professor Vincent SHEN

Members

(a) Director of CCST, ex-officio
   Dr W. Max IVEY

(b) Two representatives from each School, one to be nominated by the Dean and one to be selected by the School Board
Standing Committees of Senate

Nominated by Dean
Dr Thomas JEFFERSON - School of Business & Management
Professor Nelson CUE - School of Science
Professor Vincent SHEN - School of Engineering
Dr Edward TU - School of Humanities & Social Science

Selected by School Board
Mr Hong-Leung LAM - School of Business & Management
Dr Yue-Kuen KWOK - School of Science
Dr Philip CHAN - School of Engineering
Dr Chi-Cheung CHOI - School of Humanities & Social Science

(c) One representative each from the Administration and Business Branch and the Research and Development Branch respectively, to be nominated by the Pro-Vice-Chancellor concerned

Mr Norman NGAI - Administration & Business Branch
Dr Ming FANG - Research & Development Branch

(d) Two students, one postgraduate and one undergraduate, to be selected by the student body

Term
Two years, renewable
One year renewable for student members

Library Committee

Terms of Reference

1. To advise the Senate on matters concerning the provision and use of library services in the University, and to review the effectiveness of such services including, but not limited to:

(a) evaluation of needs of the library, and

(b) liaison among academic staff, students, and the library;

(c) other matters as may be required by the Senate.

2. To submit to the Chairman of the Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

Powers

1. To co-opt such additional voting members as may be required but not exceeding one-third of formal committee membership.

2. To form any working group as considered necessary.

Membership

Chairman
Appointed by Chairman of the Senate
Professor Hsi-Sheng CH'I

(a) Director of Library, ex-officio
Mrs Min-Min CHANG

(b) Two representatives from each School, one to be nominated by the Dean and one to be selected by the School Board

Nominated by the Dean
Dr Andrew CARVERHILL - School of Business & Management
Professor Chung-Chun YANG - School of Science
Professor C. K. SHEN - School of Engineering
Dr Yimin LIN - School of Humanities & Social Science

Selected by School Board
Dr Chi-Wa YUEN - School of Business & Management
Dr Robert HOLDEFER - School of Science
Dr Scott DEERWESTER - School of Engineering
Dr Chi-Cheung CHOI - School of Humanities & Social Science

(c) Two students, one postgraduate and one undergraduate, to be selected by the student body

Term
Two years, renewable
One year renewable for student members
Committee on Postgraduate Studies

Terms of Reference

1. To advise and make recommendations to the Senate on policies and regulations, and to monitor and review procedures, quality and performance relating to postgraduate studies, including, but not limited to:
   (a) general programme requirements;
   (b) programme development including new programmes recommended by School Boards;
   (c) programme quality control, including examinations and award of degrees;
   (d) matters from the School Boards relating to postgraduate studies and student appeals;
   (e) selection and admission of postgraduate students;
   (f) collection and maintenance of student records;
   (g) student fees and financial assistance; and
   (h) other matters as may be required by the Senate.

2. To submit to the Chairman of Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

Powers

1. To co-opt such additional voting members as may be required but not exceeding one-third of formal Committee membership.

2. To form any working groups as considered necessary.

Membership

Chairman
Appointed by Chairman of the Senate
Professor W. H. HUI

Research Committee

Terms of Reference

1. To develop and present to the Senate policy recommendations that:
   (a) deal with the initiation, conduct, administration, and evaluation of research activities both basic and applied throughout the university including technical assistance to government and industry and the transfer of technology to humanitarian and commercial applications;
   (b) deal with the involvement of students and staff in research and service activities including consultancies and extra compensation, release from teaching duties, intellectual property rights, proprietary control, allocation and distribution of indirect costs, programmes for internal and external funds, publication standards, and other considerations for the enhancement of human resources and their effective benefit and support from research and service functions; and
   (c) other matters as may be required by the Senate.

Member and Secretary
Associate Pro-Vice-Chancellor for Academic Affairs (Programmes), ex-officio
Professor Donald GEORGE

Members
(a) Deans of Schools or designates
   Dr Leonard K. CHENG - School of Business & Management
   Professor Fred LOCHOVSKY - School of Engineering
   Professor Hsi-Sheng CH'I - School of Humanities & Social Science
   Professor George WONG - School of Science

(b) One representative to be selected by each School Board
   Dr Francis LUI - School of Business & Management
   Professor Pin TONG - School of Engineering
   Professor Edward CHIEN - School of Humanities & Social Science
   Dr Kwong-Kee WAN - School of Science

(c) The Director of Admissions, Registration and Records, ex-officio
   Mr Fred CASTRO

Term
Two years, renewable
Standing Committees of Senate

2. To submit to the Chairman of Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

Powers

1. To co-opt such additional voting members as may be required but not exceeding one-third of formal Committee membership.

2. To form any working groups as considered necessary.

Membership

Chairman
Appointed by Chairman of the Senate
Professor Fred LOCHOVSKY

Member and Secretary
Pro-Vice-Chancellor for Research & Development, ex-officio
Professor Thomas STELSON

Members
(a) Director of Research Centre, ex-officio
Professor Jay-Chung CHEN

(b) A Dean of a School elected by the Deans
Professor H. K. CHANG

(c) Three Department Heads from different Schools, excluding the School from which the Dean has been elected by the Department Heads
Professor Nai-Fu CHEN - School of Business & Management
Professor Hong HSU - School of Humanities & Social Science
Professor Nai-Teng YU - School of Science

(d) Four members of the Senate who are not Deans or Department Heads, one representative to be selected by each School Board
Dr Danny WONG - School of Business & Management
Professor Fred LOCHOVSKY - School of Engineering
Dr Edward TU - School of Humanities & Social Science
Dr Kwong-Kee WAN - School of Science

Term
Two years, renewable

Scholarship Committee

Terms of Reference

1. To advise and make recommendations to the Senate on all matters concerning the administration of scholarships, prizes and other funds that are awarded mainly on academic merit in the University, but not to scholarships, prizes and other funds designated for award by specific Schools or Departments. Such advice and recommendations should include but not be limited to:

(a) the formulation of policies and guidelines for the award of scholarships and prizes administered by the University; and

(b) other matters as may be required by the Senate.

2. To establish procedures and methods in the selection of recipients for awards.

3. To select recipients of awards.

4. To submit to the Chairman of the Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

Powers

1. To co-opt such additional voting members as may be required but not exceeding one-third of formal committee membership.

2. To form any working groups as considered necessary.

Membership

Chairman
Appointed by Chairman of Senate from among the members who are also Senate Members.
Professor Chung-Chun YANG

Member and Secretary
Appointed by Director of Student Affairs from among the Student Affairs Office staff.
Mr Siu-Ming LEE

Members
(a) Pro-Vice-Chancellor for Academic Affairs or designate
Dr Henry LIU
Standing Committees of Senate

(b) One representative from each School, to be selected by the School Boards.

Professor Yuk-Shee CHAN - School of Business & Management
Dr Philip CHAN - School of Engineering
Professor Hsi-Sheng Ch'l - School of Humanities & Social Science
Professor Chung-Chun YANG - School of Science

* Resource Persons
(a) Director of Admissions, Registration and Records
Mr Fred CASTRO

(b) Director of Student Affairs
Mr Luke WONG

(c) Director of Public Affairs
Dr Priscilla CHUNG

* Resource persons are not members of the committee.

Committee on Student Affairs

Terms of Reference
1. To advise and make recommendations to the Senate on policies relating to student affairs.
2. To consider at the request of the Senate policy issues relating to student affairs.
3. To submit to the Chairman of Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

Powers
1. To co-opt such additional voting members as may be required but not exceeding one-third of formal committee membership.
2. To form any working groups as considered necessary.

Standing Committees of Senate

Membership
Chairman
Appointed by Chairman of the Senate
Professor Peter CHEUNG

Member and Secretary
Director of Student Affairs, ex-officio
Mr Luke WONG

Members
(a) One representative from each School, to be selected by the School Boards
Dr Li Jing ZHU - School of Business & Management
Dr Kin-Man LEE - School of Engineering
Dr Xiao-Yuan LI - School of Science
Dr David LAWRENCE - School of Humanities & Social Science

(b) One Dean and one Department Head, to be appointed jointly by the Pro-Vice-Chancellor for Academic Affairs and the Pro-Vice-Chancellor for Administration and Business
Professor Yuk-Shee CHAN - Dean
Professor Peter CHEUNG - Department Head

(c) Two students, one postgraduate and one undergraduate, to be selected by the student body

Term
Two years, renewable
One year, renewable for student members

Committee on Undergraduate Studies

Terms of Reference
1. To advise and make recommendations to the Senate on policies and regulations, and to monitor and review procedures, quality and performance relating to undergraduate studies, including, but not limited to:
   (a) general programme requirements;
   (b) programme development including new programmes recommended by School Boards;
   (c) programme quality control, including examinations and award of degrees;
   (d) matters from the School Boards relating to undergraduate studies and student appeals;
Standing Committees of Senate

(e) selection and admission of undergraduate students;

(f) collection and maintenance of student records;

(g) student fees and financial assistance; and

(h) other matters as may be required by the Senate.

2. To submit to the Chairman of Senate no later than the 31st of July each year a written report covering the period 1 July - 30 June on the activities of the committee during the previous academic year.

Powers

1. To co-opt such additional voting members as may be required but not exceeding one-third of formal Committee membership.

2. To form any working groups as considered necessary.

Membership

Chairman
Appointed by Chairman of the Senate
Dr Danny WONG

Member and Secretary
Associate Pro-Vice-Chancellor for Academic Affairs (Programmes), ex-officio
Professor Donald GEORGE

Members

(a) Two representatives each from the Schools of Science, Engineering, and Business and Management: one to be nominated by the Dean and one to be selected by the School Board

Nominated by the Dean
Dr David Kwai-Che TSE - School of Business & Management
Professor Fred LOCHOVSKY - School of Engineering
Dr Terence S.M. WAN - School of Science

Selected by the School Board
Dr Danny WONG - School of Business & Management
Dr Neil MICKLEBOROUGH - School of Engineering
Dr Raymond S.C. WONG - School of Science

(b) One representative from the School of Humanities and Social Science, to be selected by the School Board
Professor Hsi-Sheng CH'I

(c) The Director of Admissions, Registration and Records, ex-officio
Mr Fred E. CASTRO

Term
Two years, renewable
ADVISORY COMMITTEES

President's Advisory Board

OVERSEAS

Dr Morris Chang (張思謀博士)
Chairman, Industrial Technology Research Institute
Chairman, Taiwan Semiconductor Manufacturing Corporation
Chairman, Wyse Technology Inc
Taiwan

Professor Paolo Maria Fasella
Director-General of the Directorate-General for Science, Research and Development, and of the Joint Research Centre, Commission of the European Communities
Europe

Dr K. T. Li (李國鼎博士)
Senior Advisor to the President
Taiwan

Dr Walter E. Massey
Senior Vice President and Provost, University of California
(immediate past Director, U.S. National Science Foundation)
USA

Professor Chang-Lin Tien (田長霖教授)
Chancellor, University of California, Berkeley
USA

Lord Tombs of Brailes
Chancellor, University of Strathclyde
Member, Committee on Science and Technology in the House of Lords
Director, Shell UK Limited
Director, N. M. Rothschild & Sons, Limited
UK

Professor Zhou Guangzhao (周光召教授)
President, Chinese Academy of Sciences
PRC

LOCAL

Mr Hisao Imai
Director and Area General Manager for Hong Kong, Bank of Tokyo, Limited
President, Hong Kong Japanese Club
Hong Kong

The Honourable Allen Lee Peng-Fei, OBE, JP (李鵬飛議員)
President, Meadville Limited
Member of the Legislative Council
Hong Kong

Dr Helmut Sohmen, OBE
Chairman, World-Wide Shipping Agency Limited
Council Chairman, Hong Kong Academy of Performing Arts
Hong Kong

School of Science Advisory Committee

Professor David J. Benney
Department of Mathematics
Massachusetts Institute of Technology
USA

Professor Sunney I. Chan, Academia Sinica (陳長謙教授)
Department of Chemistry
California Institute of Technology
USA

Professor Edward C. D. Cocking, FRS
Department of Life Science
University of Nottingham
UK

Professor Julian E. Davies
Department of Microbiology
The University of British Columbia
Canada

Professor Murray Goodman
Department of Chemistry
University of California, San Diego
USA

Professor Bruce D. McCombe
Department of Physics and Astronomy
State University of New York, Buffalo
USA

Professor Yuen-Ron Shen, Academia Sinica (沈元壤教授)
Department of Physics
University of California, Berkeley
USA
Advisory Committees

Professor Yum-Tong Siu (蕭蔭棠教授)
Department of Mathematics
Harvard University
USA

Professor James C. Wang, Academia Sinica, NAS (王傳教授)
Department of Biochemistry and Molecular Biology
Harvard University
USA

Professor Shang-Fa Yang, Wolfe Prize, NAS (楊群發教授)
Mann Laboratory
University of California, Davis
USA

School of Engineering Advisory Committee

Sir Eric A. Ash, CBE, FRS
University College
London University
U.K.

Dr Raymond Ho (何鍾泰博士)
Chairman
Crow Maunsell Management Consultants Ltd.
H.K.

Professor John Hopcroft
Department of Computer Science
Cornell University
U.S.A.

Professor Paul C. Jennings, NAE
Vice President & Provost
California Institute of Technology
U.S.A.

Professor Ernest S. Kuh, Academia Sinica, NAE (葛守仁教授)
Electronics Research Laboratory
University of California, Berkeley
U.S.A.

Dr York Liao (廖的克博士)
Executive Director
Varitronix Ltd.
H.K.

Advisory Committees

Professor Karl S. Pister, NAE
Chancellor
University of California, Santa Cruz
U.S.A.

Dr Stuart Reed
Director of Environmental Protection
Department of Environmental Protection
H.K. Government

Dr Casper Shih (石滋宜博士)
President
China Productivity Centre
Taipei, R.O.C.

Professor Henry T. Yang, NAE (楊祖祐教授)
Dean
School of Engineering
Purdue University
U.S.A.

School of Business and Management Advisory Committee

Professor George Bain
Principal
London Business School
U.K.

Professor John Gould
Dean, Graduate School of Business
University of Chicago
U.S.A.

Mr. William Laidlaw, Jr
Executive Vice President
American Assembly of Collegiate Schools of Business
U.S.A.

Professor William Pierskalla
Ronald A. Rosenfeld Professor
The Wharton School
University of Pennsylvania
U.S.A.

Professor Dennis Weidenaar
Dean, School of Management & Krannert Graduate School of Management
Purdue University
U.S.A.
Advisory Committees

School of Humanities and Social Science Advisory Committee

Sir Christopher Ball
Formerly Master
Keble College
University of Oxford
UK

Professor Robert Bennett
Head
Department of Geography
London School of Economics and Political Science
UK

Professor Hao Chang (張海教授)
Director, East Asia Studies
Department of History
Ohio State University
USA

Professor Albert Feuerwerker
Department of History
University of Michigan, Ann Arbor
USA

Professor Ambrose King (金耀基教授)
Pro-Vice-Chancellor
Chinese University of Hong Kong
Hong Kong

Professor Leo Ou-Fan Lee (李歐梵教授)
Department of East Asian Language and Cultures
University of California, Los Angeles
USA

Professor Shu-Hsien Liu (劉述先教授)
Chairman
Department of Philosophy
Chinese University of Hong Kong
Hong Kong

Professor Willem Vanderberg
Director
Centre for Technology and Social Development
Faculty of Applied Science and Engineering
University of Toronto
Canada

Advisory Committees

Professor Ezra F. Vogel
Committee on the A.B. Degree in East Asian Studies
Harvard University
USA
STAFF LIST

UNIVERSITY ADMINISTRATION

Vice-Chancellor's Office

Vice-Chancellor and President:
Chia-Wei WOO (吳家維), BS Georgetown Coll; MA, PhD Washington Univ
(Professor of Physics)

Executive Assistant to Vice-Chancellor and President:
Loretta S.M. PANG (Ms) (彭恩梅), BA Geneva; MEdAdmin New England

Office of the Pro-Vice-Chancellor for Academic Affairs

Pro-Vice-Chancellor for Academic Affairs:
Shain-Dow KUNG ( 孔憲鍾), BSc Chung-Hsing; MSc Guelph; PhD Toronto
(Professor of Biology)

Associate Pro-Vice-Chancellors for Academic Affairs:
Donald A. GEORGE (張顯群), BEng McGill; MS Stanford; ScD Massachusetts Inst of Tech
(Professor of Electrical and Electronic Engineering)
Henry H.T. LIU (劉信德), BA Univ of California, Berkeley; MA, PhD Univ of California, Davis; MPA Golden Gate

Executive Assistant to Pro-Vice-Chancellor for Academic Affairs:
Vincent K.C. CHEUNG (張啓祥), MA Exeter; DipTEO Leeds; AdvDipEd Hong Kong

Assistant Secretaries:
Yvonne Y.Y. LEUNG HO (Mrs) (梁何婉若), BSocSc Chinese Univ of Hong Kong
Christina W.F. LI (Miss) (李唯芳), BSocSc Hong Kong, MSc Hong Kong Polytech

Office of the Pro-Vice-Chancellor for Administration and Business

Pro-Vice-Chancellor for Administration and Business:
Ian F.C. MACPHERSON (麥法誠), CBE; MA Oxford

Assistant Secretary:
Selby B. SCALBERG (Ms), BA Univ of California, Los Angeles

Office of the Pro-Vice-Chancellor for Research and Development

Pro-Vice-Chancellor for Research and Development:
Thomas E. STELSON (施德信), BS, MS, DSc Carnegie Inst of Tech
(Professor of Civil Engineering)

Senior Assistant Secretary:
Simon K.H. MAK (兼桂恒), C.Text.ATI, PGDip, PhD Leeds

Research Centre

Director:
Jay-Chung CHEN (陳介中), BS Cheng Kung; MS, PhD California Inst of Tech
(Professor of Mechanical Engineering)

Associate Director of Research Centre:
Yuk-Shan WONG (黃玉山), BA Concordia; MSc, PhD McGill

Principal Research Engineer:
Leon Ru-Liang WANG (王汝樑), BSCE Cheng Kung; MSCE Univ of Illinois, Urbana-Champaign; ScD Massachusetts Inst of Tech

Visiting Professor:
Gary W. HEINKE, BASc, MASc Toronto; PhD McMaster
(Professor of Civil Engineering)

Technical Programme Manager:
Ming FANG (方明), BS, PhD Univ of Illinois, Urbana-Champaign; MS Pennsylvania State

Engineer:
MA Jianxin (馬建新), BSc, MEng East-China Univ of Chem. Tech.; Dr-Ing Technische Universität Clausthal

Office of Contract and Grant Administration

Interim Director:
Thomas E. STELSON (施德信), BS, MS, DSc Carnegie Inst of Tech
(Pro-Vice-Chancellor for Research & Development, and Professor of Civil Engineering)

Contract Administrator:
LIM Lie Ting (Ms) (林麗貞), BA, BSW McMaster; MSc Oxford

(Information as at 1 July, 1993)
Office of Planning and Co-ordination

Director:
Peter N. DOBSON, Jr (杜家磊), BS Massachusetts Inst of Tech; PhD Maryland
(Professor of Physics)

Senior Assistant Secretary:
George E. DELEHANTY (狄恒定), BBA Minnesota; PhD Massachusetts Inst of Tech

Administrative Assistant:
Agnes CHEUNG (張燕萍), Dip Inst of Linguists

Office of Internal Audit:

Internal Auditor:
Peter Kwok Chung CHOW (周國松), MSc Aston; FCCA, AHKSA, CPA(Aust)

SCHOOLS AND ACADEMIC DEPARTMENTS

School of Science

DEAN’S OFFICE

Dean:
Leroy L. CHANG (張立鋼), BSc National Taiwan; MSc Univ. of South Carolina;
PhD Stanford
(Professor of Physics)

Assistant Secretary:
Adeline H.Y. MAN (文皓英), BSc California State Univ, Los Angeles

DEPARTMENT OF BIOCHEMISTRY

(Head: Professor J. Tze-Fei WONG)

Professors:
Tian-Yow TSONG (鄭天佑), MSc, PhD Yale
(Director of Biotechnology Research Institute)
J. Tze-Fei WONG (王子煥), BA, PhD Toronto

Senior Lecturers:
James A. HACKETT (郝德志), BSc, PhD Dublin; PhD Australian National
Raymond S.C. WONG (王仕中), Dip Hong Kong Baptist Coll; MSc, PhD South Dakota State

Lecturers:
Robert CHEN (陳惠民), BSc National Taiwan Normal; DSc Univ of Texas, Arlington
King-Chuen CHOW (周敬泉), BSc, MPhil Chinese Univ of Hong Kong; PhD Toronto
Xiao-Ming GAO (高曉明), BA, BM Beijing Medical Univ; PhD Council for National Academic Awards, UK
Yi-Fan HAN (韓佩怡), BS Shanghai First Medical Coll; MS Peking Union Medical Coll; PhD Medical Coll of Ohio
Robert K.M. KO (高錦明), BSc, MPhil Chinese Univ of Hong Kong; PhD British Columbia
Peter H.Y. LAM (林永仁), BSc Chinese Univ of Hong Kong; PhD Univ of Wisconsin, Madison
Wan-keung R. WONG (黃允強), Dip Hong Kong Baptist Coll; MSc Regina; PhD British Columbia

DEPARTMENT OF BIOLOGY

(Head: Professor Madeline C.S. WU)

Professors:
Donald C. CHANG (張東才), BSc National Taiwan; MA, PhD Rice
Fu-Shiang CHIA (齊學相), BSc National Taiwan; MS, PhD Univ of Washington
Shain-dow KUNG (況南曦), BSc Chung-Hsing; MSc Guelph; PhD Toronto
(Pro-Vice-Chancellor for Academic Affairs)
Madeline C.S. WU (呉汪樹文), BSc National Taiwan; PhD Univ of Texas, Austin

Senior Lecturers:
Maria Li LUNG (龍李梅瑞), BSc Cornell; PhD British Columbia
I-Hsun NI (倪怡訓), BSc, MSc National Taiwan; PhD British Columbia

Lecturers:
Robert N. HOLDEFER, BA Drake; MA, PhD Southern Illinois
Nancy Y.Y. IP (葉玉如), BS Simmons Coll; PhD Harvard
Mun-Fai LEUNG (梁文輝), BSc Northeastern; PhD Boston
Peiyuan QIAN (錢佩元), BSc Qingdao Univ of Oceanology; MSc Xiamen; PhD Alberta
Karl Wah-Keung TSIM (唐華強), BSc, MPhil Chinese Univ Hong Kong; PhD Cambridge
Kwong-Kee WAN (尹廣麒), BSc, MSc Toronto; PhD Queen’s Univ, Kingston
Yung-Hou WONG (溫厚粵), BSc London; MPhil, PhD Cambridge

Affiliated:
Yuk-Shan WONG (黃玉山), BA Concordia; MSc, PhD McGill

Visiting Assistant Lecturer:
Yue-Ying REN (任躍英), BMedSc Nanking Medical Coll; MSc, PhD Univ of California, Los Angeles.
Visiting Reader:
Pu K. CHAN (陳沛光), BS, MPhil Chinese Univ of Hong Kong; PhD Toronto

Visiting Scholars:
Mette T. SKAANILD, MSc Copenhagen; PhD Roskilde
Chaoyang ZHAI (崔朝陽), PGDip Beijing Union Medical Coll

DEPARTMENT OF CHEMISTRY
(Head: Professor Nai-Teng YU)

Professors:
Hiroyuki HIRAOKA (平岡弘之), BA, MS, PhD Kyoto; MBA, Golden Gate
Nai-Teng YU (尤乃亭), BS National Taiwan; MS New Mexico Highlands; PhD Massachusetts Inst of Tech

Visiting Professor:
Leon H. ZALKOW, BS, MS, PhD Georgia Inst of Tech

Readers:
Albert S. C. CHAN (陳新滋), AB International Christian; PhD Chicago
Richard HAYNES (麥東治), BS, PhD Western Australia

Lecturers:
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444
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A
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Department of Computer Science
129, 137, 447

ALTAMAN, Michael S.
Department of Physics
93, 104, 444

ARAI, Michael S.
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230, 222, 456

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458

AU, Grace
Department of Business Information Systems
168, 206, 451

AU, Oscar C.
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143, 149, 448

AU, Peter H.K.
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458

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Department of Computer Science
129, 137, 447

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92, 103, 391, 444, 464

BASAK, Gopal K.
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70, 86, 443

BELITZ, Joel
Department of Finance
170, 211, 453

BOEHNIKER, Donald M.
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385, 459

BUCHANAN, James P., Jr.
Division of Humanities
220, 223, 456

BUCHWALD, Aamn W.
Department of Electrical and Electronic Engineering
143, 150, 448

BUCKMASTER, John D.
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70, 85, 443

Bui, Tung X.
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168, 206, 451

C
CAI, Jun
Department of Finance
170, 211, 453

CAPLAN, Victoria F.
Library
463

CARLIER, Paul R.
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61, 66, 442

CARMICHAEL, Sarah
Language Centre
385, 462

CARMICHAEL, Michael
Department of Finance
170, 211, 423, 453

CASTRO, Angela S.
Educational Technology Centre
453

CASTRO, Fredelico E.
Admissions, Registration and Records Office
425, 428, 431, 457

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Office of Dean of Humanities and Social Science
218, 225, 227, 416, 417, 419, 423, 425, 428, 430, 455, 457

CHEN, Chih-Chen
Department of Mechanical Engineering
158, 165, 449

CHENG, Brian Fung-sang
Department of Mechanical Engineering
158, 164, 388, 417, 426, 439, 449

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382, 418, 423, 456

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115, 123, 446

CHEN, Min-min
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128, 136, 447

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Department of Mathematics
70, 86, 443

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129, 138, 447

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168, 206, 451

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Centre of Computing Services and Telecommunications
458

CHE, Chun-Tao
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61, 66, 442

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70, 86, 443

CHEN, Hong
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171, 212, 454

CHEN, Jay-Chung
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158, 164, 388, 417, 426, 439, 449

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Division of Humanities
220, 223, 456

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CHEN, Ting
Department of Physics
93, 104, 444

CHENG, Brian Fung-sang
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383, 442

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219, 223, 456

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465

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Department of Economics
169, 208, 452

CHEN, Ngai-Hang
Department of Mathematics
70, 85, 443

CHEN, Philip C.H.
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143, 149, 422, 428, 448
<table>
<thead>
<tr>
<th>Staff Index</th>
<th>Staff Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>KWAN, Joseph K.</td>
<td>LEUNG, Jonathan Hon-yan</td>
</tr>
<tr>
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</tr>
<tr>
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<td>LEUNG, Mun-Fai</td>
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</tr>
<tr>
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<td>Kwun Tong Library</td>
</tr>
<tr>
<td>LAM, Hong-lung</td>
<td>Library</td>
</tr>
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<td>Office of Pro-Vice-Chancellor for Academic Affairs</td>
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</tr>
<tr>
<td>LAM, Kiel</td>
<td>Li, Chun-luen</td>
</tr>
<tr>
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<td>Estates Management Office</td>
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<tr>
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<td>Li, Clara K.L.</td>
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<tr>
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<td>Language Centre</td>
</tr>
<tr>
<td>LAM, Peter H.Y.</td>
<td>Li, Edward Siu-leung</td>
</tr>
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<tr>
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<td>Estates Management Office</td>
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<tr>
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<tr>
<td>LAW, Shing Keung</td>
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<tr>
<td>LAWRENCE, David P.</td>
<td>Department of Electrical and Electronic Engineering</td>
</tr>
<tr>
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<td>Library</td>
</tr>
<tr>
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<td>Leung, Carol</td>
</tr>
<tr>
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<tr>
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<td>Office of Social Science</td>
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<td>Office of Student Affairs</td>
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<tr>
<td>LEUNG, Eva S.K.</td>
<td>Office of Student Affairs</td>
</tr>
</tbody>
</table>

472

473
<table>
<thead>
<tr>
<th>Staff Index</th>
<th>Staff Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOMAS, George E.</td>
<td>Estates Management Office</td>
</tr>
<tr>
<td>LOY, Michael M.</td>
<td>Department of Physics</td>
</tr>
<tr>
<td>LU, Lewis X.</td>
<td>Department of Finance</td>
</tr>
<tr>
<td>LUI, Francis T.</td>
<td>Department of Economics</td>
</tr>
<tr>
<td>LUI, Shiu-Hong</td>
<td>Department of Mathematics</td>
</tr>
<tr>
<td>LUK, Robert K.H.</td>
<td>Centre of Computing Services and Telecommunications</td>
</tr>
<tr>
<td>LUNCE, Carol S.</td>
<td>Library</td>
</tr>
<tr>
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<td>Library</td>
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<tr>
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<tr>
<td>LUNG, Maria</td>
<td>Department of Biology</td>
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<td>Department of Business Information Systems</td>
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<td>MA, Jinxin</td>
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<td>MAK, Brenda</td>
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<td>MAN, Adeline H.Y.</td>
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<td>MAO, Jian-Min</td>
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<td>MCAINSIS, Duncan A.</td>
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<td>MENG, Guo-Wu</td>
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<td>MI, Yongli</td>
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<td>MURCH, Ross David</td>
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<td>N</td>
<td>NAZARI, Amin</td>
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<td>NG, Irene Wai yee</td>
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<tr>
<td></td>
<td>NG, Shu Ming</td>
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<td>NG, Tai-Kai</td>
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<td>NI, Hsuan</td>
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<td>NOWAK-SOLINSKI, W. Andrew</td>
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<td>OU-YANG, Hui</td>
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<td>PANG, Joseph K.O.</td>
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<td>PNG, Ivan P.</td>
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<td>POON, Vincent M.C.</td>
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<td>Q</td>
<td>QI, Yuan-Wei</td>
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<td>QIAN, Peiyuan</td>
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<td>QIU, Lany Dongya</td>
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<tr>
<td>R</td>
<td>RAMAKRISHNA, Seshan</td>
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<td>REN, Yue Ying</td>
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<td>SHEIK, Kin-shing</td>
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<td>SHEN, C.K.</td>
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<tr>
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<td>SHEN, Helen C.</td>
</tr>
</tbody>
</table>
SHEN, Vincent Y.S.  
Department of Computer Science  
128, 136, 392, 417, 419, 421, 422, 447

SHERMAN, Ann Guenther  
Department of Finance  
170, 211, 453

SHI, Guangyu  
Department of Civil and Structural Engineering  
116, 159, 166, 446, 450

SHEH, Irene L.Y.  
Library  
463

SHIN, Jiyoung  
Department of Finance  
170, 211, 453

SHUM, Chung Dak  
Department of Computer Science  
129, 141, 448

SIN, Johnny K.O.  
Department of Electrical and Electronic Engineering  
143, 150, 449

SIU, Sunny K.B.  
Centre of Computing Services and Telecommunications  
459

SKAANILDI, Mette T.  
Department of Biology  
50, 442

SMALLWOOD, Ian Martin  
Language Centre  
384, 462

SMITH, Lawrence R.  
Division of Humanities  
219, 456

SOU, Philip Lam-Koong  
Department of Physics  
93, 105, 444

SPODICK, Edward F.  
Library  
463

STELSON, Thomas E.  
Office of Pro-Vice-Chancellor for Research and Development  
115, 123, 389, 416, 417, 426, 439, 446

STIBER, Michael D.  
Department of Computer Science  
129, 141, 448

SUN, Zehua  
Library  
463

SWEARENGEN, Peter M.  
Estate Management Office  
460

SZETO, Kwok-Yip  
Department of Physics  
93, 105, 444

T

TAM, Kar Yan  
Department of Business Information Systems  
168, 206, 418, 451

TAM, Kew Kui  
Department of Physics  
93, 105, 445

TAM, Wing Yin  
Department of Physics  
93, 105, 445

TANG, Danny H.W.  
Centre of Computing Services and Telecommunications  
458

TANG, De-joan  
Division of Social Science  
225, 226, 457

TANG, Michael W.C.  
Centre of Computing Services and Telecommunications  
458

TANG, Tai-Man  
Department of Mathematics  
70, 86, 443

TAO, Zhigang  
Department of Economics  
169, 209, 452

TAY, William  
Division of Humanities  
219, 223, 456

TAYLOR, Grant Allan  
Department of Economics  
169, 209, 452

THOMAS, Gareth  
Department of Mechanical Engineering  
158, 164, 390, 418, 448, 465

TITMAN, Sheldon  
Department of Finance  
170, 210, 418, 453

TO, Wai Ming  
Department of Mechanical Engineering  
158, 165, 449

TONG, Anthony Kin-kwok  
Language Centre  
384, 462

TONG, Charles H.  
Department of Mathematics  
70, 89, 444

TONG, Keith Sai-tao  
Language Centre  
383, 462

TONG, Pin  
Department of Mechanical Engineering  
158, 164, 425, 449

TONG, Wilson H.S.  
Department of Finance  
170, 211, 453

TROGEL, Philip A.  
Department of Economics  
169, 209, 452

TSANG, Andrew K.C.  
Centre of Computing Services and Telecommunications  
458

TSANG, Danny H.K.  
Department of Electrical and Electronic Engineering  
143, 151, 449

TSE, David Kwai-Che  
Department of Marketing  
172, 214, 430, 455

TSIM, Karl Wah-Kuang  
Department of Biology  
46, 56, 441

TSOI, Anthius Hau-Man  
Department of Mathematics  
70, 88, 444

TSONG, Tian-Yow  
Department of Biochemistry  
41, 46, 390, 440

TSU, Anne S.  
Department of Management  
171, 212, 454

TU, Edward Jow-ching  
Division of Social Science  
225, 227, 418, 422, 426, 457

TUNG, William C.H.  
Centre of Computing Services and Telecommunications  
458

W

WAN, Kwong-Koe  
Department of Biology  
46, 56, 418, 425, 426, 441

WAN, Terence S.M.  
Department of Chemistry  
61, 66, 430, 442

WANG, Ching-Hsien  
Division of Humanities  
219, 223, 456

WANG, Ka-wen  
Division of Humanities  
220, 224, 456

WANG, Leon Ru-Liung  
Department of Civil and Structural Engineering  
116, 123, 439, 446

WANG, Susheng  
Department of Mathematics  
70, 88, 444

WAREHAM, David G.  
Department of Civil and Structural Engineering  
116, 125, 446

WASSINK, Donald B.  
Library  
463

WEI, John K.C.  
Department of Finance  
170, 210, 453

WEI, Qiuyuan  
Division of Humanities  
219, 456

WELCH, John C.  
Department of Mechanical Engineering  
159, 195, 450

WILLIAMS, Ian  
Department of Chemistry  
61, 66, 442

WOLF, Neal E.  
Laboratory Services  
461

WONG, AsaAnn K.Y.  
Library  
463

WONG, Danny S.N.  
Department of Accounting  
165, 205, 418, 426, 430, 450

WONG, Dorothy S.C.  
Department of Management  
171, 214, 454

WONG, Geoffroy M.Y.  
Technology Transfer Centre  
465

WONG, George K. L.  
Department of Physics  
93, 104, 425, 444

WONG, Grace Ho-Yee  
Language Centre  
384, 462

WONG, J. Tze-Fai  
Department of Biochemistry  
41, 46, 417, 440

WONG, James Sai-Wing  
Department of Mathematics  
69, 85, 443

WONG, Kam Sing  
Department of Physics  
93, 106, 445

WONG, Karl K.P.  
Department of Finance  
170, 211, 453

WONG, Luke Sai-kwong  
Student Affairs Office  
394, 418, 428, 429, 465

WONG, Man  
Department of Electrical and Electronic Engineering  
143, 151, 449
WONG, Man-Yu
Department of Mathematics
70, 88, 444

WONG, Michael Kwok-Yee
Department of Physics
41, 46, 119, 430, 440

WONG, Raymond S.C.
Department of Biochemistry
49

WONG, Steaven K.W.
Centre of Computing Services and Telecommunications
499

WONG, Wan-Houng R.
Department of Biochemistry
41, 48, 441

WONG, Wan-Yu
Library
463

WONG, Wing-Hung
Department of Mathematics
70, 85, 443

WONG, Winnie Su-shing
Educational Technology Centre
499

WONG, Winnie W.Y.
Office of Dean of Business and Management
450

WONG, Yuk-Shan
Research Centre
456, 56, 439, 441

WONG, Yung-Hou
Department of Biology
45, 56, 441

WOO, Chia-Wai
Vice-Chancellor’s Office
93, 104, 416, 417, 429, 438, 444

WU, Changqi
Department of Economics
169, 209, 452

WU, Dukai
Department of Computer Science
129, 141, 448

WU, Joe C.N.
Centre of Computing Services and Telecommunications
499

WU, Li-Xin
Department of Mathematics
70, 88, 444

WU, Madeline C.S.
Department of Biology
49, 54, 417, 441

WU, Woody Y.
Department of Accounting
168, 206, 451

WU, Yundong
Department of Chemistry
61, 65, 442

WUTHERICH, Beat
Department of Computer Science
129, 141, 448

X
XUANG, Bing
Department of Accounting
168, 206, 451

XIAO, Fang-Fu
Department of Physics
93, 106, 445

XIE, Dayang
Department of Economics
170, 209, 452

XU, Xiao-Ping
Department of Mathematics
70, 88, 444

Y
YAMADA, Takeashi
Department of Finance
170, 211, 453

YAN, Min
Department of Mathematics
70, 88, 444

YAN, Xiao
Department of Physics
93, 106, 445

YANG, Chung-Chun
Department of Mathematics
69, 85, 418, 423, 427, 428, 443

YANG, Shihe
Department of Chemistry
61, 66, 442

YANG, Zhi Yu
Department of Physics
93, 106, 445

YAU, Mark Sze-Fong
Department of Electrical and Electronic Engineering
143, 151, 449

YEH, Kung-chia
Division of Social Science
226, 457

YEH, Michelle
Division of Humanities
219, 223, 456

YEUNG, David W.
Centre of Computing Services and Telecommunications
459

YEUNG, Dit-Yan
Department of Computer Science
129, 141, 448

YIF, Chi Ying
Personnel Office
464

YIP, Stephen K.F.
Department of Physics
93, 106, 445

YOO, Kwong-Mow
Language Centre
384, 419, 462

YU, Anna Wai-yin
Department of Mathematics
70, 85, 443

YU, Kunru
Department of Chemistry
60, 65, 417, 426, 442

YUE, P.L.
Department of Chemical Engineering
108, 113, 417, 445

YUEN, Chi-Wa
Department of Economics
170, 209, 423, 452

YUEN, Matthew Ming-Fai
Department of Mechanical Engineering
158, 165, 449

YUEN, Pandora Man-hung Wan
Student Affairs Office
465

YUNG, Danny N.T.
Public Affairs Office
464

YUNG, Wayne K.W.
Centre of Computing Services and Telecommunications
459

Z
ZAKS, Shmuel
Department of Computer Science
128, 136, 447

ZALKOW, Leon H.
Department of Chemistry
60, 442

ZENG, Bing
Department of Electrical and Electronic Engineering
143, 151, 449

ZHAI, Huiying
Department of Biology
50, 442

ZHANG, Guochang
Department of Accounting
168, 256, 451

ZHANG, Tong-Yi
Department of Mechanical Engineering
158, 165, 449

ZHENG, Jia-Qi
Department of Economics
170, 210, 452

ZHELYASKOV, Valentin
Department of Chemistry
61, 442

ZHENG, Jia Qi
Materials Characterisation and Protection Centre
464

ZHOU, Jia Ying
Department of Economics
170, 210, 429, 452

ZOHAR, Yitshak
Department of Mechanical Engineering
158, 165, 450
### Subject Index

| J | Joint degree programmes 229 - 233 |
|   | BEng programme in Computing Engineering 229 - 231 |
|   | MA in Chinese Studies 233 |
|   | MSc in Biotechnology 231 - 233 |
|   | BTEC courses 222 - 231 |
|   | Curriculum 232 |

| L | Language Centre 363 - 384 |
|   | Undergraduate course descriptions 287 - 288 |
|   | Library 362 |

| M | Management Department 185 |
|   | BBA programme 185 - 190 |
|   | Faculty list 171 |
|   | Faculty research interests 212 - 214 |
|   | Postgraduate course descriptions 289 - 373 |
|   | Undergraduate course descriptions 296 - 299 |

|   | Marketing Department 190 |
|   | BBA programme 191 - 192 |
|   | Faculty list 172 |
|   | Faculty research interests 214 - 215 |
|   | Postgraduate course descriptions 256 - 254 |
|   | Undergraduate course descriptions 283 - 284 |

|   | Materials Characterization and Preparation Centre 291 |
|   | Mathematics Department 69 |
|   | BSc programme 71 - 81 |
|   | Faculty list 69 - 71 |
|   | Faculty research interests 84 - 89 |
|   | Postgraduate course descriptions 254 - 260 |
|   | Postgraduate programmes 81 - 94 |
|   | Undergraduate course descriptions 284 - 291 |
|   | MBA programme 35 |
|   | MBA programme – full time 193 |
|   | Admission 193 - 194 |
|   | Curriculum 194 - 199 |
|   | Fees 194 |

| P | MBA programme – part-time 199 |
|   | Curriculum 199 - 202 |
|   | Fees 202 |
|   | Format and schedule 202 |
|   | Mechanical Engineering Department 158 |
|   | BEng programme 159 - 161 |
|   | Faculty list 158 - 159 |
|   | Faculty research interests 163 - 166 |
|   | Postgraduate course descriptions 360 - 368 |
|   | Postgraduate programmes 161 - 164 |
|   | Undergraduate course descriptions 291 - 296 |

|   | Microelectronics Fabrication Centre 292 |
|   | MPhil programmes 35 - 36 |
|   | MSc and MA programmes 35 |

| O | Office of Contract and Grant Administration 389 - 390 |
|   | Ordinance 396 - 408 |
|   | Overseas students 15 - 16 |

| R | Research Centre 388 - 389 |

| S | Sanctions 26 - 27 |
|   | School Boards |
|   | Statutes 412 |
|   | School of Business and Management 167 |
|   | Executive Education Programme 204 - 205 |
|   | PhD programme 203 - 204 |
|   | School of Engineering 107 |
|   | School of Humanities and Social Science 218 |
|   | School of Science 40 |
|   | Senate |
|   | Membership 417 - 418 |
|   | Ordinance 404 |
|   | Standing Committees 419 |
|   | Statutes of Senate 409 - 411 |
|   | Sino Software Research Centre 392 - 393 |
|   | Staff list 438 - 465 |

|   | Standing Committee of Senate 419 - 431 |
|   | Academic Services Co-ordinating Committee 419 |
|   | Agenda/Rules Committee 420 |
|   | Committee on Postgraduate Studies 424 - 425 |
|   | Committee on Student Affairs 428 - 429 |
|   | Committee on Undergraduate Studies 429 - 431 |
|   | Computing Policy Committee 420 - 422 |
|   | Library Committee 422 - 423 |
|   | Research Committee 425 - 426 |
|   | Scholarship Committee 427 - 428 |
|   | Statutes 409 - 415 |
|   | Student Services 394 |
|   | Amenities 395 |
|   | Counselling Service 394 |
|   | Health Service 394 |
|   | Physical Education & Sports 394 |
|   | Residential Halls 394 - 395 |
|   | Student activities 395 |
|   | Student rights and obligations 27 |
|   | Supplementary examination 31 |

| T | Technology Transfer Centre 390 |

| U | Undergraduate admission requirements 401 |
|   | Advanced standing 12 |
|   | Department entrance requirements 12 |
|   | Entrance requirement equivalents 11 |
|   | General requirements 10 |
|   | Requirements for mature applications 12 |
|   | Undergraduate applications |
|   | Admission through JUPAS 12 |
|   | Direct admission 13 |

|   | Undergraduate programmes 5 - 4, 28 |
|   | University, The |
|   | Academic Faculty 2 |
|   | Campus 1 |
|   | Introduction 1 |
|   | Organisation 2 |
|   | Students 3 |
### Important Dates in the 1993-94 and 1994-95 Academic Years

#### Academic Year 1993-94

<table>
<thead>
<tr>
<th>Week</th>
<th>SMTW</th>
<th>Events</th>
<th>Public Holidays</th>
</tr>
</thead>
<tbody>
<tr>
<td>July, 1993</td>
<td>1 2 3</td>
<td>7-9 Programme Registration</td>
<td></td>
</tr>
<tr>
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<td>4 5 6 7 8 9 10</td>
<td>- continuing students</td>
<td>28 Sat preceding last Mon in Aug</td>
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<td>11 12 13 14 15 16 17</td>
<td>29-30 Programme Registration for new UG students (1st round)</td>
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<td>18 19 20 21 22 23 24</td>
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<td>August</td>
<td>1 2 3 4 5 6 7</td>
<td>5-6 Course Registration</td>
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<td>15 16 17 18 19 20 21</td>
<td>16 Programme Registration for new UG students (2nd round)</td>
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<tr>
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<td>22 23 24 25 26 27 28</td>
<td>20-21 Programme &amp; Course Registration for both new and old PG students</td>
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<tr>
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<td>29 30</td>
<td>25-26 Course Registration - new UG students</td>
<td></td>
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<tr>
<td>September</td>
<td>1 2 3 4</td>
<td>6 Fall Semester commences Programme Registration</td>
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</tr>
<tr>
<td>WK.1</td>
<td>5 6 7 8 9 10 11</td>
<td>- for new UG students (3rd round)</td>
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<tr>
<td>WK.2</td>
<td>12 13 14 15 16 17 18</td>
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<td></td>
</tr>
<tr>
<td>WK.3</td>
<td>19 20 21 22 23 24 25</td>
<td>6-11 Add-drop and late registration period</td>
<td></td>
</tr>
<tr>
<td>WK.4</td>
<td>26 27 28 29 30</td>
<td>11 Last day in Fall to apply for graduation</td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>1 2 3 4 5 6 7</td>
<td>12 Senate Meeting 1 Day following Mid-Autumn Festival</td>
<td></td>
</tr>
<tr>
<td>WK.5</td>
<td>8 9 10 11 12 13 14</td>
<td>20-22 Plenary Session of Council First Congregation</td>
<td></td>
</tr>
<tr>
<td>WK.6</td>
<td>15 16 17 18 19 20 21</td>
<td>23 Day following Chung Yeung Festival</td>
<td></td>
</tr>
<tr>
<td>WK.7</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>WK.8</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>1 2 3 4 5 6</td>
<td>2 Last day to withdraw from courses without penalty</td>
<td></td>
</tr>
<tr>
<td>WK.10</td>
<td>7 8 9 10 11 12 13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WK.11</td>
<td>14 15 16 17 18 19 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WK.12</td>
<td>21 22 23 24 25 26 27</td>
<td></td>
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</tr>
<tr>
<td>WK.13</td>
<td>28 29 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>1 2 3 4</td>
<td>6 Senate Meeting 25 Christmas Day</td>
<td></td>
</tr>
<tr>
<td>WK.14</td>
<td>5 6 7 8 9 10 11</td>
<td>11 Last day of Fall Semester classes 27 1st weekday after Christmas Day</td>
<td></td>
</tr>
<tr>
<td>WK.15</td>
<td>12 13 14 15 16 17 18</td>
<td>13-14 Study break</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 20 21 22 23 24 25</td>
<td>15-21 Fall Semester examinations</td>
<td></td>
</tr>
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<td>26 27 28 29 30 31</td>
<td>21 Last day of Fall Semester</td>
<td></td>
</tr>
</tbody>
</table>

#### Important Dates in the 1993-94 and 1994-95 Academic Years

<table>
<thead>
<tr>
<th>Week</th>
<th>SMTW</th>
<th>Events</th>
<th>Public Holidays</th>
</tr>
</thead>
<tbody>
<tr>
<td>November</td>
<td>1 2 3 4 5 6</td>
<td>6 Autumn Semester commences Programme Registration</td>
<td></td>
</tr>
<tr>
<td>WK.10</td>
<td>7 8 9 10 11 12 13</td>
<td>- for new UG students (3rd round)</td>
<td></td>
</tr>
<tr>
<td>WK.11</td>
<td>14 15 16 17 18 19 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WK.12</td>
<td>21 22 23 24 25 26 27</td>
<td>6-11 Add-drop and late registration period</td>
<td></td>
</tr>
<tr>
<td>WK.13</td>
<td>28 29 30</td>
<td>11 Last day in Fall to apply for graduation</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>1 2 3 4</td>
<td>6 Senate Meeting 25 Christmas Day</td>
<td></td>
</tr>
<tr>
<td>WK.14</td>
<td>5 6 7 8 9 10 11</td>
<td>11 Last day of Fall Semester classes 27 1st weekday after Christmas Day</td>
<td></td>
</tr>
<tr>
<td>WK.15</td>
<td>12 13 14 15 16 17 18</td>
<td>13-14 Study break</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 20 21 22 23 24 25</td>
<td>15-21 Fall Semester examinations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>26 27 28 29 30 31</td>
<td>21 Last day of Fall Semester</td>
<td></td>
</tr>
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</table>
The universe of science and technology and applications are the preoccupation of faculty members of this University. Through their contribution to that universe, they work towards the common goal of a front-ranked institution.