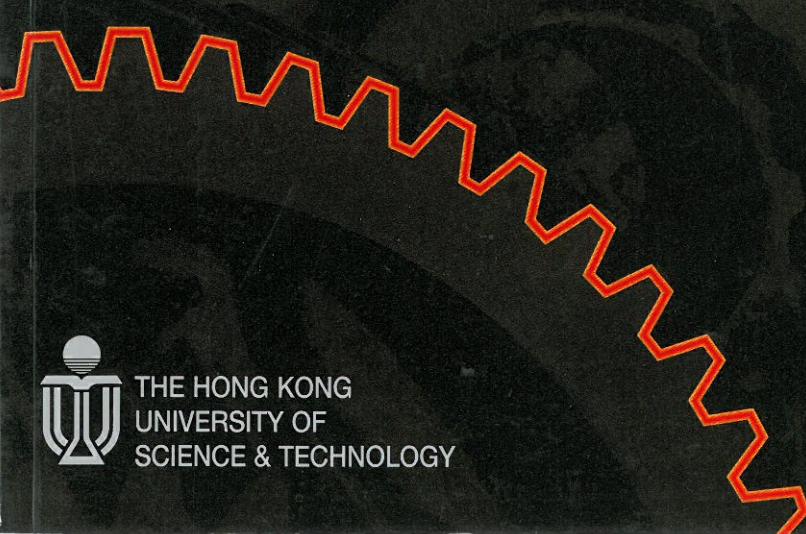


School of Engineering

STATUS REPORT 1993-1994

ON LINE
&
in GEAR



This brochure is produced by the School of Engineering, The Hong Kong University of Science & Technology. The information contained herein is subject to change as the School develops; in particular, the admission requirements and procedures may be revised by the appropriate University authorities.

School of Engineering

STATUS REPORT 1993-1994

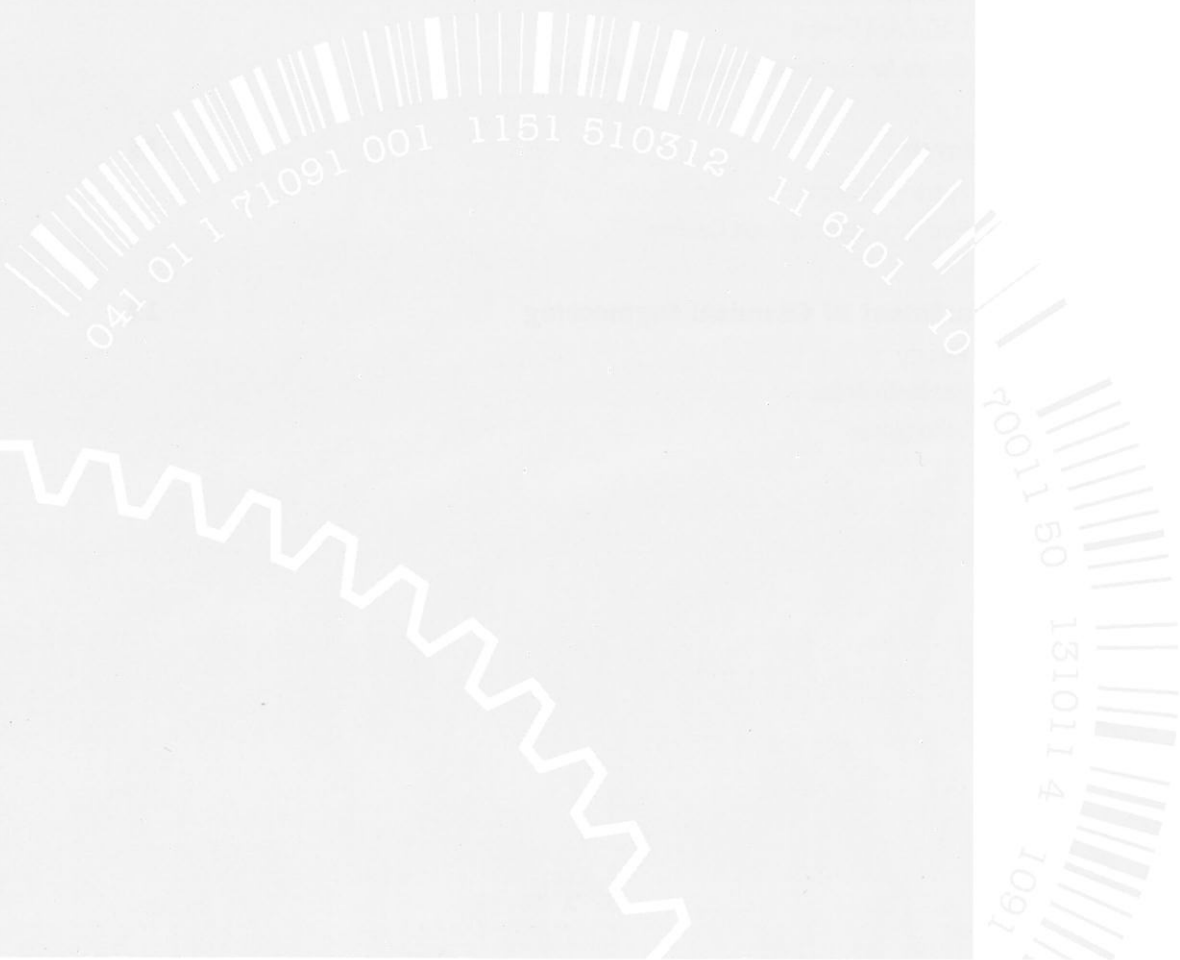


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FOREWORD



.....
Prof. H. K. Chang
Dean

One year ago, while still very much an infant, we proudly and eagerly pronounced ourselves "On Line & In Gear". Now a toddler, we wish to reaffirm our desire to be well-connected, fully-operational and forward-moving. Thus we once again name our status report "On Line & In Gear".

Our School's Advisory Committee met in June 1993 and proclaimed that "what has been achieved in the School of Engineering in the two-and-a-half years since our first discussions is truly remarkable". While these kind words are most encouraging, we know that we still have a long way to go before we can congratulate ourselves on our achievements as an engineering school.

To sketch an outline of what we have accomplished in the past twelve months, I shall mention below a few landmarks.

The most significant change in the last year occurred in April 1993 when we moved into our present space, with 13400m² of laboratory space and 3390m² of office and other types of space. In this space, we shall eventually house some 240 faculty and operate nearly 100 laboratories for 2800 undergraduate and postgraduate students.

Our proudest achievement during the last year was on 21 October when 29 young engineers received their Master's degree from HKUST. They are the pioneers of our School and represent our first contributions to Hong Kong's increasing need for technical and management talents.

After Chemical Engineering and Industrial Engineering came on line in September 1993, all six of the planned departments are operational, and we now have 1100 undergraduate and 290 postgraduate students.

While there were some 75 faculty last June, our faculty size now stands at 110. They come from 50 institutions and belong to 17 nationalities. By any standard, our faculty are an especially talented and dedicated group of scholars. Together they taught 47 undergraduate and 47 postgraduate courses to some 5500 students in the past two semesters. Of course, these numbers will appear rather small when compared to the corresponding numbers for the coming year.

In research, our faculty are currently engaged in 98 funded projects, totalling some \$55 million. About one-third of these funds come from non-Government sources. Not only are our faculty busily doing research and publishing their results in journals and international conferences, an increasing number of them are also involved in applied contract research. In conjunction with the Research and Development branch of our University, some of our faculty are taking part in a \$125 million project to study the wind-shear problem for Hong Kong's new airport, probably the largest on-going infrastructure project in the world.

Our faculty have also conducted very practical yet difficult research on wireless communication for the telecommunication enterprises in Hong Kong. A project on Liquid Crystal Display may one day render Hong Kong a centre of activity in this rapidly improving field of high-technology. Our faculty have consulted for the Hong Kong Government on a number of environmental and geotechnical issues. Most appropriately, the newly arrived faculty in the Department of Industrial Engineering are already busy working with several industrial concerns.

To facilitate interdisciplinary work and provide some focuses for our applied research, three new research institutes were formed last year; each received an initial University funding of \$10-12 million and more will be sought from external sources. They are the Institute for Environmental Studies, the Institute of MicroSystems and the Advanced Manufacturing Institute. Each of these institutes has about 30 participating faculty including those from the other Schools of the University.

Under the management of the School, the Microelectronics Fabrication Centre in July produced the first IC chip that had ever been made by a tertiary institution in Hong Kong. This Centre is now fully operational and is used by many faculty and students on a 24-hour basis. The CAD/CAM Centre has begun to function as a support unit for both teaching and research; it is rapidly expanding at this time and should soon be a useful resource for the University as well as Hong Kong's industry. Thanks to the efforts of several faculty and an enlightened administration, our School recently received permission along with \$23.5 million to establish a Centre for Advanced Engineering Materials. I feel confident that I will have much to report about the achievements of this facility one year from now.

Indeed, the School of Engineering is on line and in gear. I invite you to take a good look at this young School of Engineering of ours.



H. K. Chang
Dean
March 1994





ADMINISTRATION AND ORGANISATION



.....
Dr. Philip C. H. Chan
Associate Dean

The administration of HKUST follows a model which provides clear lines of responsibility and authority. The Vice-Chancellor and President is the University's chief executive and academic officer. Reporting to him are three Pro-Vice-Chancellors. They bear responsibilities for Academic Affairs, Administration and Business, and Research and Development.

There are four Schools in the University. The Deans of these four Schools report to the Pro-Vice-Chancellor for Academic Affairs.

In a manner similar to that of the University, the Dean of a School is the School's chief executive and academic officer. Reporting to him are the Department Heads and Directors of Central Facilities and Research Institutes managed by that School. The Associate Dean shares the responsibilities of the Dean in the management and operations of the School.

Vice-Chancellor/President

Professor Chia-Wei Woo

Pro-Vice-Chancellor for Academic Affairs

Professor Shain-Dow Kung

Dean of School of Engineering

Professor H.K. Chang

Associate Dean of School of Engineering

Dr. Philip C.H. Chan

Head of Department of Chemical Engineering

Professor Po-Lock Yue

Head of Department of Civil and Structural Engineering

Professor Chih-Kang Shen

Head of Department of Computer Science

Professor Vincent Y. Shen

Head of Department of Electrical and Electronic Engineering

Professor Peter W. Cheung

Head of Department of Industrial Engineering

Professor Mitchell M. Tseng

Acting Head of Department of Mechanical Engineering

Professor Yiu-Wing Mai

Director of Microelectronics Fabrication Centre

Dr. Tai-Chin Lo

Interim Director of Computer-Aided-Design/Computer-Aided-Manufacturing Centre

Dr. Matthew M.F. Yuen

Interim Director of Centre for Advanced Engineering Materials

Professor Yiu-Wing Mai

UNDERGRADUATE STUDIES

EDUCATIONAL PHILOSOPHY

The undergraduate programmes offered by the University involve students attending full-time for three academic years. The University curriculum is founded on a credit-based system, and all undergraduate degrees are honours degrees. The undergraduate curricula in the School of Engineering are broad-based with special attention given to laboratory skills, computer applications, and design techniques. All engineering undergraduate students are required to take specialist courses in various engineering disciplines, both in and outside their departments. 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.



.....
Civil & Structural Engineering students practising horizontal distance surveying at the surveying camp.

DEGREE PROGRAMMES

Degree	Title of Course	Abbreviated Title	Course Code
BEng	Chemical Engineering	CENG	E320
BEng	Civil and Structural Engineering	CIVL	E330
BEng	Computer Science	COMP	E340
BEng	Electrical & Electronic Engineering	ELEC	E350
BEng	Industrial Engineering	INDE	E360
BEng	Mechanical Engineering	MECH	E370
BEng	*Computer Engineering	CPEG	E380

* This programme is jointly administered by the Departments of Electrical & Electronic Engineering and Computer Science.

Undergraduate Enrolment

Dept.	1994-95 Intake (Projected)	1993-94 Intake (1st Year Students)	1992-93 Intake (2nd Year Students)	1991-92 Intake (3rd Year Students)	Total Current Enrolment
Chemical Engineering	70	43	—	—	43
Civil & Structural Engineering	115	67	45	—	112
Computer Science	134	139	133	113	385
Electrical & Electronic Engineering	174	168	136	114	418
Industrial Engineering	70	34	—	—	34
Mechanical Engineering	105	69	42	—	111
Computer Engineering	80	—	—	—	—
Total	748	520	356	227	1,103

DEGREE REQUIREMENTS

For graduation purposes students need to accumulate a total of 100-105 course credits, as specified for each programme. For complete programme requirements, please see the University Academic Calendar and University's undergraduate prospectus.

The School will have its first cohort of about 225 graduates from its undergraduate programmes at the end of the current academic year. These graduates come from the Departments of Computer Science and Electrical and Electronic Engineering which are the first two engineering departments admitting undergraduate students.

.....
*Engineering students
 applying the CAD software
 tools to design a robotic arm.*



Undergraduate Programme Course Credit Requirements

Programme	Engineering		Science	Business & Management	Humanities & Social Science	Language	Free Elective	Total	
	Within Dept.	Outside Dept.							
Chemical Engineering	59	4	18	6	12	3		102	
Civil & Structural Engineering	68	7	12	6	12			105	
Computer Science	54	13	12	6	12	3		100	
Electrical & Electronic Engineering	64	4	13	6	12	3		102	
Industrial Engineering	51	19	13	7	12			102	
Mechanical Engineering	68	8	10	6	12			104	
Computer Engineering	45	21	10	6	12	3	3	100	
Minimum Credits Required			6	6	12			100	
	36*								

* The total number of credits that students are required to take from departments other than the major department must be at least 36.

ADMISSION REQUIREMENTS

To qualify for admission to the University, applicants must:

- (a) normally be at least 17 years of age by the first day of the academic year to which they are seeking admission;
- (b) meet the general entrance requirements of the University and the requirements of the particular programme or programmes for which they are applying; and
- (c) apply on the prescribed form before the application deadline.

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



General Requirements

To satisfy the general University requirements, an applicant must have obtained (for 1995 admission):

- (a) passes in at least seven subjects in the Hong Kong Certificate of Education Examination 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 another language, either Chinese or an alternative language,
 - ii) for English Language (Syllabus B), the grade obtained must be D or above, or equivalent, and
 - iii) in at least two subjects the grade obtained must be C or above;

(b) Grade E or above in:

- either
 - i) the same sitting in one Advanced Level (AL) subject plus
 - ii) either Advanced Supplementary (AS) Chinese Language and Culture, or AS Liberal Studies plus
 - iii) two AS subjects,
- or
 - i) the same sitting in two AL subjects plus
 - ii) either AS Chinese Language and Culture, or AS Liberal Studies.

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
 - i) 2 AL subjects (including Chinese Literature) and 1 AS subject;
- or
 - ii) AL Chinese Literature and 3 AS subjects.

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

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

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 at least three subjects at the AL (with two AS Level passes being regarded as the equivalent of one AL pass);

- (b) at least one year's successful full-time study or equivalent in a bachelor's degree programme at a university or other 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.

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 in 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.

Departmental Requirements

In addition to satisfying the General Undergraduate Entrance Requirements of the University, candidates applying on the basis of the Hong Kong Advanced Level Examinations should obtain acceptable grades in the subjects indicated for each programme.



.....
Victory for engineering students at the University's annual sports event.



Departmental Requirements for 1995 Entry to Undergraduate Programmes

Department	Advanced Level (AL) Only	Advanced Level (AL) and Advanced Supplementary (AS)
Chemical Engineering	<u>Each of:</u> Pure Mathematics, Chemistry, Physics or Engineering Science	AL - <u>Two of:</u> Chemistry Pure Mathematics, Physics or Engineering Science AS - <u>Two of:</u> Applied Mathematics, Biology, Mathematics & Statistics
Civil & Structural Engineering	<u>Each of:</u> Pure Mathematics, Physics or Engineering Science	AL - <u>Each of:</u> Pure Mathematics, Physics or Engineering Science AS - <u>Two of:</u> Any AS subjects
Computer Science	<u>Each of:</u> Pure Mathematics <u>Two of:</u> Any other AL subjects	AL - <u>Each of:</u> Pure Mathematics <u>One of:</u> Any other AL subjects AS - <u>Two of:</u> Any AS subjects
Electrical & Electronic Engineering	<u>Each of:</u> Pure Mathematics, Physics or Engineering Science <u>One of:</u> Any other AL subjects	AL - <u>Each of:</u> Pure Mathematics, Physics or Engineering Science AS - <u>Two of:</u> Any AS subjects
Industrial Engineering	<u>Each of:</u> Pure Mathematics or Applied Mathematics, Physics or Engineering Science	AL - <u>Each of:</u> Pure Mathematics or Applied Mathematics, Physics or Engineering Science AS - <u>Two of:</u> Applied Mathematics, Biology, Chemistry, Computer Applications, Design & Technology, Mathematics & Statistics
Mechanical Engineering	<u>Each of:</u> Pure Mathematics, Physics or Engineering Science <u>One of:</u> Any other AL subjects	AL - <u>Each of:</u> Pure Mathematics, Physics or Engineering Science AS - <u>Two of:</u> Any AS subjects
Computer Engineering	<u>Each of:</u> Pure Mathematics, Physics or Engineering Science <u>One of:</u> Any other AL subjects	AL - <u>Each of:</u> Pure Mathematics, Physics or Engineering Science AS - <u>Two of:</u> Any AS subjects

HOW TO APPLY

Secondary 7 students in a Hong Kong School should apply to the Joint University and Polytechnic Admissions Office.

Others may apply for admission directly to the University's Admissions Office. Applications for admission in September should reach the University by 31 December of the previous year.



.....
The jubilant graduates... the first since the University opens its door to students in 1991.

All departments within the School of Engineering offer the MSc, MPhil, and PhD degrees. Most postgraduate degrees are available on a part-time or full-time basis. The taught programmes leading to the MSc degree may be the most suitable for students interested in part-time study. The MPhil and PhD are research degrees, and students in some disciplines are required to participate in research on a full-time basis.

Postgraduate Enrolment 1993 - 1994

Full-time

Dept.	MSc	MPhil	PhD	Total
Chemical Engineering	4	7	1	12
Civil & Structural Engineering	1	7	4	12
Computer Science	7	42	10	59
Electrical & Electronic Engineering	3	46	18	67
Industrial Engineering	3	3	1	7
Mechanical Engineering	0	5	19	24
Total	18	110	53	181

Part-time

Dept.	MSc	MPhil	PhD	Total
Chemical Engineering	2	0	0	2
Civil & Structural Engineering	15	1	4	20
Computer Science	9	2	3	14
Electrical & Electronic Engineering	23	5	6	34
Industrial Engineering	4	0	0	4
Mechanical Engineering	26	1	7	34
Total	79	9	20	108

DISCIPLINARY PROGRAMMES

MSc Programmes

These are coursework degrees for which students must fulfil a minimum credit requirement of 30. Students may also undertake a project in some departments. 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 as "Pass with Distinction" when appropriate. For full-time students, the normal length of time for completion of the MSc degree is one and a half years.

MPhil Programmes

In addition to coursework requirements, if any (see Course Credit Requirement table), 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. When the thesis is ready for examination, to the satisfaction of both the student and the supervisor, the department head will appoint an examination committee consisting of three faculty members and chaired by the supervisor. The committee shall examine the thesis and conduct an oral thesis examination. Theses will be graded "Pass" or "Fail". A "Pass" grade may be denoted "Pass with Distinction" when appropriate. For full-time students, the normal length of time for completion of the MPhil degree is one and a half years.

PhD Programmes

PhD programmes focus on original research by the student, but most also require coursework (see Course Credit Requirement table). Doctoral students proceed from admission to the programme, to candidacy for the degree, and then to defence of the thesis; and each has a thesis supervisor who oversees the student's research. Candidacy is obtained by the successful completion of qualifying examinations. The thesis examination is conducted by a committee of five members: 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. The thesis examination committee is chaired by an individual appointed by the Committee on Postgraduate Studies of Senate who is not one of the five members. Theses will be graded "Pass" or "Fail". A "Pass" grade may be denoted "Pass with Distinction" when appropriate.

Degrees Offered and Their Course Credit Requirements

Discipline	Degree		
	MSc	MPhil	PhD
Chemical Engineering	30	15	15
Civil & Structural Engineering	30	15	30
Computer Science	30	17	17
Electrical & Electronic Engineering	30	15	15
Industrial Engineering	30	15	15
Mechanical Engineering	30	12	24

For complete programme requirements, please see the University Academic Calendar and departmental postgraduate studies brochures.

Last year, a total of 29 students from 3 departments graduated from the Master's programmes of the School. It is anticipated that the number will rise slightly to 32 from 4 departments this year.

INTERDISCIPLINARY PROGRAMMES

Master of Science (MSc) in Biotechnology

This programme is administered by a joint committee formed by faculty members from various HKUST Departments involved in biotechnology research. The purpose of this programme is to train research and technical personnel for the biotechnology industry. The programme offers subjects in biotechnology-related topics and extensive laboratory training in biotechnological techniques. Each student is required to take a set of subjects determined individually by the joint committee, and to perform research in one of the biotechnology-related laboratories. Research projects are interdisciplinary in nature and applied in orientation. While original contributions to biotechnological knowledge are not prerequisite to the completion of the MSc degree, the attainment of scientific competence is essential. Submission and successful defence of a written report on a well-defined research project is required for the degree.

Master of Science (MSc) in Manufacturing Engineering

The curriculum for the MSc in Manufacturing Engineering is designed to be multi-disciplinary, drawing on the disciplines of mechanical, electrical, chemical, civil, and industrial engineering, as well as computer science and management. This programme is administered at the school level and managed by the programme director under the supervision of the Dean of Engineering. On completion of the programme, a student should have a general knowledge of manufacturing engineering and an in-depth knowledge of manufacturing technology in a specific field. The curriculum is multi-disciplinary, and suitable for students with basic training in any engineering discipline. Students take a common core of four courses (Advanced Engineering Mathematics, Engineering Management, Quality Engineering and Operations Planning and Control) plus six electives in specific fields. Specific fields include, but are not limited to, electronics manufacturing, mechanical manufacturing, textiles, polymer processing, chemical processing and building construction.

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 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.

HOW TO APPLY

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 will be 1 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;
- (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 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 bankdraft or certified bank cheque with the completed application form.



FACILITIES

CENTRE OF COMPUTING SERVICES AND TELECOMMUNICATIONS

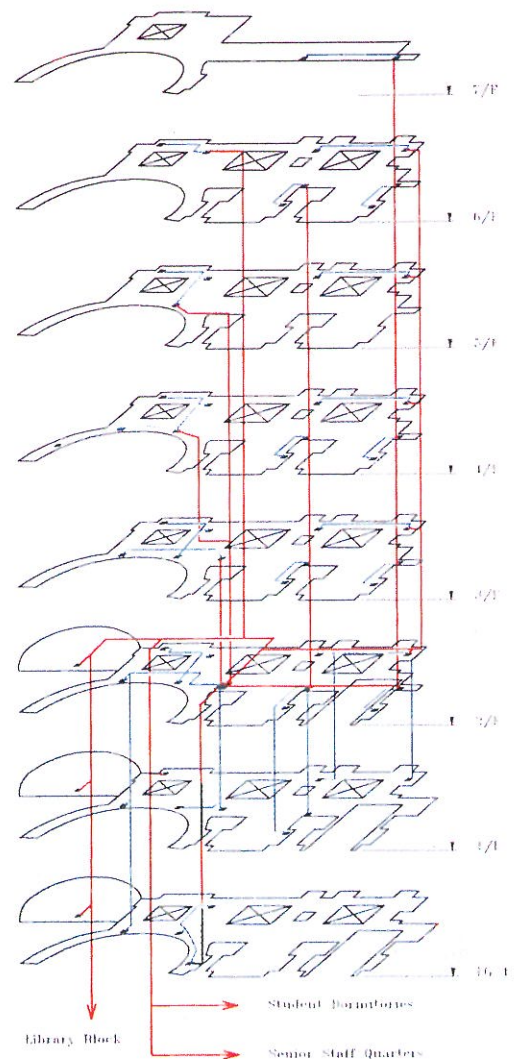
The Centre of Computing Services and Telecommunications (CCST) develops and manages the computing and networking infrastructure of the University. It provides computing support to undergraduate and postgraduate teaching, and research applications in science, engineering, business and management, and humanities and social science.

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 campus network is connected to Harnet (Hong Kong Academic & Research Network) and to Internet in the United States. Network service 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 resources, 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 is developing a high performance, distributed and parallel computing environment composing of high-end computation and graphics workstations with FDDI interface and interconnected by a super high-speed gigaswitch. Besides a four-HP735 workstation cluster and a 8-processor SGI Onyx Reality Engine Symmetric Multi-Processor (SMP) machine, the University is going to have a Massively Parallel Processing (MPP) supercomputer in 1994 timeframe to support academic research.



.....
 The high speed Fibre Distributed Data Interface (FDDI) network supports the computing needs of the University's campus.

UNIVERSITY LIBRARY

The rapid growth of the University requires a correspondingly rapid rate of growth in its library collection. The Library opened in 1991 with a collection of approximately 110,000 books, periodicals and non-print materials. During the 1991-1994 triennium, and thereafter, the Library plans to add about 60,000 items per year to provide support for the University's academic programmes.

In 1993 the Library occupies four levels with over 8,000m² of floor space and 1,200 seats. A fifth floor will open in the Fall of 1994 with another 2,000m² floor space and 350 seats. The library is much more than a repository for the accumulated knowledge of our civilization; it serves as the heart of our intellectual enterprise. In addition to many titles in science and technology, the collection has a strong humanities and social sciences core, in order to offer the university community the broadest kind of educational support. Currently, the Library

holds 240,000 volumes of books and subscribes to about 5,000 journals.

Public-access terminals may be found throughout the library. This 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 variety of bibliographic and full-text information as well as to search CD-ROM databases. The library's link via telecommunication networks permits patrons to consult holdings of libraries around the world as well as to search additional databases locally and abroad.

.....
Reference materials in the University Library are easily accessible to students and staff for their studies and research.



LANGUAGE CENTRE

Those students needing English language support have access to the Language Centre's pre-sessional and in-course provisions, and Departments may require such supplementary study. HKUST is considering the adoption of minimum graduation requirements in communication skills for all majors. The Centre will also offer a programme of subjects in various languages such as Japanese, Spanish, and French.

MATERIALS CHARACTERISATION AND PREPARATION CENTRE

Materials are the building blocks of our physical world. A better understanding of the structure and properties of materials, together with the advent of new processing methods, have underpinned many recent technological advances. HKUST has therefore established a central facility, the Materials Characterisation and Preparation Centre (MCPC), specially

devoted to the synthesis and study of new materials. The facility serves academics from all the Science and Engineering Departments, and promotes both interdisciplinary research and collaboration with other research organisation. Any spare equipment capacity in the Centre is available to clients from other local tertiary institutions, government bodies, and private industry.

In MCPC, instrumentation already in operation includes scanning electron microscopes (SEM), transmission electron microscopes (TEM), x-ray diffraction system (XRD), a multi-technique surface analysis system, a nuclear magnetic resonance spectrometer (NMR), a scanning tunnelling/atomic force microscope (STM/AFM),



atomic absorption and ultraviolet/visible spectrometers, thin film preparation and measurement equipment, and other instruments for supporting sample preparation and analysis. These techniques and equipment are particularly suited to the study and development of new materials. Applicability exists for materials in the areas of electronics, mechanical engineering, civil and structural engineering, and chemical engineering with potential for commercial exploitation.

.....
High-tech equipment in the Materials Characterisation & Preparation Centre open to faculty and students to do research.

MICROELECTRONICS FABRICATION CENTRE

The mission of the Microelectronics Fabrication Centre (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 495 m² allocated to the Centre in Phase I is devoted to Class 1000 clean rooms where state-of-the-art microelectronic processing equipment is located. It is already in full operation. The Centre's clean rooms are divided into four basic fabrication modules, namely, photolithography, thermal diffusion/thin film deposition, dry/wet etching and metallisation. The facilities of MFC in the Phase II building is being implemented.



CAD/CAM CENTRE

The Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) Centre was established in late 1993 as a central facility of the entire University. The Centre, comprising a floor space of 300m² of its own, is multi-disciplinary in its scope and aims to promote inter-disciplinary and application-oriented research. The initial focus is on areas which are considered likely to have an impact on Hong Kong's economy. These include areas such as manufacturing automation, robotics, computer vision, integrated circuit computer-aided design,

.....
*Operation of the concurrent
 computer system in the
 CAD/CAM Centre for high
 speed data acquisition
 research.*

multi-media information technology, computer graphics and animation technology, mechanical and civil engineering CAD, computer simulation and numerical modelling, manufacturing information systems, expert systems, chemical process simulation and plant design.

CENTRE FOR ADVANCED ENGINEERING MATERIALS

The Centre for Advanced Engineering Materials was established in early 1994 with an initial allocation of \$23.5 million. Its mission is to provide the facilities and direction for HKUST as well as the Hong Kong industries to develop advanced engineering materials technology and application by means of research on manufacturing, microstructural design, new materials development and testing methodology.

Research programmes, though to be largely initiated by faculty, emphasize applications suitable for industry. The Centre will also engage in training of students and researchers in advanced materials technology, and international exchanges.

The planned areas of its components will include metallic materials and metal matrix composites, ceramics and ceramic matrix composites, advanced polymers and polymer-based composites, advanced cementitious materials and fibre composites, electronic packaging materials, bioengineering and biomedical materials, surface engineering and thin-film technology, and intelligent materials and biomimetics.

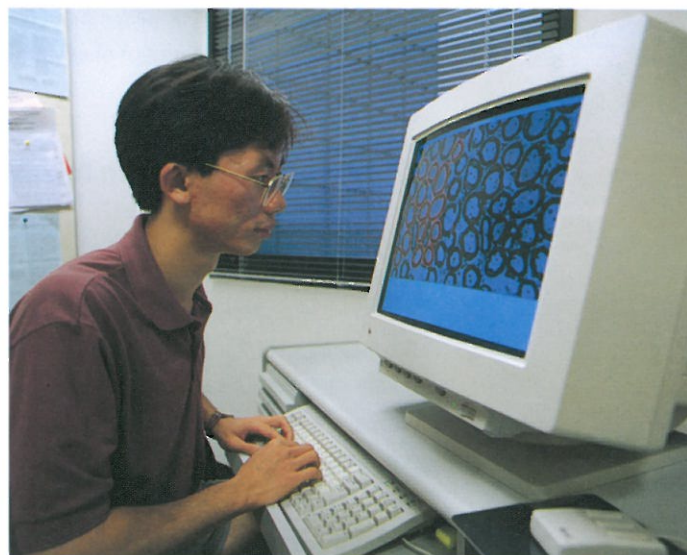
RESEARCH

The research functions of our University not only provide for the intellectual development of faculty and students but also stimulate the transfer of the latest and best in technology to meet the economic, industrial, commercial, and environmental needs of Hong Kong. The faculty provide the leadership to position HKUST's research at the forefront of intellectual development and to insure the movement of new knowledge into teaching programmes. As participants in research activities, students build a foundation for fruitful professional careers in industry, commerce, education, or public service.

No university, especially a technological university like HKUST, can be self-contained in research. Elsewhere in the world are recognised experts, fine laboratories, and good organisations that can contribute greatly to the programmes at HKUST. One of the goals of research programme development is to co-operate worldwide with other universities, research institutions, and industrial laboratories to the benefit of all. Thus, duplication of costly facilities and programmes may be avoided. These partnerships in research extend the capability of HKUST far beyond local resources. The benefits of these partnerships are especially significant during a period when faculty and the student body are expanding rapidly and new laboratory facilities are being constructed.

To contribute more effectively to the economic vitality of Hong Kong and the surrounding region, the University works with industrial and commercial organisations to set up new and expanded enterprises. Furthermore, the University's personnel and facilities are available to support the community's on-going technical needs in testing, computation, evaluation, non-credit and credit training, as well as industrial R&D.

Research in the School of Engineering is funded from a variety of sources, both government and private. At present, there are already over 150 research projects in the School; Appendix 2 gives the titles and the names of the investigators of these projects and offer a glimpse of the research activities that go on in the School.



FUNDING SOURCES

A major source of funding for research is the recurrent budget of the University. In Hong Kong, departmental budgets contain a research component (between 30% and 40% of the budget) that is intended, by the University and Polytechnic Grants Committee (UPGC) which funds tertiary institutions in Hong Kong, to support such aspects of research as conference travel, consumables, and general expenses.

.....
An image analysis method developed by Computer Science Department able to automate the counting and sizing of brain cells.

Research Grants Council Earmarked Research Grants

The Research Grants Council (RGC) allocates grants on a competitive basis for academic research projects undertaken by academic staff of the seven tertiary institutions funded by the UPGC. HKUST is one of these seven institutions. Applications are submitted by individuals or groups of academic staff. The research can be of a basic or applied nature. Grant funds provide support mainly for research staff and may support a modest amount of equipment, consumables, and travel expenses.

RGC Direct Allocation Grant

The Research Grants Council (RGC) provides a block grant to each of the seven UPGC-funded tertiary institutions for allocation to research projects. In 1993/94 the total funds available to HKUST amounted to \$5.9 million. Awards are made on a competitive basis, are normally for one year, and cannot exceed \$150,000 per award. Grant funds provide support mainly for research staff and may support a modest amount of equipment, consumables, and travel expenses.

RGC Central Allocation

The Research Grants Council (RGC) provides, as its yearly budget permits, grants in support of inter-institutional research projects. Grant funds provide mainly support for facilities or equipment costs that normally cannot be supported from the recurrent budgets of individual institutions. The involvement of several institutions in the proposal is strongly encouraged.

UPGC-funded Research Infrastructure Grant

As a UPGC-funded institution, HKUST uses about 2% of the overall recurrent budget to provide grants to build research infrastructure at the University. Research infrastructure is mainly interpreted as the building of research programme activities, procedures and mechanisms needed for the development of HKUST into a research university. Interdisciplinary and/or multidisciplinary proposals are preferred to augment the normally funding pattern of disciplinary research. In 1993/94 the total funds available amounted to \$16.6 million. Awards are made on a competitive basis and are normally for a period of one to three years. Grant funds provide support mainly for research staff and may support a modest amount of equipment, consumables, and travel expenses. A unique aspect of the Research Infrastructure Grant programme is that projects are required over their life-time to attract external non-UPGC funding of an amount at least equal to that of the Research Infrastructure Grant awarded and other UPGC-sponsored funds.

Private and Other Governmental Funding Sources

In addition to the sources of research funding discussed above, there are a number of other private and governmental funding sources, some of which are listed below.

UK/HK Joint Research Scheme

Provides support mainly for travel costs for collaborative research with another institution in the United Kingdom.

Foundations

The Croucher Foundation

Chiang Industrial Charity Foundation Ltd.

Various branches of the Hong Kong government from time to time issue requests for proposals. There are also many private businesses and corporations in Hong Kong which provide opportunities for research or consulting contracts. A sample of some of these which have or have had contracts with faculty at HKUST are:

Private Companies

Hutchison Telecom

Mass Transit Railway Corporation

DEC Corporation

Chrontel, Incorporated

Glaxo Hong Kong Ltd.

Hat Fash Ltd.

Hong Kong Government

Civil Aviation Department

Geotechnical Control Office

Industry Department

Finally, there are a number of research institutes and centres within HKUST that fund research projects. These are described below.

RESEARCH INSTITUTES AND CENTRES

Some research activities fit well into the traditional disciplinary organisation, and are administered by academic Departments and Schools. This is especially true of smaller, basic research programmes that primarily involve faculty and thesis students. For research programmes that are large and require the participation of a combination of faculty and students from different disciplines, the activities are separately administered in research institutes and centres. Special laboratory facilities are, in some instances, also separately and

centrally maintained. Faculty and students are encouraged to pursue disciplinary as well as multidisciplinary or interdisciplinary research.

Biotechnology Research Institute

The Biotechnology Research Institute (BRI) at HKUST was established in 1990 with a \$130 million donation from The Royal Hong Kong Jockey Club. Its specific mission is to assist in Hong Kong's economic development through the development of a biotechnology industry. BRI supports biotechnological research projects in HKUST as well as other tertiary educational institutions in Hong Kong. Selection of projects is carried out by a Programme Advisory Committee. An International Advisory Panel advises on the overall direction and operation of BRI.

Ever since the inception of HKUST, biotechnology has been targeted as a top research priority of the University and an important area for postgraduate studies. BRI's contribution resides in spurring the development of biotechnology-related interests in the relevant Departments, and the attraction of world-class scientists and engineers to HKUST. Currently 15 HKUST faculty participate in BRI-supported research projects. BRI is also expending \$80 million to acquire equipment for biotechnology and to establish facilities in Animal Care, Plant Growth, Cell Culture and Fermentation.

Hong Kong Telecom Institute of Information Technology

This Institute has been founded with a grant of \$100 million from Hong Kong Telecommunications Limited. The concept of the Institute is based on the recognition that in the future there will be no economic development, no industry or commerce, no service or manufacturing capability of any significance without the full utilization 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 programs, 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.

Sino Software Research Centre

The Sino Software Research Centre (SSRC) is a recently created facility in HKUST that takes the research and development aspects of its mission equally seriously. Established with a \$20 million grant from the Sino Land Co. Ltd, the SSRC began operation in July 1992 with the dual aim of supporting software research that can lead to practical applications, and providing assistance in developing that software into actual products.

The Centre sees its primary role as that of a catalyst, helping software projects reach the critical phases of development where ideas get translated into prototypes and large-scale trials. Projects by HKUST faculty members from any department are eligible for support.

The Centre particularly encourages research in areas that are relevant to the economic and social development of Hong Kong. Current areas of interest include:

- Intelligent information retrieval systems
- Knowledge bases to support business decision-making
- Multi-country information integration

Beyond its interest in software research and development, the SSRC also provides technical and consultative help to local businesses as they seek to implement the latest software technologies. As part of this effort, the Centre sponsors workshops, seminars and lectures on software issues related to the needs of businesses and public institutions. As an integral part of HKUST's Research and Development Branch, the SSRC is dedicated both to advancing the state-of-the-art software applications and to serving the needs of Hong Kong.

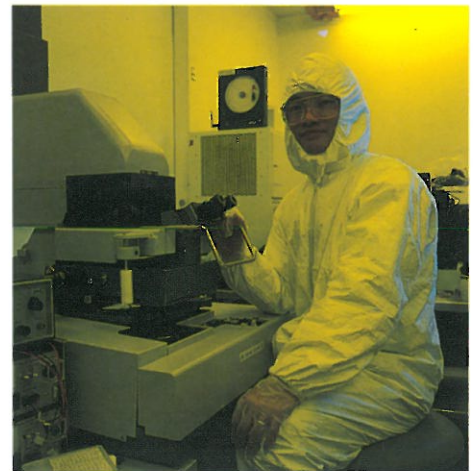
Institute of MicroSystems

The Institute of MicroSystems (IMS) includes five Centres:

1. Centre for Micro Electro Mechanical Systems
2. Centre for Circuit and System
3. Centre for Nano Device and Technology
4. Centre for Advanced Display Technology
5. Centre for Microelectronic Material and Technology

The goals of IMS are to foster research in crucial areas of microelectronics, and to transfer the developed technologies to the local electronics industry to raise its competitive edge and to spawn new business.

Research areas will have high scientific as well as commercial potentials. Currently the Institute has obtained \$12 million funding. To utilize the limited available resources effectively and efficiently, IMS will pick particular areas or topics which the Institute is able to afford; HKUST expertise is not far behind; have academic contents; produce results with good commercial potential; and have enough interested people to form the critical mass.



.....
*The Microelectronics
Fabrication Centre provides
clean room facility for
fabrication of microelectronic
integrated circuits.*

Institute for Environmental Studies

The formation of the Institute for Environmental Studies (IES) provides for effective collaboration among several departments in the University which are directly involved with environmental studies to assist government and industry in resolving many urgent environmental challenges facing Hong Kong and its surrounding region.



.....
The pulsed laser deposition system ready to support photonic materials research.

At present, about 30 individuals are involved in environmental research and the Institute's focal point is on coordinating technical and administrative aspects of all major environmental research activities.

In the initial years, priority will be given to those areas which are urgent to the solution of Hong Kong's and its region's environmental problems. Another important emphasis is to contribute to the enormous challenges of solving the environmental problems of developing countries.

Individual projects will be carried out through research or development contracts, or through consulting contracts with the Institute, which will have the responsibility for performance and schedule of all work. Currently the Institute has \$10 million funding.

Advanced Manufacturing Institute

The Advanced Manufacturing Institute will be established in 1994 with an initial allocation of \$10 million. In order to slow down the transformation of the manufacturing sector, Hong Kong industry needs to up-grade the technical capability, move manufacturing/design capacity to the high value-added level, and to leverage the existing business network of Hong Kong. To meet this challenge, the Advanced Manufacturing Institute aims to provide opportunities for young engineers to acquire systems design expertise through cooperation with world-class manufacturing system designers and research institutes, and aims at promoting industry-university cooperation in the area of advanced manufacturing technology and systems.

Areas of interest include Manufacturing Management, Manufacturing Process Technology, Manufacturing Control, and Manufacturing System Design. The main scope will consist of providing a focal point for the research and development of advanced manufacturing systems, developing and expanding the activities of material processing, control technology and manufacturing logistics, promoting interchange and transfer of manufacturing technology to industry, providing a stimulating environment for training of students and researchers and facilitating international exchanges for investigators in the field of advanced manufacturing.



DEPARTMENT OF CHEMICAL ENGINEERING



.....
Prof. Po-Lock Yue
Head

"A new chapter has been created in the history of Hong Kong's tertiary education when the Department of Chemical Engineering at HKUST launched its degree programmes in September 1993. The first chemical engineering department in Hong Kong began classes with more than 40 undergraduate students, 15 postgraduates and 7 faculty. In 1996 we will witness the award of the first bachelors degree in Chemical Engineering in Hong Kong. We are determined to publicise our degree courses and help Hong Kong industries to realise that a new pool of talents will soon be available.

The postgraduate students are of equally high calibre. They have selected research projects in the fields of polymers studies, microelectronic materials, aerosols, wastewater decontamination, all of which involve innovative applications of chemical engineering principles and practice in areas which are highly relevant to industries in Hong Kong and its region.

The highlight of the Fall semester was undoubtedly the University Open Day. Staff and students worked together with great enthusiasm and dedication to mount a very attractive display introducing the chemical engineering discipline and the department to thousands of visitors. Opportunities were offered to youngsters to participate in "hands-on" experiments demonstrating chemical engineering principles.

The next phase of development will take the department to double its present faculty size. The recruitment of high quality students continues to be a matter of top priority. As we seek to move into a higher gear we are only too aware of the need of collaboration within the School of Engineering, with other units in the University and not least of all the support of Hong Kong industries. The challenge is immense but the reward should be great."

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 or plants, operate them, manage personnel and capital, and conduct the research necessary for new developments. They supply the society with petroleum products, plastics, agricultural chemicals, household products, pharmaceuticals, electronic and advanced materials, photographic materials, chemical and biological compounds, various food and other products.

FACULTY

Professor and Head of Department:

Po-Lock 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 *Calif Inst of Tech*

Lecturers:

Chak-Keung CHAN, BS *Texas (Austin)*; PhD *Calif Inst of Tech*

Ping GAO, BSc *Dalian*; PhD *Cambridge*

Tze-Man KO, BE *Cooper Union*; PhD *Wisconsin (Madison)*

Xiang-Ming LI, BSc, MEng *South China Univ of Tech*; PhD *Michigan*

Yongli MI, BS *Heifer*; PhD *Syracuse*

RESEARCH AREAS

Chemical engineering has become a highly diversified engineering and science discipline which encompasses research interests ranging from aerosol to zeolite and from conventional petrochemical processing to multi-disciplinary areas such as materials engineering, biotechnology and environmental engineering. In addition to the fundamentals of transport, thermodynamics, kinetics and reaction engineering, research interests at HKUST focus on four areas, as described below.

Advanced Materials

Over the last three decades, many of the “high-technology” industries have evolved from mechanical-based manufacturing to chemical-based manufacturing. Examples may be seen in home entertainment, data storage and manipulation, telecommunication, high performance polymers, advanced ceramics and composites. Chemical engineers have actively participated in researches that have made these advances possible. At HKUST, research efforts are being focused on novel polymers and polymer composites. The fundamental processes such as rheology, non-Newtonian flow, heat and mass transport, and reactor design associated with the production and processing of these materials are being studied in depth. Research programmes are supported by state-of-the-art equipment at the Materials Characterisation

and Preparation Centre. In addition, multidisciplinary research and collaboration are possible through the Institute of Microsystems and the Advanced Manufacturing Institute.

Biochemical Engineering

Biotechnology and biomedicine have emerged as new opportunities for chemical engineers. Potential applications are artificial organs, therapeutic, pharmaceutical and agricultural products. The design of a bioprocess relies on the understanding of the kinetics of microbial growth or enzyme catalysed reactions, and the transport and thermodynamic properties in the biochemical system. Genetic and environmental manipulations of cells for protein production and for enhanced biocatalytic activities are possible by techniques of recombinant DNA and gene splicing. Novel biosensors, environmental biotechnology and food biotechnology are also active research endeavors. Research activities are supported by the Biotechnology Research Institute at HKUST.

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. Naturally, research programmes at HKUST aim to develop appropriate technologies for improving the environmental quality in Hong Kong. However, research efforts will not merely be restricted to tackling local problems but will involve fundamental studies of generic phenomena and innovative methods which provide the basis for new solutions to the many and varied environmental problems worldwide. The Department participates in collaborative programmes with other departments in the University and the Institute for Environmental Studies. Examples of projects include air pollutant formation and abatement, gas to particulate conversions, combustion, deodorisation of indoor air, catalytic and advanced oxidation, conventional and advanced methods for the treatment of wastewater, hazardous waste and micro-contamination, waste minimisation, and cleaner technologies.

Modelling and Computation

Validated and robust models underpin the success of scale-up, design and optimisation of all kinds of processes in the process and allied industries. The design, operation and control of these processes may be facilitated by advanced computational tools and computer technology. In conjunction with the other three areas of research, projects are developed to model complex problems such as air pollutant dispersion, scale-up of bioprocesses, and surface phenomena and effects. Other projects will focus on the application of dynamic simulation, parallel processing, knowledge-based systems, neural network and other artificial intelligence techniques to problems in non-traditional processes, particularly those that are relevant to industries in Hong Kong and Asia.

LABORATORIES

Process Engineering Applications Laboratories
Advanced Materials Research Laboratories
Biochemical Engineering Research Laboratories
Environmental Engineering Research Laboratories
Modelling and Computation Laboratory
Food Engineering Laboratory
Analytical Laboratory
Pilot Plant Research Laboratory
Air Pollution Control Research Laboratory
Waste and Wastewater Treatment Research Laboratory
Polymer Processing Laboratory



.....
*Visitors at the University
Open Day observe the
operations of a liquid phase
reactor.*

DEPARTMENT OF CIVIL AND STRUCTURAL ENGINEERING



.....
Prof. Chih-Kang Shen
Head

"Civil engineers are primarily responsible for the planning, designing, and construction of what is commonly referred to as civil infrastructures which contribute directly to humanity's continued health and well-being; economic growth and environmental protection; and utilization and management of natural resources. Civil infrastructures include major buildings, bridges, dams, pipelines, sewage and water treatment works, and various transport systems and facilities. As society evolves, the solutions to civil engineering problems are no longer exclusively technical in nature. Instead, they require considerations of social, economic and political implications as well. The civil and structural engineering programme at HKUST aims at giving students the technical skills, coupled with intellectual inspiration, and at the same time, nurturing a humanistic attitude to meet the challenges facing the present-day civil engineers.

Having started its first undergraduate class in 1992, the Civil and Structural Engineering Department now has 112 undergraduate students in their first two years, 30.5 full time equivalent graduate students and 15 teaching faculty. All undergraduates in the programme are required to take at least 20% of their credits in humanities and social science as well as business and management, in addition to the civil engineering subjects. Well equipped teaching and research laboratories are being established for hands-on experience for our students. The civil and structural engineering programme was accredited provisionally by the Joint Board of Moderators (UK) in May 1993. The Department, through teaching and research, is committed to educating students to serve and to improve the civil infrastructure development of Hong Kong."

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.

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.

FACULTY

Professor and Head of Department:

Chih-Kang SHEN, BS *National Taiwan*; MS *New Hampshire*;
PhD *California (Berkeley)*

Professors:

Paul T.Y. CHANG, BS *National Taiwan*; MS, PhD *California (Berkeley)*

Gerhard W. HEINKE, BSc, MSc *Toronto*; PhD *McMaster*
(Director of the Institute for Environmental Studies)

Howard J.C. HUANG, BS *National Taiwan*; MS, PhD *Texas (Austin)*



.....
Concrete samples prepared
for the courses on
construction materials and
technology.

Visiting Professor:

Edward D. SCHROEDER, BS, MS *Oregon State*; PhD *Rice*

Adjunct Professor:

Leon R.L. WANG, BS *National Cheng-Kung*; MS *Illinois (Urbana-Champaign)*;
ScD *Massachusetts Institute of Technology*

Senior Lecturer:

Neil C. MICKLEBOROUGH, Dip.C.E. *Hobart Tech College*; MEng. *Carleton*;
PhD *Tasmania*

Lecturers:

Chun-Man CHAN, BSc, MSc *Massachusetts Inst of Tech*; PhD *Waterloo*

Guang-Hao CHEN, MEng, DEng *Kyoto*

Mark J. DAVIDSON, BSc, PhD *Canterbury (Christchurch)*

Mohamed S. GHIDAOUI, BEng, MSc, PhD *Toronto*

Lambros S. KATAFYGIOTIS, MS, PhD *Calif Inst of Tech*

Jun-Shang KUANG, BSc *South China Inst of Tech*; PhD *Hong Kong and Cambridge*

Kin-Man LEE, BSc, PhD *Western Ontario*

Xiang-Song LI, BS *Tsing Hua*; MS, PhD *California (Davis)*

Zongjin LI, BE *Zhejiang*; MS, PhD *Northwestern*

Irene M.C. LO, BSc *National Taiwan*; MSc, PhD *Texas (Austin)*

Duncan A. MCINNIS, BSc, MSc *Calgary*; PhD *Toronto*

David G. WAREHAM, BSc, MSc *Waterloo*; PhD *British Columbia*

Hai YANG, BS *Wuhan*; MEng, PhD *Kyoto*

RESEARCH AREAS

The research focus of the Civil and Structural Engineering Department lies in two broad areas: infrastructural development and planning, and environmental and water resources studies. There are many subgroups under each of these two areas. A brief description of each area is given below. It is likely that research focus will change as necessary to explore new areas of interest associated with the emergence of new technology.

Infrastructure Development and Planning

The bulk of the infrastructure development schemes are within the realm of the civil engineering disciplines, including the traditional specialty fields of structural engineering, construction management and technology, geotechnical engineering, harbour and coastal engineering, and the interdisciplinary, broad based approach of transportation systems engineering, regional development and planning, etc. The infrastructure facilities to be developed under the Port and Airport Development Scheme (PADS) in Hong Kong will have a very strong and positive impact on research and technology development of our postgraduate programme. Major research areas identified include: construction technology and ground engineering, building-system design and analysis, geotechnical engineering and soil-structure interaction, and infrastructure system development, on which the Department is working closely with the Institute of Infrastructure Development.

Environmental Engineering

The 1990s are generally recognised as the decade of environmental awareness. HKUST is committed to devoting its resources and expertise in fundamental research and in the development of advanced technology in order to improve the quality of life and to free it of environmental hazards. The areas of research where civil and structural engineering will play a leading role shall include contaminated sediment transport; physical, chemical, and biological water and waste treatment processes; mathematical models for environmental quality management; mixing and transport phenomena of pollutants in natural and artificial systems; and water resources management and engineering. The Department is in close cooperation with the Institute for Environmental Studies in this area of research.

LABORATORIES

Structures/Dynamics Laboratory
Geotechnical Engineering Laboratory
Fluid Mechanics/Hydraulics Laboratory
Construction/Concrete/Materials Laboratory
Environmental Engineering Laboratory
Surveying Laboratory
Computational Mechanics Laboratory

DEPARTMENT OF COMPUTER SCIENCE

"The Department of Computer Science has achieved the distinction of being the largest and the most diverse department on campus this year: with 34 faculty members representing 12 nationalities. Its size and diversity in ethnic background did not lead to chaos; on the contrary, they bring together a stimulating environment which is particularly suitable for a discipline which has a history of re-inventing itself every few years.

In addition to one PC lab and one Unix lab, the Department inaugurated two more teaching laboratories last year: a Unix lab equipped with 41 Sun SPARC 10/30 workstations, and a graphics lab with 20 SGI Indigo workstations. These laboratories provide ample computing power and facilities to prepare the students for any real-world computing problems they might encounter.

The faculty of the Department were involved in about 30 sponsored research projects last year. Many of these projects may have immediate applications locally. For example, a mobile robot named Apollo, an early product of research projects on robotics and computer vision, made a debut at the First University Congregation in October, 1993 and greeted the guests there.

Complementing teaching and research is the service to the community. Faculty from the Department are active in conducting workshops and providing consulting services to the local community. A major activity was the launching of the Hong Kong SuperNet project through the Sino Software Research Centre and the HKUST RandD Corporation last November. Faculty, staff, and students from the Department initiated this project which offers Internet services to private and commercial users in Hong Kong. We are working with people in Taiwan, Singapore, and China to explore the possibility of providing similar services there.

The Computer Science Department is indeed building momentum to achieve a prominent position by the world's standards through its dedicated effort in teaching, research, and service."



.....
Prof. Vincent Y. S. Shen
Head

Computer Science is the discipline that studies the structure, function, and applications of computers. The Computer Science programmes at the Hong Kong University of Science and Technology cover topics in the areas of Foundations of Computer Science, Artificial Intelligence, Computer Engineering, Data and Knowledge Base Systems, and Software Technology.

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 computer literacy 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 global marketplace.

Traditional computer science research covers hardware, which studies the physical components of computer systems, and software, which studies 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 research as well as in various applications.

FACULTY

Professor and Head of Department:

Vincent Y.S. SHEN, BS *National Taiwan*; MA, PhD *Princeton*

Professors:

Roland T.H. CHIN, BS, PhD *Missouri-Columbia*

Frederick H. LOCHOVSKY, BSc, MSc, PhD *Toronto*

Reader:

Samuel T. CHANSON, BSc *Hong Kong*, MSc, PhD *California (Berkeley)*

(Associate Head of Department)

Visiting Reader:

Shmuel ZAKS, BSc, MSc *Technion*; PhD *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 *Wisconsin (Eau Claire)*; MS, PhD *Virginia Polytech Inst and State*

Helen C.M. SHEN, BMath *Waterloo*; MSc *Toronto*; PhD *Waterloo*

Lecturers:

Ishfaq AHMAD, BSc *Eng & Tech (Pakistan)*; MS, PhD *Syracuse*

George BACIU, BMath, MSc, PhD *Waterloo*

Lewis H.M. CHAU, BSc *Chinese Univ of Hong Kong*; MSc *Alabama (Birmingham)*;

PhD *California (Los Angeles)*

Siu-Wing CHENG, BSc *Hong Kong*; PhD *Minnesota*

Scott C. DEERWESTER, BS, MS, PhD *Purdue*

Pamela A. DREW, BA, MS, PhD *Colorado (Boulder)*
 Mordecai J. GOLIN, BSc *Hebrew Univ of Jerusalem*; MA, PhD *Princeton*
 James W. GRAY, III, BS, MS, PhD *Maryland*
 Mounir HAMDJ, BS *Southwestern Louisiana*; MS, PhD *Pittsburgh*
 Babak HAMIDZADEH, BS, MS, PhD *Minnesota*
 Andrew B. HORNER, BMusic *Boston*; MS *Tennessee (Knoxville)*; PhD *Illinois (Urbana-Champaign)*
 Kamalakar R.S. KARLPALEM, BSc *Bombay*; MS *Indian Statistical Inst*; MS *Indian Inst of Tech*; PhD *Georgia Inst of Tech*
 Alex C.Y. KEAN, BCS, MSc *Acadia*; PhD *British Columbia*
 Chung-Mong LEE, BSc, MSc, PhD *Minnesota*
 Qing LI, BE *Hunan*; MSc, PhD *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 *California (Los Angeles)*; PhD *Kent (Canterbury)*
 Chung-Dak SHUM, BS, MS *Washington*; PhD *California (Los Angeles)*
 Michael D. STIBER, BS *Washington*; MS, PhD *California (Los Angeles)*
 Dekai WU, BS *California (San Diego)*; PhD *California (Berkeley)*
 Beat WÜTHRICH, BS *Berne Neufeld*; MS, PhD *Swiss Federal Inst of Tech*
 Dit-Yan YEUNG, BSc (Eng), MPhil *Hong Kong*; MS, PhD *Southern California*
 Lianwen ZHANG, BS, *China Univ of Elec Sci & Tech*; MS *Beijing Normal*; PhD, *Beijing Normal and British Columbia*



.....
 Computer Science's Unix Lab provides an ideal venue for students to practise computer applications and programming skills.

RESEARCH AREAS

The Department of Computer Science at HKUST is initially seeking to establish critical mass in a few research areas that are relevant to the needs of society and that can be sustained by talents from the local community. The particular emphasis of these selected areas is *software*. This is because research in computer software is gaining importance worldwide, the cost of software development is increasing rapidly, and the education system in Hong Kong is producing many young people qualified to pursue careers in the software area. Brief descriptions of the initial areas are given below. Additional research areas will be established as the Department reaches maturity.

Foundations of Computer Science

Foundations of Computer Science can be divided into two areas, namely, Theory of Computation, and Design and Analysis of Algorithms. Work in Theory of Computation seeks to uncover and explain the structures underlying computational processes, as well as to model the difficulties encountered in an attempt to understand them. The goals of research in Design and Analysis of Algorithms are to identify central problems in various applications and develop efficient approaches to solve them, as well as to propose effective general algorithm design paradigm and analysis techniques.

Topics currently under investigation are algebraic complexity of computation, applications of logic, automata and formal language theory, combinatorial optimisation, computational geometry, graph theory and algorithms and probabilistic and randomised algorithms.

Artificial Intelligence

Artificial intelligence (AI) research studies how computers can be made to exhibit intelligent behaviour in performing certain tasks which, until now, have been better done by humans. These tasks include deductive and inductive reasoning, planning, speech recognition, vision, language understanding, common-sense reasoning, learning, and motion control. Related fundamental issues in AI involve knowledge representation, problem-solving paradigms and strategies, computer languages for AI and their implementations, software development environments, and parallel architectures for AI applications.

Specific areas under investigation are computer vision, expert systems, image processing, logic programming, machine learning, natural language processing, neurocomputing and robotics.

Several possible applications that are valuable to Hong Kong are automatic translation between Chinese and English, computer-assisted manufacturing, autonomous vehicle navigation, medical image analysis for diagnostic purposes, speech and character recognition, electronic libraries, expert systems, and intelligent tutoring systems.

Computer Engineering

Computer engineering is concerned with the design, analysis and implementation of computer systems. Design techniques take into consideration both the requirements imposed upon the system and the technology available for implementation, while analysis techniques are useful in verifying if the system meets its requirements.

Computer engineering can be broadly divided into computer architecture and organisation, fault-tolerant computing, operating system, parallel and distributed computing and real-time systems.

Other topics that involve expertise from both computer and electrical engineering are computer communication and networking and VLSI design.

Data and Knowledge Management

Data and Knowledge Management covers research on techniques for representing and utilising data and knowledge bases and on effective integration of these two technologies into a unified approach for supporting emerging data-and knowledge-intensive applications. Within the Computer Science Department at HKUST, data and knowledge management research is focused in three main areas:

- cooperative and intelligent database/information systems
- distributed database systems
- data and knowledge base systems integration

Technologies of relevance to these research areas include database modelling and design, query language, knowledge representation, planning and problem-solving, information retrieval, integration and interoperability of heterogeneous data/knowledge bases. A major application area in Hong Kong is providing such advanced technologies to the local industrial sector as it moves towards computerised information services.

Current topics under investigation are conceptual modelling and design, DBMS internals, distributed, federated and heterogeneous databases, information retrieval, intelligent knowledge-based management systems, organisational activity support and user level facilities.

Software Technology

Software Technology covers topics related to 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 will be used by software engineers in the future to produce high-quality systems at low cost.

Specific sub-areas under investigation are chinese computing, formal specifications, graphical user interface design, graphics and music experimentation (GAME), program visualisation, requirements engineering and software architecture design.

LABORATORIES

Personal Computer Laboratory

Unix Laboratory I, II and III

Database, Knowledge Base, and Systems Laboratory

Network & Operating Systems Laboratory

Parallel Computation and Distributed Systems Laboratory

Graphics/Visualization Laboratory

AI/Robotics Laboratory

Project Laboratory

.....
*Research on pattern
recognition in the Computer
Science Department.*



DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

"In 1993, the Department grew rapidly from 20 to 34 faculty, reaching half of its planned full size. I am proud to report that the Department has been able to attract several world renowned senior academics and some extremely talented young faculty who have added strength and dynamism to our teaching and research activities. We will continue to build up momentum in faculty recruitment which will remain the most important task ahead.



.....
Prof. Peter W. Cheung
Head

To accomplish our mission to contribute to the socio-economic development of Hong Kong and its region, we are mindful of the importance of interactions and collaboration with industry. Thanks to the hard work of our distinguished faculty, we have been successful in attracting research funding. All the seven earmarked competitive research grant proposals of the Department have received support from the Research Grant Council of the UPGC; a \$1 million (for the first year only) consultancy contract with Hutchison Telecom to investigate wireless communication for the Hong Kong environment has been obtained; Varitronix Ltd., the largest LCD display manufacturer in Hong Kong, has given us a \$1 million grant to support research in advanced liquid crystal display technology; a \$2.5 million grant from the University's Infrastructure Grant has been received for the design of the next generation of machine tool controllers, this is facilitated by a donation of a machine tool centre from COSMOS Machine International as a joint effort in this project;....Our efforts in promoting inter-institutional collaboration is culminated in our recent success in obtaining a \$30 million grant from the UPGC Central Allocation Vote to set up an Inter-institutional Microelectronics Consortium among the tertiary institutions, which will help partially fund the establishment of our new microelectronics fabrication facility at HKUST.

Looking ahead, 1994 will be a landmark year for the Department. The first 110 graduates from our BEng programme will receive their awards in October 1994. The Department will undergo its first accreditation exercise with the Institution of Electrical Engineers in the U.K.. Some 20 laboratories will have been commissioned. In conjunction with the Department of Computer Science, we will admit the first class of 80 students to the Computer Engineering programme. This is an important area into which we will devote strong faculty and staff support.

There are yet many challenges ahead and we have been fortunate to have the resources, the administrative support and most important of all, a group of highly talented faculty and staff to help us accomplish the missions of the Department."

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 influenced every

aspect 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, electrical and 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 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 Centre which will be equipped with the latest computing workstations, graphics input and output devices and application software.

FACULTY

Professor and Head of Department:

Peter W.P. CHEUNG, BS *Oregon State*; MS *Puget Sound*; PhD *Washington*

Professors:

Donald A. GEORGE, BEng *McGill*; MS *Stanford*; ScD *Massachusetts Inst. of Tech*

(Associate Pro-Vice-Chancellor for Academic Affairs)

Hoi-Sing KWOK, BS *Northwestern*; MS, PhD *Harvard*

Ming-Lei LIOU, BS *National Taiwan*; MS *Drexel*, PhD *Stanford*

(Director of Hong Kong Telecom Institute of Information Technology)

Visiting Professor:

Ping K. KO, BS *Hong Kong*; MS, PhD *California (Berkeley)*

Kenneth C. SMITH, BAsC, MASc, PhD *Toronto*

Readers:

Xiren CAO, BS *Chinese Univ of Sci & Tech*; MS, PhD *Harvard*

Philip C.H. CHAN, BS *California (Davis)*; MS, PhD *Illinois (Urbana-Champaign)*
(Associate Dean of Engineering)

Justin C. CHUANG, BS *National Taiwan*; MS, PhD *Michigan State*

Senior Lecturers:

Zexiang LI, BS *Carnegie-Mellon*; MS, PhD *California (Berkeley)*

Tai-Chin LO, BS *National Taiwan*; MS, PhD *Illinois (Urbana-Champaign)*
(Director of Microelectronics Fabrication Centre)

Lecturers:

Oscar C.L. AU, BS *Toronto*; MA, PhD *Princeton*

Khaled BEN LETAIEF, BS, MS, PhD *Purdue*

Aaron W. BUCHWALD, BSEE *Iowa*; MS, PhD *California (Los Angeles)*

Dan N. CHEN, BS *Calif Inst of Tech*; MS, PhD *Columbia*

Kwan-Fai CHEUNG, BS, MS, PhD *Washington*

Ho-Chi HUANG, BS, MS *National Taiwan*; PhD *Washington*

Zaheed KARIM, BS, MS, PhD *Southern California*

Tsz-Mei KO, BEE, MEE *Cooper Union*; PhD *Calif Inst of Tech*

Curtis C.S. LING, BS *Calif Inst of Tech*; MS, PhD, *Michigan*

Ross MURCH, BS, PhD *Canterbury (Christchurch)*

Cuong T. NGUYEN, BS, *California (Berkeley)*; MS, PhD *Stanford*

Truong-Thao NGUYEN, Dip Eng, *Ecole Polytechnique, Ecole Nationale Supérieure
des Telecommunications, France*; MS *Princeton*; PhD *Columbia*

Vincent M.C. POON, BSc, MPhil, PhD *Chinese Univ of Hong Kong*

Li QIU, BEng *Hunan*; MAsC, PhD *Toronto*

Bertram Emil SHI, BS, MS *Stanford*; PhD *California (Berkeley)*

Johnny K.O. SIN, BS, MS, PhD *Toronto*

Danny H.K. TSANG, BS *Winnipeg*; BEng, MS *Technical Univ of Nova Scotia*;
PhD *Pennsylvania*

Li-Xin WANG, BS, MS *Northwestern Polytech Univ, China*; PhD *Southern California*

Man WONG, BS, MS *Massachusetts Inst of Tech*; PhD *Stanford*

Mark S.F. YAU, BSc *Hong Kong*; MS *Boston*; PhD *Illinois (Urbana-Champaign)*

Bing ZENG, BS, MS *Univ of Electronic Sci & Tech of China*;
PhD *Tampere Univ of Tech, Finland*

Dian ZHOU, BS, MS *Fudan*; PhD *Illinois (Urbana-Champaign)*

Assistant Lecturer:

Jack K.C. LAU, BS, MS *California (Berkeley)*

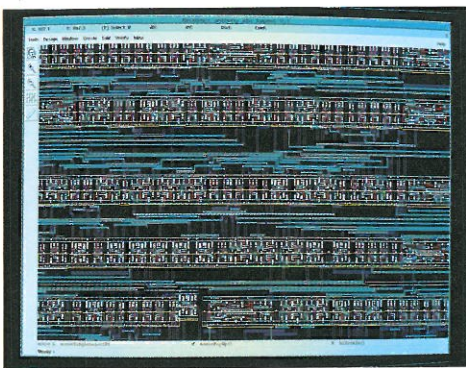
RESEARCH AREAS

Microelectronics

Microelectronics is an increasingly important research area for Hong Kong. Microelectronics at the EEE Department emphasises the fabrication of real devices for applications, in addition to research in pushing the frontiers of microelectronic technology. The central facility is the Microelectronics Fabrication Centre (MFC) which is a complete facility presently capable of handling 4-inch wafers. Research in microelectronics and semiconductor devices concentrates on the following topics:

- advanced semiconductor materials preparation and characterisation
- microwave and high frequency semiconductor devices
- advanced integrated circuits fabrication technology
- integrated sensor and transducer technology

Results from this research programme should spawn novel electronic devices and stimulate the creation of products that are not restricted only to the electronics industry. For example, integrated sensor and transducer technology could have an impact in consumer electronics, medical electronics, automotive control, industrial control, and automated manufacturing.



.....
*A magnified image of the
layer of a gate array
Application Specific
Integrated Circuit displayed
on a computer.*

Integrated Circuits Design, Microprocessors and Instrumentation

Research in this area covers basic digital and analogue IC design and applications. Particular emphasis has been placed on analogue IC design which is important for Hong Kong's future electronic technology and product development. Other research emphases include application of modern electronics and signal processing, application specific integrated circuits (ASIC) for medical electronics, speech processing, and telecommunications. Another important area is the application of

microprocessors in modern electronics and instrumentation. The emphasis here is on microprocessor- and microcontroller-based instrumentation design and development.

Photonics

Photonics is the "wave" of the future. Opto-electronics is rapidly replacing and supplementing electronics in many applications, ranging from communications to signal processing. At the EEE Department, we place emphasis on photonic applications to optical signal processing (and computing), communications and advanced display technology. Some of the topics include:

- application of electronic microfabrication techniques to electro-optical device design and fabrication
- optoelectronic integrated circuits (OEIC) based on silicon technology
- optical signal processing and computing based on smart spatial light modulators
- new optical and electro-optical materials
- display technology

Robotics, Control and CAD/CAM

Research in *robotics* covers the various fundamental issues in robot manipulation including design, analysis and control of multi-robot manipulation systems; robot sensing; gross/fine motion and task planning; intelligent control of robots; applications of robotic technologies to manufacturing and industrial automation.

Research in *control* covers theory and applications of robust control; computer control systems; optimal control; nonlinear control and applications of nonlinear control techniques to robotics and manufacturing; discrete event system theory and applications to computer communication systems; adaptive control; fuzzy logic systems and intelligent control.

Research in *CAD/CAM* covers various issues related to intelligent manufacturing systems including design and development of sensor-based advanced controllers for machine tools; computer-aided setups and on-line quality inspection systems; CAD/CAM integration; and man-machine interface.

Signal, Image and Video Processing

Information technology, which involves both the processing and transfer of information, has significant importance in our daily life. The high standard of living conditions and the conveniences that we are enjoying are results from the recent advances in such technology.

The EEE Department at HKUST currently conducts major research projects in this key technological area. The research activities of this research group are concentrated in the following major areas:

- image coding and compressing
- image processing and enhancement
- video conversion, composition, and compression
- real-time video signal processing
- very low bit-rate video for various applications
- HDTV and super HDTV
- virtual reality
- medical imaging

Information Theory, Communications and Networks

Research in information theory involves the fundamental theories for both information processing and information transfer. Emphasised research areas include:

- information theory for space communications
- lossless and lossy data compression
- coding and error control mechanisms
- data encryption and system security

Communications and networks deal with the mechanisms and systems for the transfer of information. Research in communications and networks includes both “wired” and “wireless” communications. For wired communications, research areas include:

- B-ISDN, ATM and other high speed networks
- spread spectrum systems
- optical communication systems

Wireless communications is becoming extremely important for Hong Kong and China. At HKUST, we have begun a major effort in wireless communications research in the following areas:

- channel propagation measurement and prediction
- cellular channel allocation, frequency reuse, and spread spectrum
- radio link techniques, technology and implementation
- system architecture, control and networking
- universal wireless personal communication network

.....
An electro-optic research bench in operation in the Electrical & Electronic Engineering lab.



LABORATORIES

Basic Electronics Core Laboratory
Senior Project Laboratory
Module Teaching Laboratory
PC CAD Laboratory
Digital Electronics & Microprocessor Laboratory
Analog Electronics Laboratory
Device Characterisation and Test Laboratory
Sensor and Instrumentation Laboratory
VLSI Design and Test Laboratory
Electro-optic Laboratory
Optical Device Characterization Laboratory
Photonic Materials Laboratory
Photonic Materials Preparation Laboratory
Holography Laboratory
Broadband Network Laboratory
Signal Processing and Communications Laboratory
Image Processing Laboratory
Video Technology Laboratory
Wireless Communication Laboratory
Machine Intelligence Laboratory
Robot Manipulation Laboratory
Robotic Teaching Laboratory
Automatic Control Laboratory

DEPARTMENT OF INDUSTRIAL ENGINEERING



Prof. Mitchell M. Tseng
Head

"The Department of Industrial Engineering at HKUST opened its door on September 6, 1993 to a very different kind of world from what Frederick W. Taylor envisaged at the beginning of this century when he put forward the theory and practice of "Scientific Management". To begin with, the industry itself is going through a transition of a magnitude much greater than what has ever happened before. Although somewhat quietly, this transition has caused major displacements in labour force and social disruptions in developed countries. Under the banner of Re-engineering, a powerful undercurrent is challenging what has been tried, learned or taken for granted in the past. People have suddenly awakened to the fact that it is dangerous to hide behind regimented organizational structures. Ineffectiveness can no longer disguise mindless management by numerical figures. In the meantime, incompetence can be traced to a cruel disregard of human potentials by imposing inflexible rules.

In order to excel in a world of global competition and rapid technological innovation, we need to reexamine the key ingredients that make successful technical managers in this new world order. To set up this new department we invited local successful practitioners and world-class experts to help us design a new curriculum. Our goal is to equip future engineers, entrepreneurs and technical managers with the kind of tools, methodology, skill, and attitude that can transform vision into reality.

Witnessing as it does one of the most exciting industrial transformations at all times going on in Hong Kong, the Department has a curriculum with contemporary and relevant topics such as Business Process Engineering, Manufacturing Systems Design, Systems Modeling, Systems Integration Engineering, Service Engineering and Human Factor Engineering. We want students with integrity, creativity, perseverance, vision and ambition to join us. Just as the challenges are awesome, the opportunities are also enormous. The industrialization of this part of the world is at such a pace and with such excitement that we will not want to be on the sidelines and miss the opportunity to make tangible contributions."

Hong Kong is experiencing a major transition from a labour-intensive economy to a technology-based society. This transition promises great opportunities and challenges to the local economy as well as to the universities. The Industrial Engineering Department at the Hong Kong University of Science and Technology (HKUST) recognises the need and sets its vision of Industrial Engineering as follows:

Industrial Engineering is a body of knowledge to enable the effective translation of business vision into reality, and the continuous improvement of the organisation.

Our goal is to equip students with the knowledge and skill necessary to meet the challenges and to contribute to this economy.

FACULTY

Professor and Head of Department:

Mitchell M. TSENG, BS *National Tsing Hua*; MSc, PhD *Purdue*

Professor:

Joseph MIZE, BSc *Texas Tech*; MSc, PhD *Purdue*

Lecturers:

Ajay JONEJA, BTech *Indian Inst of Tech*; MSc, PhD *Purdue*

Richard J. LINN, BEng *Pennsylvania State*; MS *Virginia Polytech*; PhD *Pennsylvania State*

Jiyin LIU, BSc, MSc *Northeast Univ of Tech, China*; PhD *Nottingham*

Liming LIU, BEng, MEng *Huazhong Univ of Sci & Tech, Wuhan*; PhD *Toronto*

Heloisa H.O.M. SHIH, BSc, MSc *Univ of Sao Paulo*; PhD *Yokohama National*

Chuan-Jun SU, BS *National Tsing Hua*; MS *Tarleton State*; PhD *Texas A&M*

Yat-Wah WAN, BSc, *Hong Kong*; MS *Texas A&M*; PhD *California (Berkeley)*

RESEARCH AREAS

Four guidelines are closely followed to identify our areas of research. First, the Department will focus its research efforts on areas of greatest interest to meet the needs and challenges of the economic communities of Hong Kong and South China. Second, we will exploit the maturing technologies that will provide the best conditions for forefront IE research. Third, the research areas will be appropriate to the university environment, and likely yield significant advances in both academic and practical values. Fourth, the research work must be compatible with concentrations in the postgraduate programmes. With these four guidelines in mind, we have identified the following four areas of focus which coincide with the four tracks in the postgraduate programmes:

- a) Manufacturing System
- b) Engineering Management
- c) System Engineering
- d) Human Factor Engineering

The above four research areas were carefully identified to avoid duplication of efforts, yet dovetail nicely with other HKUST engineering departments so as to facilitate and encourage interdisciplinary collaboration. The Department collaborates actively with other engineering departments in the research and teaching projects of the CAD/CAM Centre. A potential collaboration with the Department of Management and Department of Business Information Systems in the Business School to tackle the issues of large scale systems is currently under consideration.



.....
*An Industrial Engineering
 faculty operating a
 computer-operated milling
 machine for metal finishing.*

Equal weights will be given to the four research areas so that each will establish a critical mass to sustain its growth. However, priority may be given to manufacturing systems initially to enable the Department to assume a leading role in the school-wide manufacturing research and educational projects. Parallel to this initiative, emphasis will be given to computer based system modelling facilities so that research projects can move on.

Manufacturing System

The Manufacturing System area explores the methodologies involved in the design, development, implementation, management, and improvement of a manufacturing system to ensure that the goals of

quality, schedule, and cost are met. It includes four sub-areas: Concurrent Engineering, Manufacturing Information Systems, Planning and Control, and Manufacturing System Design and Integration. Concurrent Engineering emphasises concurrent design of product process and system. It explores the innovative use of modern technologies including CAD/CAM, group technology, computer-aided process planning (CAPP), experiment design, statistical process control, design for manufacturability, and supply chain management. Manufacturing Information System includes development of computer communication, data acquisition and validation, and database management techniques in the entire manufacturing system. Planning and Control includes manufacturing resource planning, capacity planning, shop floor control, parts sequencing, machine loading, tool management, customer order processing, vendor selection, and procurement. Manufacturing System Design and Integration is an integration of production hardware and software systems considering space allocation, layout, material handling, flow line configuration and balance, and human-machine interfaces.

Engineering Management

Research in Engineering Management studies the engineering approach to the management of complex organisations and technical programmes mainly in the service and public sectors. It includes total quality management (TQM), strategic planning, facility planning, and location selection, business process engineering, public policy analysis, technology assessment, cost management, service systems engineering, contextual enquiry, project management, and energy management.

Systems Engineering

The System Engineering area investigates the science of complex system analysis, design, modelling and optimisation to achieve optimal overall system performance at the solution level. Study subjects in the area include decision analysis, decision support systems, mathematical programming, combinatorial analysis, reliability theory, queuing theory and stochastic models, complexity theory, parallel algorithms, heuristics, computer simulation techniques, and discrete optimisation. Application of system engineering includes, but not limited to, routing, scheduling, allocation, industrial and service systems modelling, performance evaluation, and optimisation.

Human Factor Engineering

The Human Factor Engineering area studies the physical and psychological related issues of work, projects, and organisations. In recognising the emerging needs of Human Factor Engineering expertise in Hong Kong and South China, the Department is planning to launch the fourth postgraduate programme track in Human Factor Engineering in Fall 1994.

Although the Department is newly established, all the faculty are actively involved in research activities. With the addition of new faculty members and postgraduate students, it is expected that more research projects will be developed.

LABORATORIES

Quality Control Laboratory
Material Handling Laboratory
Flexible Manufacturing Laboratory
Manufacturing Process Laboratory
Human Factor Engineering Laboratory
Virtual Teaming/Concurrent Design Laboratory
Industrial Automation Laboratory
Computer Application Laboratory
System Design Laboratory



DEPARTMENT OF MECHANICAL ENGINEERING



.....
Prof. Yiu-Wing Mai
Acting Head

" The department is most pleased to have graduated its first batch of MSc students all of whom have secured employment in our various industries in Hong Kong. On the research front we take pride in our direct involvement in the design and construction of the world's first Operational Wind Shear Warning System for the new airport at Chek Lap Kok. Support from both local and overseas industries is at a very high level indeed. The significant financial contribution from China Light & Power Co Ltd has enabled the construction of a unique environmental wind tunnel/wave channel for our research on wind forces acting on and swirl flow between tall buildings, atmospheric dispersion modelling and wind-wave interactions. All these activities are of particular relevance to HK and its region. With our intimate involvement in the establishment of the CAD/CAM Centre, we are most delighted to enter into a strategic academic alliance programme with Computervision Inc. which has resulted in a multi-million dollar software donation to the department. In addition we are also a beta-site for CV products. No doubt all this will benefit and advance our teaching and research activities in the very important CAD/CAM area.

We will do even better in the next academic year. When the new Centre for Advanced Engineering Materials is set up within the School, our department will play a key role to expand our research activities into the very exciting new world of smart materials and intelligent material processing."

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, carry 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.

FACULTY

Acting Head of Department:

Yiu-Wing MAI, BS, PhD *Hong Kong*

Professors:

Jay-Chung CHEN, BS *Cheng Kung*; MS, PhD *Calif Inst of Tech* (Director of Research Centre)

Yiu-Wing MAI, BS, PhD *Hong Kong*

Gareth THOMAS, BS *Wales (Cardiff)*; PhD, ScD *Cambridge*
(Director of Technology Transfer Centre)

Pin TONG, BS *National Taiwan*; MS, PhD *Calif Inst of Tech*

Senior Lecturers:

Chin-Tsau HSU, BS, MS *National Taiwan*; MS, PhD *Stanford*

See-Chun KOT, BS *Illinois (Urbana-Champaign)*; MEng, PhD *Cornell*

Matthew M.F. YUEN, BSc *Hong Kong*; PhD *Bristol* (Interim Director of CAD/CAM Centre)

Lecturers:

Lilong CAI, BEng *Tianjin, China*; PhD *Toronto*

Chih-Chen CHANG, BS *National Taiwan*; MS, PhD *Purdue*

Jang-Kyo KIM, BSc *Seoul National*; MEngSc *Monash*; PhD *Sydney*

Steve H.K. LEE, BEng *Cooper Union*; MS, PhD *State Univ of New Jersey*

Shi-Wei LEE, BS *National Taiwan*; MS *Virginia Polytech Inst and State Univ*; 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 Sci & Tech, Beijing*

Yitshak ZOHAR, BS, MS *Technion-Israel Inst of Tech*; PhD *Southern Calif*

RESEARCH AREAS

The Department focuses its research in four areas which are relevant to the economic development of Hong Kong, suitable for the university environment, and likely to yield important advances. These areas are described below.

Solid Mechanics, Dynamics, and Acoustics

Research in this area entails the application of mathematics, theoretical mechanics, and computational skills to the design and analysis of mechanical components and systems.

Research activities include technical assessments, computer modelling and testing the linear and nonlinear behaviour of structures and continua, the mechanical behaviour of both conventional and new engineering materials, computational mechanics for analysing solids and structures, and the study and control of failure of mechanical components and systems.

Materials Engineering

Materials engineering focuses on characterising new materials, developing processes for controlling their properties and their economical production, generating engineering data necessary for design, and predicting the performance of products. Potential research topics include: interface properties of composites; fracture and fatigue; residual life assessment; thermo-mismatch of electronic board and chip-carrier modules; hydrodynamics and instability in processing systems; metal forming; plastics flow in injection molding; and instrumentation and measurement techniques.

Thermofluid Engineering

Even though research in this area includes diverse activities in energy, environmental fluid mechanics, thermal science and building services, the Department has chosen a few areas with application to local industries.

In the energy and environmental area, research will apply fluid mechanics and heat transfer skills to develop processes that minimise both the consumption of natural resources and the production of pollutants, waste-treatment methods to reduce the discharge of pollutants, and technologies to halt the degradation of and/or to rejuvenate already polluted surrounding. Research activities include technical assessments, computer modelling, studies of the phenomena involved, and studies of environmental control for options. Field work is undertaken to collect critical data needed to evaluate systems, concepts and models.

Research in thermoscience includes waste heat management, heat generation and cooling of microelectronic devices, heat pumps and heat pipes. The above topics are related to the efficient use of energy and environmental safety and in support of local manufacturing industries.

Design, Manufacturing, and Control

Mechanical design, manufacturing, and control are the heart of mechanical engineering in which engineers conceive, design, build, and test innovative solutions to “real world” problems. The activities include CAD/CAM, design analysis, manufacturing technology, and robotics with emphasis on integrated approaches of design for manufacture, inspection, maintenance, and repair.

Research in this area involves software and hardware integration guided by the development of an overriding theory in production control in order to automate design and manufacturing. Theoretical research covers topics such as design theory, abstraction and knowledge representation, fuzzy set theory, system control theory, and decision theory. Emphasis is placed on applications in design and manufacturing automation, and computer-aided software tools are employed to support the automation of design and manufacturing operation derived from the production control theory.



The hardware aspect of this research includes topics such as servosystem control, robotics, mechatronics, prime-mover system control, sensor technology and measurement techniques, control systems for manufacturing integration, in-process monitoring of manufacturing processes, inspection systems, and multi-media interfacing for automated mechanical systems.

.....
The high-end beam vibration measurement equipment useful for teaching and research in solid mechanics.

LABORATORIES

Micromachines Laboratory
Metallography Laboratory
Solid Mechanics Laboratory
Fluid Mechanics Laboratory
Manufacturing Laboratory
Wind/Wave Channel Laboratory
Aerosol Clean Room
Acoustics Laboratory
Experimental Method Laboratory
Automation Laboratory
Design Project Laboratory
Robotics/Control Laboratory
Metrology Laboratory
Materials Laboratory

APPENDIX I - ENGINEERING ADVISORY COMMITTEE

.....
Engineering Advisory
Committee members
admiring the design projects
of the Electrical & Electronic
Engineering students.



The School of Engineering places heavy emphasis on the advice of distinguished advisors from academia, industry and government bodies to ensure that its programmes are current and relevant. Since its inception in 1990, the School of Engineering has enlisted the assistance of local and overseas advisors to advise on strategic planning and development, research and curricular development, faculty recruitment and evaluation, as well as collaboration with industry in teaching and research. The School's Academic Advisory Committee (overseas) and General Advisory Committee (local) have in the past two years given the School the much-needed wise counsel and support during its crucial take-off stage.

As the School enters into maturity, the two advisory committees have been merged and re-constituted into a single committee comprising both local and overseas members. It is believed that the re-constituted committee will better serve the School in helping it meet the needs and challenges in the run-up to 1997. The Committee met in February and offered valuable advice on curricular development, faculty evaluation, resource allocation and collaboration with industry. Membership of the Committee is given below.

Sir Eric A. Ash, CBE, FRS

Professor
University College
London University
UK

Prof. John Hopcroft

Joseph Silbert Dean of Engineering
Cornell University
USA

Prof. Paul C. Jennings, NAE

Vice President & Provost
California Institute of Technology
USA

Prof. Ernest S. Kuh, Academia Sinica, NAE

William S. Floyd, Jr.
Professor Emeritus in Engineering
University of California, Berkeley
USA

Dr. York Liao

Executive Director
Varitronix Ltd.
Hong Kong

Prof. Karl S. Pister, NAE

Chancellor
University of California, Santa Cruz
USA

Dr. Stuart Reed

Director of Environmental Protection
Department of Environmental Protection
Hong Kong Government

Dr. Casper Shih

President
China Productivity Centre
Taiwan
Republic of China

Prof. Henry T. Yang, NAE

Chancellor
University of California, Santa Barbara
USA



.....
*A warm welcome to
members of the Engineering
Advisory Committee by the
Vice Chancellor/President,
Prof. Chia-Wei Woo.*

APPENDIX 2 - FUNDED RESEARCH PROJECTS

RESEARCH INFRASTRUCTURE GRANTS (UNIVERSITY & POLYTECHNIC GRANTS COMMITTEE)

Research in mobile robotic materials transport systems

*PONG, Ting-Chuen, Computer Science; YUEN, Matthew M.F., Mechanical Engineering;
CHEUNG, Kwan-Fai, HUANG, Ho-Chi, Electrical & Electronic Engineering*

Land reclamation and geotechnical engineering in Hong Kong

*CHEN, Jay-Chung, Mechanical Engineering; SHEN, Chih-Kang, LEE, Kin-Man, Civil &
Structural Engineering*

Integrated gas sensor technology research programme

*NIEVEEN, Wesley R., Materials Characterisation & Preparation Centre; YU, Nai-Teng,
Chemistry; FUNG, Kwok-Kwong, Physics; CHEUNG, Peter W.P., SIN, Johnny K.O.,
CHAN, Philip C.H., YAU, Mark S.F., Electrical & Electronic Engineering*

Research and development of silicon microwave monolithic integrated circuit (MMIC)
process technology

*HIRAOKA, Hiroyuki, Chemistry; LO, Tai-Chin, SIN, Johnny K.O., HUANG, Ho-Chi, POON,
Vincent M.C., Electrical & Electronic Engineering*

Integrated study of contaminated sediment

*LEE, Ophelia C.W., Centre of Computing Services & Telecommunications; KOT, See-
Chun, Mechanical Engineering*

Structural system identification and test bed development

*CHEN, Jay-Chung, TO, Wai-Ming, Mechanical Engineering; Lee, Kin-Man, Civil & Structural
Engineering*

Fabrication and mechanical behavior of in situ polymer composites

*LENG, Yang, TONG, Pin, Mechanical Engineering; HIRAOKA, Hiroyuki, CARLIER, Paul
R., Chemistry; FUNG, Kwok-Kwong, Physics*

Toward establishing a digital image processing programme

*CHEUNG, Kwan-Fai, MURCH, Ross D., TSANG, Danny H.K., YAU, Mark S.F., AU, Oscar
C.L., Electrical & Electronic Engineering; LOCHOVSKY, Amelia C.W. Fong, Computer
Science; ALTMAN, Michael S., Physics*

An intelligent manufacturing system for the Hong Kong apparel industry

*TAM, Kar-Yan, Business Information System; YUEN, Matthew M.F., YU, Kai-Ming,
Mechanical Engineering; MAK, Simon K.H., Pro-Vice-Chancellor (Research &
Development)'s Office; JARVIS, Christine W., Research Centre*

Parallel computation in solid and fluid mechanics

TONG, Pin, Mechanical Engineering; CHANG, Paul T.Y., Civil & Structural Engineering; HAMDJ, Mounir, Computer Science; HSIEH, Din-Yu, Mathematics

A common Chinese computing infrastructure for different computer systems

LAW, Lawrence H.Y., CHENG, Victor Pat-Leung, Centre of Computing Services & Telecommunications; PONG, Man-Chi, YEUNG, Dit-Yan, Computer Science

Characterization and profiling of airborne particulate matters in Hong Kong

KWAN, Joseph K.C., Estates Management Office; KOT, See-Chun, Mechanical Engineering; FANG, Ming, Research Centre; WAN, Terence S.M., Chemistry

Application of mangrove ecosystems on domestic and industrial wastewater treatment

KOT, See-Chun, Mechanical Engineering; WONG, Yuk-Shan, Biology

Development of hemoglobin-based technologies and instrumentation

CHEUNG, Peter W.P., Electrical & Electronic Engineering; WONG, J. Tze-Fei, Biochemistry; LEUNG, Wa-Hung, Chemistry

Laser assisted chemical vapor deposition of advanced opto-electronic materials

WONG, Man, Electrical & Electronic Engineering; XIAO, Rongfu, Physics; YANG, Shihe, HIRAOKA, Hiroyuki, Chemistry

Novel materials for magnetic storage science and technology

KO, Tze-Man, Chemical Engineering; LO, Tai-Chin, Electrical & Electronic Engineering; YAN, Xiao, ALTMAN, Michael S., Physics; HIRAOKA, Hiroyuki, Chemistry

An expanded program on design of open-architecture machine tool controller

LI, Zexiang, Electrical & Electronic Engineering; YUEN, Matthew M.F., Mechanical Engineering; LIU, Liming, Industrial Engineering

Feasibility assessment of using modified clay materials for solid/hazardous waste disposal landfills

LO, Irene M.C., Civil & Structural Engineering; YUE, Po-Lock, Chemical Engineering; ZHENG, Jiaqi, Materials Characterisation & Preparation Centre

Physical and chemical characterisation of atmospheric aerosols by laser-based spectroscopies: development of an air pollution research programme

CHAN, Chak-Keung, YUE, Po-Lock, Chemical Engineering; LI, Xiao-Yuan, YU, Nai-Teng, Chemistry; KOT, See-Chun, Mechanical Engineering; WONG, Kam-Sing, Physics

Smart holographic optics for industrial applications

KWOK, Hoi-Sing, MURCH, Ross D., HUANG, Ho-Chi, Electrical & Electronic Engineering

Stiffened lateral systems for tall building structures

KUANG, Jun-Shang, CHANG, Paul T.Y., Civil & Structural Engineering; CHEN, Jay-Chung, Mechanical Engineering

Development of active noise control and its application to railway systems

TO, Wai-Ming, CHAN Chih-Chen, Mechanical Engineering; YAU, Mark S.F., Electrical & Electronic Engineering; FANG, Ming, Research Centre

Integrated circuit package design and analysis program

CHAN, Philip C.H., Electrical & Electronic Engineering; YUEN, Matthew M.F., ZOHAR, Yitshak, Mechanical Engineering

Surface dynamics from the millisecond to femtosecond time scale

LOY, Michael M., WONG, George K.L., Physics; CHAN, Chi-Ming, Chemical Engineering; KWOK, Hoi-Sing, Electrical & Electronic Engineering; YANG Shihe, Chemistry

COMPETITIVE EARMARKED RESEARCH GRANTS (RESEARCH GRANTS COUNCIL)

Chemical Engineering

Double-layer photoresist for microelectronic processing

KO, Tze-Man; HIRAOKA, Hiroyuki (Chemistry)

Development of novel scanning optical physiometer for biological tests

LI, Xiang-Ming

Civil and Structural Engineering

An efficient method of characteristic model for simulating unsteady flows in sewer systems

MCINNIS, Duncan A.

An apparatus to determine the soil-reinforcement interactive behavior

SHEN, Chih-Kang; LEE, Kin-Man

Computer Science

Mapping parallel programs onto parallel machines in integrated high performance computing environments

AHMAD, Ishfaq

Testability of communications software

CHANSON, Samuel T.

Rectilinear Steiner Tree and routing problems in the plane

CHENG, Siu-Wing

Retrieval of software components using reductional information retrieval and spatial visualization

DEERWESTER, Scott C.

The use of probabilistic analysis and randomized techniques in the design of efficient algorithms in computational geometry

GOLIN, Mordecai J.

Architectures for high-speed fibre-optic networks

HAMDI, Mounir

Development and application of an advanced object-oriented modelling environment

LI, Qing; LOCHOVSKY, Frederick H.

Image processing and pattern recognition using parallel pipeline architectures

LOCHOVSKY, Amelia C.W. Fong

Organizational activity support and information management

LOCHOVSKY, Frederick H.

Software architecture for object-oriented multi-media communication

PONG, Man-Chi

A computer vision system that acquires, recognizes, and anticipates objects

PONG, Ting-Chuen

Mathematical modelling of flexible manufacturing systems

SHEN, Helen C.M.

A visual environment for software understanding and prototyping

SHEN, Vincent Y.S.

Dynamical neural networks: responses to transient inputs

STIBER, Michael D.

Symbolic and connectionist approaches to inductive learning

YEUNG, Dit-Yan

Electrical and Electronic Engineering

Packetized HDTV video communications

AU, Oscar C.L.; KO, Tsz-Mei; TSANG, Danny H.K.

A novel technique for mixed circuit and device simulation

CHAN, Philip C.H.

Neural fuzzy logic controllers

CHEUNG, Kwan-Fai

Development of a quick turn technology for analog integrated circuit design

CHEUNG, Peter W.P.; CHAN, Philip C.H.; LAU, Jack K.C.

Development of silicon optoelectronic integrated circuits for optical communications

HUANG, Ho-Chi; LO, Tai-Chin

Pulsed laser deposition of materials for photonic applications

KWOK, Hoi Sing; HUANG, Ho-Chi; HARK, S.H. (CUHK)

Development of a task-level robotic hand manipulation system

LI, Zexiang

Silicon-germanium-base heterojunction bipolar transistor by rapid thermal epitaxy with insitu argon sputter clean

LO, Tai-Chin

Radiation hardness of high-speed bipolar on silicon-on-insulator (SOI)

POON, Vincent M.C.; LO, Tai-Chin

Smart power IC devices for VLSI applications

SIN, Johnny K.O.; NG, Wai-Tung; LAI, Peter (HKU)

Semiconductor device cleaning and interface conditioning using vapor/gas phase chemistries

WONG, Man; LO, Tai-Chin

Model based high resolution imaging

YAU, Mark S.F.

Mechanical Engineering

Determination of micrometeorological parameters for atmospheric diffusion over Hong Kong by remote sensing

KOT, See-Chun

Measurement of urban ground heat flux

KOT, See-Chun

Global-local analytic and computational method for advanced composites design

TONG, Pin

Efficient finite element modeling on the mechanical behavior of rubber composites

TONG, Pin; CHANG, Paul T.Y.

Expert system for the design of jigs & fixtures of machined parts

YUEN, Matthew M.F.

DIRECT ALLOCATION GRANTS (RESEARCH GRANTS COUNCIL)

Chemical Engineering

Compositional dependence of water activities of ammonium sulfate - sulfuric acid - water mixtures

CHAN, Chak-Keung

Effects of interfacial conditions on extrusion and injection moulding of polymers and polymer blends

CHAN, Chi-Ming

Processing of ultra high molecular weight polyethylene powders to produce high-strength and high-modulus fibres

GAO, Ping

Preparation of thermal and mechanical stable membranes for the separation of industrial gases

MI, Yongli

Civil and Structural Engineering

Structural optimization to limit wind-induced vibrations

CHAN, Chun-Man

The capture and analysis of images of dispersion phenomena

DAVIDSON, Mark

Energy equation for unsteady channel flow in the presence of discontinuities

GHIDAQUI, Mohamed S.

Analysis and design of stiffened tall building structures

KUANG, Jun-Shang

The effects of buildings construction on existing tunnels

LEE, Kin-Man

Application of Monte Carlo simulation in the predication of contaminant transport through liners

LO, Irene M.C.

Sewage treatment plant hydraulic models using mathematical programming software

MCINNIS, Duncan A.

Analysis of framed slender reinforced concrete columns for long-term loading

MICKLEBOROUGH, Neil C.

Denitrification of high strength leachates on sequencing batch reactors

WAREHAM, David G.

Estimation of origin-destination trip matrices from traffic counts

YANG, Hai

Computer Science

Parallel processing on a network of workstations

AHMAD, Ishfaq

Computational multibody dynamics

BACIU, George

Executable functional logic specifications of distributed systems using event-based models of behavior

CHAU, Lewis H.M.

Rectilinear Steiner Tree and routing problems in the plane

CHENG, Siu-Wing

A unification model of information and its implementation

DEERWESTER, Scott C.

Temporal logic foundations for the analysis of cryptographic protocols

GRAY III, James W.

Architectures for metropolitan area networks

HAMDI, Mounir

Load balancing and memory management in multiprocessor architectures

HAMIDZADEH, Babak

Timbre breeding

HORNER, Andrew B.

Comparing approaches to nonmonotonic and default reasoning

KAMINSKI, Michael

Evaluation of algorithms to materialize distributed relational databases

KARLPALEM, Kamalakar R.S.

Federated knowledge and inference management systems

KEAN, Alex C.Y.

An object-oriented approach to federated databases

LI, Qing

Design and analysis of image processing and pattern recognition algorithms and their applications

LOCHOVSKY, Amelia C.W. Fong

Characterization of fault-tolerance in real-time systems

MUPPALA, Jogesh K.R.

Minimizing discretization visibility: context driven wavefront error diffusion

NAIMAN, Avi C.

Compilation of machine-independent Chinese input method specification

PONG, Man-Chi

Enhancing object recognition through anticipation

PONG, Ting-Chuen

Best effort database query processing

SHUM, Chung-Dak

A dynamical neural network laboratory

STIBER, Michael D.

Statistical acquisition of linguistic and semantic structures

WU, Dekai

Probabilistic FQL

WÜTHRICH, Beat

Electrical and Electronic Engineering

Analysis of multiple access techniques in optical fibre networks

BEN LETAIEF, Khaled

Bipolar analog intergated circuits for wireless communication

BUCHWALD, Aaron W.

A performance model for ATM switches with general packet length distributions

CAO, Xi-Ren

A novel technique for numerical modeling of semiconductor devices

CHAN, Philip C.H.

Integration of artificial neural networks to fuzzy logic system

CHEUNG, Kwan-Fai

Semi-custom interface circuit technology for silicon sensors

CHEUNG, Peter W.P.

An efficient dynamic channel assignment-based indoor communications system

CHUANG, Justin

Silicon based optical devices for optical communications

HUANG, Ho-Chi

Physics, technology of silicon MOSFET's with nanometer dimensions

KO, K. Ping

Decoding with feedback for a cascaded reed-solomon convolutional code

KO, Tsz-Mei

Hardware synthesis for pattern recognition algorithms

LAU, Jack, K.C.; Chan, Philip C.H.

Robust nonholonomic motion planning with collision-avoidance

LI, Zexiang

Integrated millimeter-wave phased array receivers

LING, Curtis

Blind signal processing

LIU, Ruey-Wen

Solid-state integrated micromechanical gyroscope

NGUYEN, Cuong T.

Modulation with digital correction postprocessing

NGUYEN, Truong-Thao

Advanced silicon-on-insulator (SOI) technology

POON, Vincent M.C.

Computer control system design

QIU, Li

Advanced monolithic power integrated circuit technology

SIN, Johnny K.O.

Model-based sensor array processing for high resolution imaging

YAU, Mark S.F.

Industrial Engineering

Process error model of surface mounted printed circuit board assembly

LINN, Richard J.

Perishable inventory models with positive leadtimes

LIU, Liming



Mechanical Engineering

Theoretical and experimental studies of control flexible robot arms

CAI, Lilong

The assessment of vibration control on flexible structures in Hong Kong

CHANG, Chih-Chen

Enhanced heat transfer in packed channels with periodic flows

HSU, Chin-Tsau

Numerical simulation of the powder sintering process

LEE, Steve Hon-Keung

Bending/twisting/sheering actuation and sensing of composite laminates with embedded piezopolymer film

LEE, Ricky S.W.

Fracture behavior and toughening mechanisms of metal matrix composites

LENG, Yang

Brittle-Ductile fracture transition and environmental influence

ZHANG, Tong-Yi

Control of the fine-scale activity in a 2-D jet

ZOHAR, Yitshak

Mesh generation for three dimensional solid models

YUEN, Matthew M.F.

CENTRAL ALLOCATION VOTE (RESEARCH GRANTS COUNCIL)

A laser direct write lithographic system for microelectronics research

CHEUNG, Peter W., CHAN, Philip C.H., SIN, Johnny K.O., WONG, Man, Electrical & Electronic Engineering

UPGC MATCHING FUNDS GRANT

Construction of an environmental wind/wave channel

ZOHAR, Yitshak, KOT, See-Chun, HSU, Chin-Tsau, Mechanical Engineering

BIOTECHNOLOGY RESEARCH INSTITUTE

The mechanisms of retention, mobilization and detoxification of pollutants from wastewater by mangrove ecosystems

WONG, Yuk-Shan, Research Centre; LI, Xiang-Ming, Chemical Engineering

CHIANG'S INDUSTRIAL CHARITY FOUNDATION LTD.

Engineering education for women

TONG, Pin, Mechanical Engineering

Characterisation of mould-filling flows in manufacturing of composite materials

HSU, Chin-Tsau, ZOHAR, Yitshak, Mechanical Engineering

THE CROUCHER FOUNDATION GRANTS

Remote sensing studies of marine pollution in Hong Kong/Pearl River Delta

CHEN, Jay-Chung, KOT, See-Chun, Mechanical Engineering; FANG, Ming, HONG, Huasheng, Research Centre

Computer based system for selecting a least cost treatment scheme for clearing up waters contaminated with organic constituents

LO, Irene M.C., Civil & Structural Engineering

DIGITAL EQUIPMENT CORPORATION

Automatic vehicle license plate number recognition

LEE, Chung-Mong, Computer Science

GEOTECHNICAL ENGINEERING OFFICE, HONG KONG GOVERNMENT

A study of hydraulic fill performance in Hong Kong

SHEN, Chih-Kang, LEE, Kin-Man, Civil & Structural Engineering

HONG KONG TELECOM INSTITUTE OF INFORMATION TECHNOLOGY

Telecommunication networks: A neurocomputing approach to design, management, and control

WONG, Michael K.Y., SZETO, Kwok-Yip, Physics; GEORGE, Donald A., Electrical & Electronic Engineering; JEFFERSON, Thomas R., Management; TAM, Kar-Yan, Business Information System; YEUNG, Dit-Yan, Computer Science

Lightwave technology research programmes

KWOK, Hoi-Sing, Electrical & Electronic Engineering; WONG, George K.L., SOU, lam-Keong, WONG, Kam-Sing, YOO, Kwong-Mow, Physics; HIRAOKA, Hiroyuki, CARLIER, Paul R., LEUNG, Wa-Hung, Chemistry

Development of efficient motion estimation techniques for digital video/HDTV coding

LIU, Ming Lei, AU, Oscar C.L., ZENG, Bing, Electrical & Electronic Engineering; AHMAD, Ishfaq, Computer Science

Mobile telephone propagation prediction and channel allocation

MURCH, Ross D., KO, Tsz-Mei, TSANG, Danny H.K., CHEUNG, Kwan-Fai, YAU, Mark S.F., AU, Oscar C.L., Electrical & Electronic Engineering

Research on high speed networks at HKUST

TSANG, Danny H.K., CHEUNG, Kwan-Fai, YAU, Mark S.F., KO, Tsz-Mei, CAO, Xiren, Electrical & Electronic Engineering, CHANSON, Samuel T., MUPPALA, Jogesh K.R., HAMDI, Mounir, PONG, Man-Chi, Computer Science; LIU, Liming, Industrial Engineering

Very low bit-rate video coding

LIU, Ming Lei, AU, Oscar C.L., CHEUNG, Kwan-Fai, MURCH, Ross D., ZENG, Bing, Electrical & Electronic Engineering; CHIN, Roland T.H., LEE, Chung-Mong, Computer Science

High quality video-on-demand services using asymmetrical digital subscriber line technology on Hong Kong telephone network

LIU, Ming Lei, AU, Oscar C.L., CHEUNG, Kwan-Fai, KO, Tsz-Mei, MURCH, Ross D., TSANG, Danny H.K., YAU, Mark S.F., ZENG, Bing, Electrical & Electronic Engineering

HUTCHISON TELECOM

Wireless communication for the Hong Kong environment

LIU, Ruey-Wen, AU, Oscar C.L., KO, Tsz-Mei, MURCH, Ross D., TSANG, Danny H.K., YAU, Mark S.F., Electrical & Electronic Engineering

SINO SOFTWARE RESEARCH CENTRE

Hong Kong Supernet

SHEN, Vincent Y.S., Computer Science

An information retrieval approach to software understanding

DEERWESTER, Scott C., Computer Science

Environment for interactive access to accurate information in multidatabases

DREW, Pamela A., Computer Science

Intelligent video manipulator

LEE, Chung-Mong, CHENG, Siu-Wing, Computer Science

Cause-effect analysis and graphing tool

THEBAUT, Stephen, Computer Science

Applications of the snake approach to medical analysis

CHIN, Roland T.H., Computer Science

Building a Chinese/Japanese interface to INNOPAC library system

PONG, Man-Chi, Computer Science

Development of a software system for intergrated analysis and design of tall buildings and mechanical components

TONG, Pin, YUEN, Matthew M.F., Mechanical Engineering; CHANG, Paul T.Y., KUANG, Jun-Shang, Civil & Structural Engineering; KEAN, Alex C.Y., Computer Science

A knowledge based system for minimising environmental problems in process industries (MEPPI)

YUE, Po-Lock, Chemical Engineering; KEAN, Alex, Computer Science

Input of Chinese phrases independent of input methods

PONG, Man-Chi, Computer Science

Software reuse in the small

DEERWESTER, Scott C., Computer Science

Apply linguistic and statistical information to aid the input of Chinese

PONG, Man-Chi, Computer Science

Handwritten Chinese character recognition

YEUNG, Dit-Yan, Computer Science

U.K. MINISTRY OF DEFENSE

Atmospheric dispersion acquisition and analysis software

DAVIDSON, Mark J., Civil & Structural Engineering

UK/HK JOINT RESEARCH SCHEME

Experimental measurements and theoretical modelling of the thermodynamic properties of concentrated aqueous atmospheric aerosols

CHAN, Chak-Keung, Chemical Engineering

Computer-aided process safety and environmental protection

YUE, Po-Lock, Chemical Engineering; KEAN, Alex C.Y., Computer Science

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