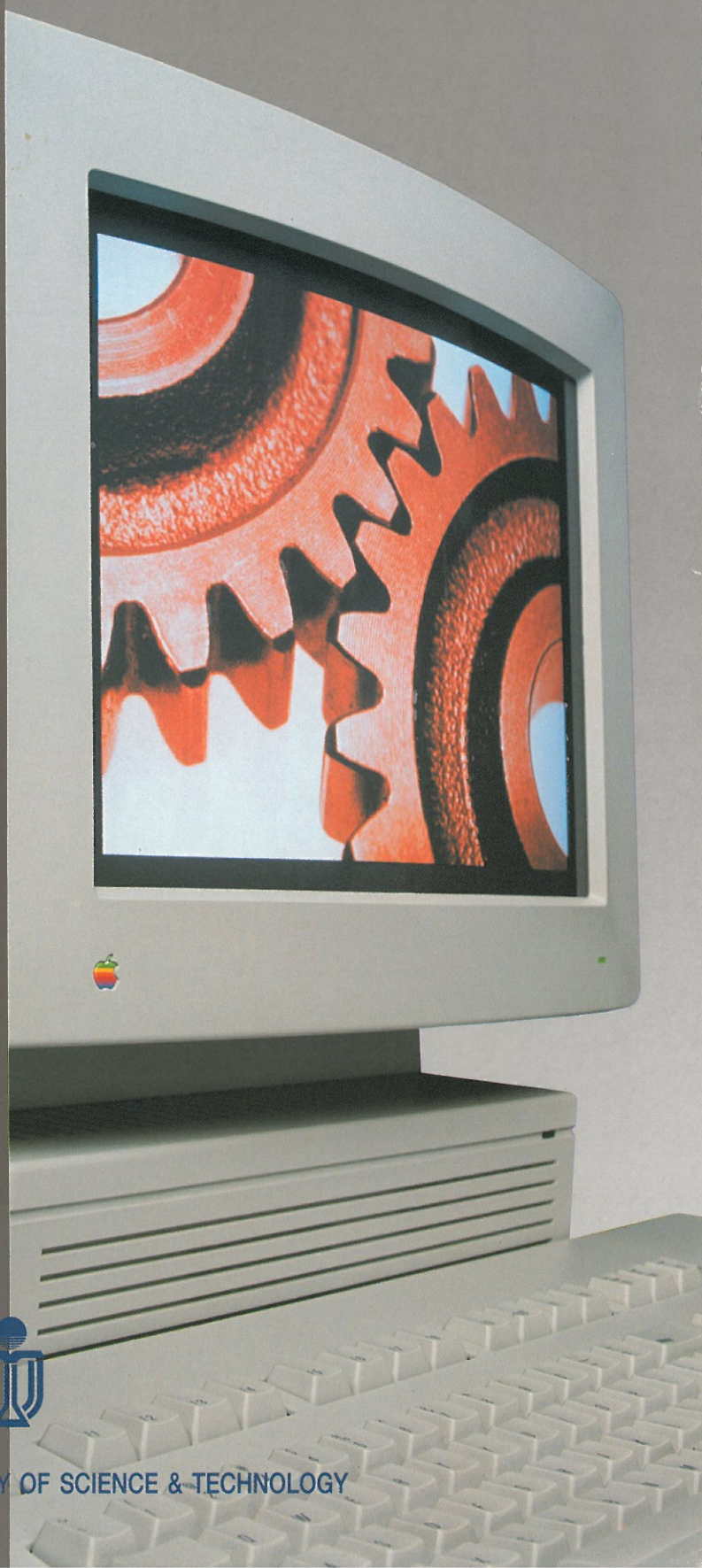
ON LINE & IN GEAR

SCHOOL OF ENGINEERING

STATUS REPORT

1992-93



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

This brochure is produced by the School of Engineering, 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 1992-93

CONTENTS

FOREWORD

Prof. H. K. Chang
Dean

The School of Engineering at HKUST is now 0.8333 year old.

Our University was inaugurated in April 1988, but the first classes began in October 1991, making the University 1.5 years old.

The School of Engineering has a somewhat different history. Its six departments have been launched in a staggered fashion: the Department of Computer Science and the Department of Electrical and Electronic Engineering began their undergraduate as well as postgraduate programmes in October 1991; the Department of Civil and Structural Engineering and the Department of Mechanical Engineering first started their postgraduate programmes in October 1991 and took in undergraduate students only in September 1992; the Department of Chemical Engineering and the Department of Industrial Engineering are scheduled to begin both their undergraduate and postgraduate programmes in September 1993.

Thus if one takes the arithmetic mean of the ages of these six departments, one obtains 5/6 or 0.8333.

Even at this tender age, the School is actively engaging in all three key functions of the University: teaching, research, and service.

An ambitious faculty recruitment programme has, starting from one person in 1990, brought together a faculty of 75 talented and devoted individuals; next year there will be 110. Our student enrolment now stands at 800, including some 200 full-time and part-time postgraduate students; next year there will be 1100 undergraduate students and some 300 postgraduate students. The curricula for six B.Eng. degrees are set. M.Sc. programmes in eight specialties have been devised and a few who entered in Fall 1991 have already completed their degree requirements. Our burgeoning M.Phil. and Ph.D. programmes have a current enrolment of 76 and 30, respectively.

Indeed, our teaching programmes are vibrantly on line.

In research, our faculty have done amazingly well in such a short time. Although more than half of the faculty have arrived on campus within the past year, there are already more than 80 faculty-initiated research projects in the School. Multi-disciplinary research groupings have been and are being formed. Support from both Government and private sources have been obtained with encouraging successes.

We are currently in the process of moving into our permanent space. We will in the next two years establish 44 teaching and research laboratories, totalling some 13,000m^2. These laboratories, along with the University-wide Central Facilities, will be the base from which we hope to spring to the status of a research-intensive technological institution.

Yes, our School is expectantly in gear.

But where do we go from here?

As Vice-Chancellor Chia-Wei Woo pointed out in his speech at the University's Opening Ceremony, our University "is a public institution established by, and for, the people of Hong Kong". While teaching and research are the main missions of our University, it "was given yet one other mission: service to the region's industry and commerce."

Hong Kong and its surrounding region are developing rapidly. In order to utilise our human and financial resources more effectively and to better serve the needs of this region, our University has identified ten areas for organised applied research. The faculty of the School of Engineering will be active and enthusiastic participants in nearly all these organised research activities.

To the extent that consultancy and contract research are compatible with and complementary to their academic obligations, our faculty are also poised to perform such work.

We hope that, even if only 0.8333 year old, we are quickly becoming a contributing force to the socio-economic development of the region that surrounds and nourishes us.

H.K. Chang
Dean
March 1993

ADMINISTRATION AND ORGANISATION

Prof. Frederick H. Lochovsky
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 equivalents. The Associate Dean shares the responsibilities of the Dean in the 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
Professor Frederick H. Lochovsky

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. S. Shen
Head of Department of Electrical and Electronic Engineering
Professor Peter W. Cheung
Head of Department of Industrial Engineering
To be appointed
Head of Department of Mechanical Engineering
Professor Pin Tong

UNDERGRADUATE PROGRAMMES

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 undergraduate students in Engineering must take a set of common courses, while the specialist courses offered by each department provide the student with an integrated and modern view of the discipline. Together these reflect the fundamental facts that the mission of engineering is to produce and synthesise, and that engineering practice must be compatible with economic realities and the social environment. In keeping with the philosophy of providing specialist training with a generalist outlook, engineering undergraduate students take at least 12 credits in Humanities and Social Science, and elective courses in both the School of Science and the School of Business and Management. To complement academic training, the Industrial Training programme offers structured training in a simulated industrial environment.

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

Enrolment

Dept.	1993-94 Intake (Projected)	1992-93 Intake (1st Year Students)	1991-92 Intake (2nd Year Students)
Chemical Engineering	40	—	—
Civil & Structural Engineering	62	48	—
Computer Science	153	144	123
Electrical & Electronic Engineering	153	143	114
Industrial Engineering	40	—	—
Mechanical Engineering	62	40	—
Total	510	375	237

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 departmental undergraduate studies brochures.

Programme Course Credit Requirements

Programme	Engineering		Science	SB & M	H & SS	LANG	Total
	Within Dept.	Outside Dept.					
Chemical Engineering	56	13	18	6	12		105
Civil & Structural Engineering	55	17	12	9	12		105
Computer Science	53	12	16	6	12	3	102
Electrical & Electronic Engineering	51-58	12-18	12	6	12	3	101-103
Industrial Engineering	48	22	15	6	12		103
Mechanical Engineering	53	13	15	6	12	3	102
Requirements (minimum)		12	6	6	12		100
			33				

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 general University and specific departmental entrance requirements.

General Requirements

To satisfy the general University requirements, an applicant must have obtained (for 1994 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 (1) the same sitting in one AL subject plus
   (2) either AS Chinese Language and Culture, or AS Liberal Studies plus
   (3) two AS subjects,

   or (1) the same sitting in two AL subjects plus
   (2) 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 (1) 2 AL subjects (including Chinese Literature) and 1 AS subject;

   or (2) AL Chinese Literature and 3 AS subjects.

   For applicants who are using an alternative language, rather than Chinese, to satisfy the language 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 the Use of English Examination.

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 Advanced Level (with two Advanced Supplementary Level (AS) 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.

1994 Entry

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

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.

POSTGRADUATE PROGRAMMES

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 1992 - 1993

Full-time

Dept.	MSc	MPhil	PhD	Total
Civil & Structural Engineering	3	6	4	13
Computer Science	9	33	3	45
Electrical & Electronic Engineering	7	19	2	28
Mechanical Engineering	0	5	6	11
Total	19	63	15	97

Part-time

Dept.	MSc	MPhil	PhD	Total
Civil & Structural Engineering	18	0	1	19
Computer Science	15	1	4	20
Electrical & Electronic Engineering	16	2	3	21
Mechanical Engineering	27	1	7	35
Total	76	4	15	95

DISCIPLINARY PROGRAMMES

MSc Programmes

These are course work 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 course work 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. For full-time students, the normal length of time for completion of the MPhil degree is one and a half years. 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.

PhD Programmes

PhD programmes focus on original research by the student, but most also require course work (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.

Course Credit Requirement

Dept.	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.

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 M.Sc. 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;

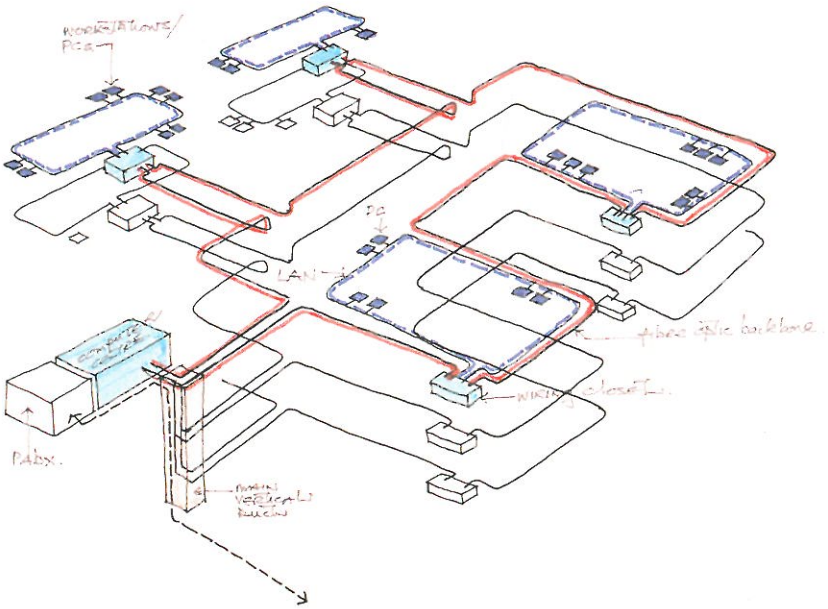
(b) two letters of recommendation mailed directly to the Director of Admissions;

(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.

CENTRE OF COMPUTING SERVICES AND TELECOMMUNICATIONS (CCST)



HKUST has one of the largest FDDI computing networks which exist in the world today. FDDI, the Fibre Distributed Data Interface, is the acronym for the 100MB optic fibre data network which promises to revolutionize computing and become the accepted standard for the decade of the '90s. Related components of nearly equal importance are the "network computing software systems" which control and regulate network access and which manage the sharing of resources and components. With such an advanced and reliable network and computing environment, users have a wide variety of network services available at their fingertips and are able to draw resources from other available systems on the network to work on their computing problems.

To cater for the various needs in teaching, research and administration, different computer platforms are supported on the network. Currently they include VAX/VMS, UNIX, MS-DOS and Macintosh.

Independent processors including minicomputers, workstations and microcomputers are linked to the FDDI backbone network, providing central computing resources to the University in academic and administrative buildings as well as in staff quarters and student halls.

In this network architecture, the PathWorks networking software enables e-mail, terminal sessions, file services, print services, X-windows sessions, and the like to be used across the different platforms. The menu system developed by CCST further enhances an integrated, user-friendly environment for easy access to the network's various services.

UNIVERSITY LIBRARY

As an integral component of the academic programme, the Library supports the University's teaching and research in science, engineering, business and management, the humanities and the social sciences. There are seminar rooms for meetings and instruction, areas for group discussion, and ample study carrels for individual use. Audio-visual materials, both educational and recreational, are available for use in specially equipped facilities.

The rapid development of the University requires a correspondingly rapid rate of growth in its library collection. The Library opened in 1991 with a collection of approximately 120,000 books, bound periodicals and non-print materials. During the 1991-94 triennium and thereafter, the Library plans to add about 60,000 items per year to provide support for the University's programme development. Reaching beyond local holdings, the Library has made extensive provisions for automation. The Library Online System forms a part of the campus-wide network, and is therefore accessible from every part of the campus. Through the Online System, users are able to consult a variety of bibliographic and full text information as well as to search CD-ROM databases. Currently, the University Library has over 60 such databases, ranking it among the very top in all academic institutions in the world. The University Library is linked via telecommunication networks to libraries and databases in institutions locally and overseas.

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 modern world languages such as Japanese, Spanish, and French.

MATERIALS CHARACTERISATION AND PREPARATION CENTRE (MCPC)

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), specifically 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 organisations. Any spare equipment capacity in the Centre is available to clients from other Hong Kong tertiary institutions, government bodies, and private industry.

Instrumentation already in operation includes both scanning and transmission electron microscopes, X-ray diffraction systems, a multi-technique surface analysis system, a nuclear magnetic resonance spectrometer, and thin film preparation and measurement equipment. These items are particularly suited to the study of electronic, magnetic and optical materials with potential for commercial exploitation.

MICROELECTRONICS FABRICATION CENTRE (MFC)

The mission of the Microelectronic 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 m^2 allocated to the Centre in Phase I is devoted to Class 1000 clean rooms where state-of-the-art microelectronic processing equipment is located. The Centre's clean rooms are divided into four basic fabrication modules, namely, photolithography, thermal diffusion/thin film deposition, dry/wet etching and metallisation.

TEACHING AND RESEARCH LABORATORIES

In 1993 the School of Engineering will move into Phase II of the Academic Complex in which all of the School's teaching and research laboratories will be housed. Some of the laboratories planned for the School are listed below.

Industrial Training Centre

Manufacturing Laboratory
Automation Laboratory
Robotics Laboratory
Control Laboratory
Design Laboratory

Chemical Engineering

Process Engineering Applications Laboratory
Advanced Materials Research Laboratory
Bioengineering Research Laboratory
Environmental Engineering Research Laboratory
Modelling and Computing Laboratory
Pilot Plant Laboratory
Analytical Laboratory

Civil and Structural Engineering

Structures/Solid Mechanics/Dynamics Laboratory
Geotechnical Laboratory
Water Resources & Environmental Fluid Mechanics/Hydraulics Laboratory
Construction/Concrete/Materials Laboratory
Environmental Laboratory
Surveying Laboratory
Computational Mechanics Laboratory

Computer Science

Personal Computer Laboratory
Unix Laboratory I, II and III
Database, Knowledge Base, and Systems Laboratory
Parallel Computation and Distributed Systems Laboratory
Graphics/Visualization Laboratory
AI/Robotics Laboratory
Project Laboratory

Electrical and Electronic Engineering

Basic Electronics Core Course Laboratory
Device Characterisation and Test Laboratory
Electromagnetics Laboratory
Communication and Network Laboratory
Digital Electronics and Microprocessor Laboratory
VLSI Design and Test Laboratory
Analog Electronics Laboratory
PC CAD Laboratory
Computer Engineering Laboratory
Senior Project Laboratory
Integrated Sensor and Instrumentation Laboratory
Video Technology Laboratory
Image Processing Laboratory
Digital Signal Processing Laboratory
Systems Research Laboratory
Motor Control Laboratory
Robot Manipulation Laboratory
Photonic Materials Laboratory
Electro-optic Laboratory
Wireless Communication Laboratory

Industrial Engineering

Computer Integrated Manufacturing (CIM) Laboratory
Quality Control Laboratory
Facility Planning Laboratory
Material Handling Laboratory
System Performance and Simulation Laboratory
Industrial Control Laboratory
Ergonomics Laboratory
Work Methods Laboratory
Industrial Psychology Laboratory
Packaging Laboratory

Mechanical Engineering

Fluid Mechanics Laboratory
Materials Laboratory
Acoustic Laboratory
Micromachines Laboratory
Aerosol Clean Room Laboratory

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 newest 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.

FUNDING SOURCES

Research in the School of Engineering is funded from a variety of sources, both government and private. At present, there are already over 70 research projects in the School (see Appendix 2). Application forms for all competitive research grants are normally available from the HKUST Office of Contract and Grant Administration (OCGA). Application deadlines cited below are subject to change.

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. Hence, these items are generally not supported by the UPGC-funded research grants.

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, consumable, and travel expenses. The deadline for submission to RGC is 1 November for grants beginning no earlier than 1 July of the following year.

RGC Direct Allocation Grant

The RGC provides a block grant to each of the seven tertiary institutions funded by the UPGC for allocation to research projects. In 1992/93 the total funds available amounted to HK$3.5 million. Awards are made on a competitive basis, are normally for one year, and cannot exceed HK$200,000 per award. Grant funds provide support mainly for research staff and may support a *modest* amount of equipment, consumable, and travel expenses. The deadline for submission in the 1992/93 academic year was 1 September for awards starting 1 October.

RGC Central Allocation

The 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. The deadline for submission to RGC is normally in early Fall.

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. 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 funded pattern of disciplinary research. In 1992/93 the total funds available amounted to HK$12 million. Awards are made on a competitive basis and are normally for one to three years. Grant funds provide support mainly for research staff and may support a *modest* amount of equipment, consumable, 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. In the 1992/93 academic year there were four deadlines for submission: 1 August 1992; 1 November 1992; 1 February 1993 and 1 May 1993.

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. Requests for proposals (RFPs) for these sources are available from the Office of Contract and Grant Administration.

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.

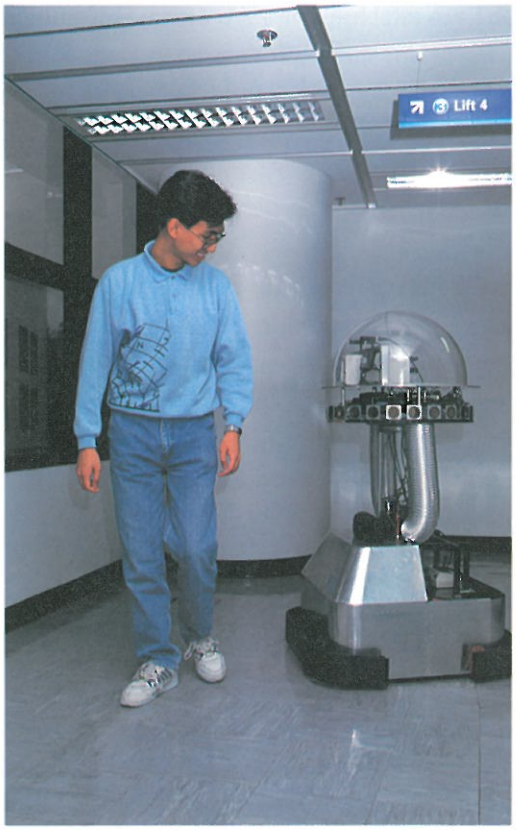
Various branches of the Hong Kong government from time to time issue requests for proposals. There are also many private businesses and corporations in Hong Kong which provide opportunities for research or consulting contracts. A sample of some of these which have or have had contracts with faculty at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

Private Companies
Hutchison Telecom
Mass Transit Railway Corporation
NEC Corporation
Chrontel, Incorporated
Glaxo Hong Kong Ltd.
Hat Fash Ltd.

Hong Kong Government
Civil Aviation Department
Geotechnical Engineering Office

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 complex mixture 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 and interdisciplinary research.

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 in software applications and to serving the needs of Hong Kong.

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 spurning the development of biotechnology-related interests in the relevant Departments, and the attraction of world-class scientists and engineers to HKUST. Currently fifteen 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 Telecommunication 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.

DEPARTMENT OF CHEMICAL ENGINEERING

Prof. Po-Lock Yue
Head

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 the individuals and capital which make them possible, and do the research necessary for new developments. They supply 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, BE, PhD *McGill*

Professor:

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

Reader:

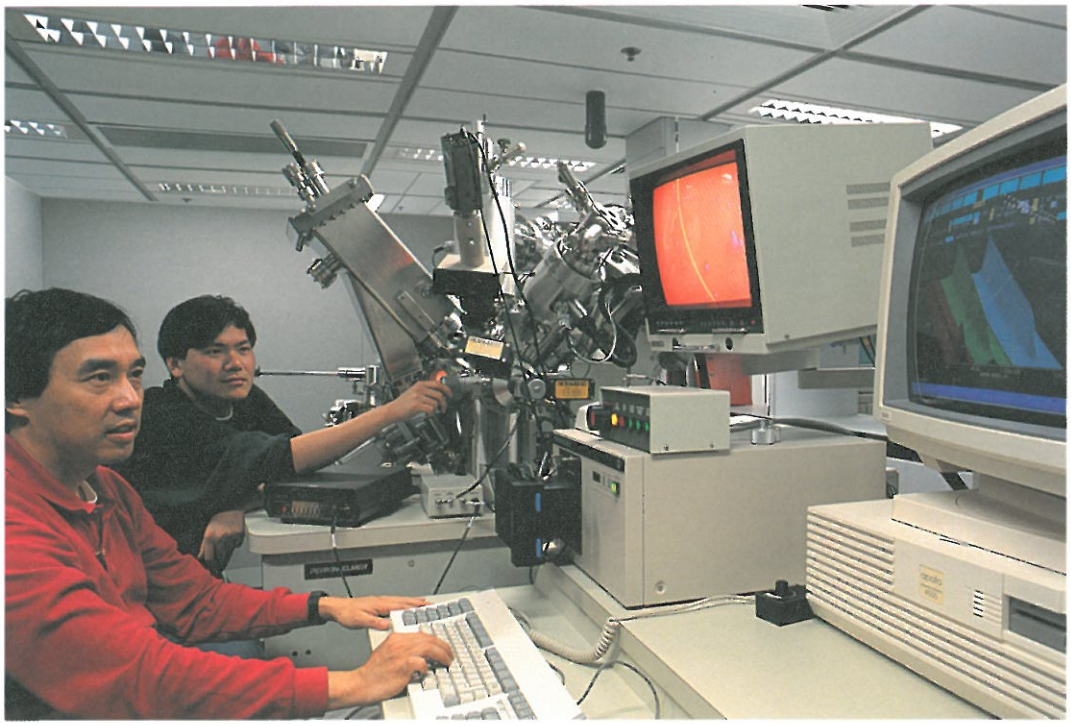
Chi-Ming CHAN, BS *Minnesota*; MS, PhD *Calif Inst of Tech*

Lecturers:

Chak K. CHAN, BS *Texas, Austin*; PhD *Calif Inst of Tech*

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

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 in four areas. They are: 1) Advanced Materials, 2) Biochemical Engineering, 3) Environmental Engineering, and 4) Modelling and Computation. Brief descriptions of these research emphases are given 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, telecommunications, high performance polymers, advanced ceramics and composites. Chemical engineers have actively participated in research that has made these advances possible. At HKUST, research efforts will be focused on novel polymers and materials for photonics, electronics and recordings. 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 will be studied in depth. Research programmes are supported by the Microelectronics Fabrication Centre and the Materials Characterisation and Preparation Centre.

Biochemical Engineering

Biotechnology and biomedicine have emerged as new opportunities for chemical engineers. Potential applications are artificial organs, therapeutic pharmaceuticals 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 protein separation is also an active research endeavor. Research programmes are conducted in conjunction with 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 at developing 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 world-wide. The Department intends to participate in collaborative programmes with other departments in the University and other research and higher education institutions, particularly in South East Asia. Examples of projects include air pollution monitoring and modelling, pollutant formation and abatement, gas to particulate conversions, combustion, stack dispersions, conventional and advanced methods for the treatment of waste water, hazardous waste and micro-contamination, waste management, 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 will be developed to model the associated 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.

DEPARTMENT OF CIVIL AND STRUCTURAL ENGINEERING

Prof. Chih-Kang Shen
Head

Civil and structural engineering is a broad-based discipline in which technical skills are applied to solve problems related to the maintenance and advancement of civilisation. Solutions to most societal problems have a component which involves civil and structural engineering, including the development, utilisation, and control of resources. Since the practice of the profession is rapidly changing, the civil and structural engineering programme emphasises the teaching of fundamental knowledge together with basic technical and human skills to prepare the students to meet the challenges found in the development of a modern society. In particular, the programme aims at familiarising the student with the broad and interdisciplinary nature of civil and structural engineering, and with the role and responsibility of civil engineers in the planning, design and construction of modern infrastructures.

FACULTY

Professor and Head of Department:

Chih-Kang SHEN, BS *National Taiwan*; MS *New Hampshire*; PhD *Calif, Berkeley*

Professors:

Thomas E. STELSON, BS, MS, DSc *Carnegie Inst of Tech* (Pro-Vice-Chancellor for Research and Development)

Howard Ju-Chang HUANG, BS *National Taiwan*; MS, PhD *Texas, Austin*

Paul Tse-Yung CHANG, BS *National Taiwan*; MS, PhD *Calif, Berkeley*

Senior Lecturer:

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

Lecturers:

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

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

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

Irene Man-Chi LO, BSc *National Taiwan*; MSc, PhD *Texas, Austin*

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

David G. WAREHAM, BASc, MASc *Waterloo*; PhD *British Columbia*

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 shift as changes are called for 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 being developed under the Port and Airport Development Scheme (PADS) in Hong Kong has 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.

Environmental And Water Resources Studies

Hong Kong is a densely populated community which is surrounded by a marine environment. Proper management of the environmental quality of both land and ocean waters is crucial to the well-being of the people of Hong Kong. In order for further expansion to occur in the already crowded commercial and industrial sectors, unique environmental strategies and technologies must be adopted to avoid further deterioration of the environmental quality. The Civil and Structural Engineering Department intends to pursue an active role in environmental and water resources research, with the goal of contributing to the preservation and restoration of environmental quality in Hong Kong. The general categories of research include: water quality management and pollution control; handling and disposal of solid and hazardous wastes; computational hydraulics for modelling pollutant transport; and comprehensive water resources planning.

DEPARTMENT OF COMPUTER SCIENCE

Prof. Vincent Y. S. Shen
Head

Computer science is the discipline that studies the structure, function, and application of computers. The computer science programmes at HKUST cover such topics as algorithmic analysis and design, artificial intelligence, communications and networks, computer architecture, data and knowledge base management, human computer interaction, operating systems, programming languages and compilers, and software engineering. Traditional computer science research covers computer hardware (the physical components of computer systems) and computer software (the logical instructions to the computer for problem solving). Computer science programmes at HKUST will cover both areas but will particularly emphasise software. This emphasis is consistent with a world-wide trend of increasing importance of computer software in research as well as various applications.

FACULTY

Professor and Head of Department:

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

Professors:

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

Frederick H. LOCHOVSKY, BASc, MSc, PhD *Toronto*
(Associate Dean of Engineering)

Reader:

Samuel T. CHANSON, BSc *Hong Kong*, MSc, PhD *Calif, Berkeley*

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 Univ*

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

Lecturers:

Ishfaq AHMAD, BSc *Univ of Engineering and Technology*; MS, PhD *Syracuse*

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

Mounir HAMDI, BS *Southwestern Louisiana*; MS, PhD *Pittsburgh*

Kamalakar KARLAPALEM, BSc *Bombay*; MS *Indian Statistical Inst*; MS *Indian Inst of Tech*; PhD *Georgia Inst of Tech*

Alex Chia-Yee KEAN, BCS, MSc *Acadia Univ, Canada*; PhD *British Columbia*

Chung-Mong LEE, BSc, MSc, PhD *Minnesota*

Qing LI, BE *Hunan*; MSc, PhD *Southern Calif*

Jogesh K. MUPPALA, BE *Osmania*; MS *Southwestern Louisiana*; PhD *Duke*

Man-Chi PONG, BSc (Eng), MPhil *Hong Kong*; MSc *Calif, Los Angeles*; PhD *Kent, Canterbury*

Chung-Dak SHUM, BS, MS *Washington Univ*; PhD *Calif, Los Angeles*

Michael D. STIBER, BS *Washington Univ*; MS, PhD *Calif, Los Angeles*

Dekai WU, BS *Calif, San Diego*; PhD *Calif, Berkeley*

Dit-Yan YEUNG, BSc (Eng), MPhil *Hong Kong*; MS, PhD *Southern Calif*

Visiting Scholar:

Stephen M. THEBAUT, BA *Duke*; MS, PhD *Purdue*

RESEARCH AREAS

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 under investigation are: *algebraic complexity of computation*; *applications of logic*; *automata and formal language theory*; *combinatorial optimization*; *computational geometry*; *graph theory and algorithms*; *probabilistic and randomized 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. Topics under investigation include: *computer vision*; *expert systems*; *image processing*; *logic programming*; *machine learning*; *natural language processing*; *neurocomputing*; *Robotics*.

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. Topics under investigation include: *computer architecture and organisation; fault-tolerant computing; operating systems; parallel and distributed computing; real-time systems; computer communication and networking; 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. Technologies of relevance to this research area include database modelling and design, query languages, 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. Topics under investigation include: *conceptual modelling and design; DBMS internals; distributed, federated, and heterogeneous databases; information retrieval; intelligent database systems; organisational activity support; user level facilities.*

Software Engineering

Software engineering 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. Topics under investigation include: *Chinese computing, formal specifications; graphical user interface design; program visualisation; requirements engineering; software architecture design for multi-media communications.*

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

Prof. Peter W. Cheung
Head

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. It is fair to say that 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.

FACULTY

Professor and Head of Department:

Peter W. 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-Shing KWOK, BS *Northwestern*; MS, PhD *Harvard*

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

Ruey-Wen LIU, BS, MS, PhD *Illinois, Urbana-Champaign*

Visiting Professor:

Xie-Ting LING, Graduate *Shanghai Jiao Tung*, Postgraduate *Fudan*

Reader:

Philip C.H. CHAN, BS *Calif, Davis*; MS, PhD *Illinois, Urbana-Champaign*

Senior Lecturers:

Zexiang LI, BS *Carnegie-Mellon*; MS, PhD *Calif, Berkeley*

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

Lecturers:

Oscar C. AU, BS *Toronto*; MA, PhD *Princeton*
Aaron BUCHWALD, BSEE *Iowa*; MS, PhD *Calif, Los Angeles*
Kwan-Fai CHEUNG, BS, MS, PhD *Washington*
Ho-Chi HUANG, BS, MS *National Taiwan*; PhD *Washington*
Tsz-Mei KO, BEE, MEE *Cooper Union*; PhD *Calif Inst of Tech*
Ross David MURCH, BS, PhD *Canterbury, Christchurch*
Vincent M.C. POON, BSc, MPhil, PhD *Chinese Univ of Hong Kong*
Johnny K.O. SIN, BS, MS, PhD *Toronto*
Danny H.K. TSANG, BS *Winnipeg*; BEng, MS *Technical Univ of Nova Scotia*; PhD *Pennsylvania*
Man WONG, BS, MS *MIT*; PhD *Stanford*
Mark Sze-Fong YAU, BSc *Hong Kong*; MS *Boston*; PhD *Illinois, Urbana-Champaign*
Bing ZENG, BS, MS *Univ of EST of China*; PhD *Univ of Technology, Finland*

Assistant Lecturer:

Jack K.C. LAU, BS, MS *Calif, Berkeley*

RESEARCH AREAS

Microelectronics and Semiconductor Devices

Microelectronics and semiconductor devices will become an increasingly important research area in Hong Kong. With the establishment of the Microelectronics Fabrication Centre (MFC), the Department intends to place major emphasis in the semiconductor devices and microelectronics area. It is anticipated that research in microelectronics and semiconductor devices concentrate on the following topics :

- Advanced semiconductor materials preparation and characterisation
- Microwave and high frequency semiconductor devices
- Custom integrated circuits fabrication technology
- Integrated sensor technology
- Optoelectronic devices and integrated optics

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, optoelectronic devices could influence the communication industry, and integrated sensor technology could have impact in medical electronics, automotive electronics, industrial control, and automated manufacturing.

Integrated Circuits (IC), Electronics, Microprocessors, and Instrumentation

Research in this area will cover basic digital and analogue IC design and applications. Particular emphasis will be placed on analogue IC design which is important for Hong Kong's future electronic technology and product development. Other emphases will be on application of modern electronics and signal processing, Application Specific Integrated Circuits (ASIC) for medical electronics, speech processing, and telecommunications, among others. Another important area is the application of microprocessors in modern electronics and instrumentation. The emphasis here will be on microprocessor- and microcontroller-based instrumentation design and development.

Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)

Research in CAD will cover the various fundamental and general issues in CAD including the generation of CAD tools for specific applications. In the IC area, CAD tools for more efficient analogue IC design and simulation and for mixed analogue and digital signal design, layout and simulation are both needed. In the rapidly advancing and also increasingly important area of microsensors, there are also needs for CAD tools to aid in the overall research and development in this field.

Another important area is the development of efficient CAD tools for microcomputers because of their immense popularity, low cost and increased processing power. CAD tools using the integrated framework environment concept for large scale multi-user engineering design projects are topics of particular interest. There is also a need to develop the multi-media graphics user interface and the integration of multi-media technology with CAD which will open large industrial and commercial potentials in the future.

Information and Communication Technology

Rapid advances in computer and communication technologies have resulted in the increasing merger of these two fields. The boundaries between computing, switching and digital transmission equipment have started to fade. As a result, the same digital techniques are being used for data, voice, and image transmission. Merging and evolving technologies, coupled with increasing demands for efficient and timely collection, processing, and dissemination of information, are leading to the need of developing an integrated information and telecommunication system that transmits and processes all types of data. This is an important area for Hong Kong to support its leadership as a global communication, business and commercial centre. Research in this area will also help to support the Hong Kong Telecom Institute of Information Technology (HKTIIT). Improvement in information and communication technology will also make significant impacts on other high tech industries in Hong Kong.
At this time, we have identified a number of high potential areas for research in information technology which include:

- Digital communications and control
- Multi-dimensional and multi-media digital signal processing
- Pattern recognition and classification
- Real time image processing and transmission
- Connectionist systems
- Knowledge engineering
- Computer networking technology

DEPARTMENT OF INDUSTRIAL ENGINEERING

Industrial engineering is a broad-based discipline which is built upon a collection of methodological tools for problem-solving in engineering and manufacturing management, with productivity improvement as the overall objective. Unique among the engineering disciplines, industrial engineering is primarily concerned with translating designs into economic products, rather than with the fundamental design of the products themselves. Modern industrial engineering encompasses a wide spectrum of sub-specialities, from the "people-oriented" human-factor engineering to the "high-tech sounding" computer-integrated manufacturing (CIM). Other examples are manufacturing strategy, facility and environment design, quality assurance, and operations research and systems engineering. Industrial engineers work in diverse industries and environments under a wide variety of job titles.

FACULTY

Professor and Head of Department:

To be appointed

Visiting Senior Lecturer:

Kim A. STELSON, BS *Stanford*; MS, PhD *Massachusetts Inst of Tech*

Lecturer:

Liming LIU, BEng, MEng *HUST, China*; PhD *Toronto*

RESEARCH AREAS

IE is a relatively young yet very broad and all encompassing discipline; its applications also depend on the technological and social environment that is still rapidly advancing. Without the collective wisdom of its faculty which is yet to be established, it is rather difficult to identify the major research areas of the Department. However, a tentative list still needs to be developed at least for recruiting and budgetary purposes.

This Department must focus its research efforts on areas of greatest interest to all of the stake holders of the IE programmes. Active research work at HKUST should satisfy the needs of the economic communities of Hong Kong including the Pearl River Delta Region. The Department must also exploit the maturing technologies that will provide the best conditions for the forefront of IE research. The focused research areas must also be appropriate for the university environment and likely yield significant advances of both academic and practical values.

With these factors in mind, the following focused areas are tentatively identified:

Concurrent Engineering Design

Aspects of current engineering design of the product and its manufacturing support systems by expending the theory and the innovative use of CAD/CAM (computer aided design, computer aided manufacturing), grouping technology and CAPP (computer aided process planning), experiment design, quality control, failure analysis, yield management, operations research and applied probability and statistics techniques. Application to design for reliability and quality, machinability, producibility, assembly, testing, yield and field service, standardization, unit cost and life cycle cost as well as culture, organization and reward systems.

Computer Integrated Manufacturing (CIM)

Development of shop floor technology-driven and application-oriented computer communication, data acquisition and validation, and database management techniques. Interfacing and integration of hardware and software systems of total production systems such as manufacturing resource planning, capacity planning, shop floor control, parts sequencing, machine loading, tool management, customer order processing, vender selection, and procurement. Application to the development of user friendly software systems of computer controlled equipment such as robots, automated transported vehicles, surface mounting devices and other automated parts feeding, assembly, and packaging devices.

Work and Facility Design

Design of flow line configuration and balance, shop floor space allocation, plant layout, facility plan, and location selection using network analysis, computer scaled animation, graphic simulation, artificial intelligence and operations research techniques. Application to the design of work station, clustered production cell, material handling system, flexible production system, and focused factory.

Human Factor Engineering

Design of tasks, equipment, systems, and work environment using physiological, psychological, and sociological theories. Study of man-computer-machine interfaces, distributed data collection, communication security, information gathering and distribution, and control systems. Instrumentation and analytic methods for the design and conducting of ergonomic studies. Application to job design, time standards, industrial training, job evaluation, labor relation, incentive systems development, industrial hygiene, and safety engineering, as well as software packaging, documentation, and quality assurance.

Engineering Economic Systems

Microeconomical analysis of industrial and other technology-based systems. Public policy analysis and technology assessment. Planning and evaluation of large scale systems. Decision analysis and decision support systems. Application to financial and capital investment, equipment procurement and replacement, and project management as well as energy management, contamination control, waste treatment, lighting and HVAC (heat, ventilation and air conditioning) control.

Mathematical Programming and Stochastic Optimization

Theoretical study of operations research techniques such as linear, non-linear, integer, and dynamic programming, combinatorial analysis, complexity theory, parallel algorithms, and heuristic, discrete optimization. Application to all of the above mentioned research areas on topics such as routing, scheduling, allocation, and systems analysis, modelling and simulation for the manufacture, assembly, packaging and distribution of discrete production and service functions.

DEPARTMENT OF MECHANICAL ENGINEERING

Prof. Pin Tong
Head

Mechanical engineering is a broad-based discipline that applies technical skills to the creation and operation of mechanical systems. Mechanical engineers study physical phenomena, design mechanical systems, and manage resources to promote economic and social development. The mechanical engineering programme at HKUST aims to prepare students to deal with technological issues of mechanical systems and advance the state of knowledge in the profession.

FACULTY

Professor and Head of Department:
Pin TONG, BS *National Taiwan*; MS, PhD *Calif Inst of Tech*

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)

Senior Lecturers:
Chin-Tsau HSU, BS, MS *National Taiwan*; MS, PhD *Stanford*
See-Chun KOT, BS *Illinois, Urbana-Champaign*; MEng, PhD *Cornell*
Matthew Ming-Fai YUEN, BSc *Hong Kong*; PhD *Bristol*

Lecturers:
Yang LENG, BS *Chongqing*; MS *Michigan Tech*; PhD *Virginia*
Sabbir S RANGWALA, BS *Bombay*; MS *Texas*; PhD *Calif, Berkeley*
Wai Ming TO, BSc *Glasgow*; PhD *London*
Yitshak ZOHAR, BS, MS *Technion-Israel Inst of Tech*; PhD *Southern Calif*

Visiting Scholars:
Kim A. STELSON, BS *Stanford*; MS, PhD *Massachusetts Inst of Tech*
John C. Welch, MSc *Manchester*

RESEARCH AREAS

Solid Mechanics, Dynamics, and Acoustics

This research involves the application of mathematics, theoretical mechanics, and computational skills to the design and analysis of mechanical components and systems. Research includes 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 moulding; 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 will focus in 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 (i) processes that minimise both the consumption of natural resources and the production of pollutants; (ii) waste-treatment methods to reduce the discharge of pollutants; and (iii) technologies to halt the degradation and/or to rejuvenate already polluted surroundings. Research will include technical assessments, computer modelling, studies of the phenomena involved, and studies of environmental control for options. Field work will also be undertaken to collect critical data needed to evaluate systems, concepts and models. Research in thermoscience shall include 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. The research 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 will cover topics such as design theory, abstraction and knowledge representation, fuzzy set theory, system control theory, and decision theory. This research will emphasise applications in design and manufacturing automation. Research will also be conducted on computer-aided software tools to support the automation of design and manufacturing operation derived from the production control theory. The hardware aspect of this research will include 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.

APPENDIX 1:

ACADEMIC ADVISORY COMMITTEE

To ensure the currency and relevance of our programmes, the School of Engineering has enlisted local and overseas advisors to advise on strategic and curricular planning, programmatic issues, co-operative education, collaboration with industry in research, and the scope and operation of the School's Central Facilities.

The Academic Advisory Committee was first appointed in July 1990 and comprises world-renowned academics and senior academic administrators. While all are well-established scholars in the engineering disciplines, several of them are also holding the position of rector, provost, or vice-president at their institutions. Their advice has been particularly useful in our strategic planning and development, research and curricular development, as well as faculty recruitment and evaluation. Membership of the Committee is as follows:

Sir Eric A. Ash, CBE, FRS
Rector
Imperial College of Science,
Technology and Medicine
London
UK

Professor J. Ray Bowen
Dean
College of Engineering,
University of Washington
Seattle, Washington
USA

Professor Gary W. Heinke
Dean
Faculty of Applied Science and Engineering
University of Toronto
Toronto, Ontario
Canada

Professor Paul C. Jennings, NAE
Vice-President and Provost
California Institute of Technology
Pasadena, California
USA

Professor Ernest S. Kuh,
Academia Sinica, NAE
Electronics Research Laboratory
University of California
Berkeley, California
USA

Professor Alan W. Pense
Provost and Vice-President
Lehigh University
Bethlehem, Pennsylvania
USA

Professor Winfred M. Phillips
Dean
College of Engineering
University of Florida
Gainesville, Florida
USA

Professor Karl S. Pister, NAE
Chancellor
University of California
Santa Cruz, California
USA

Professor Leonard M. Silverman, NAE
Dean
School of Engineering
University of Southern California
Los Angeles, California
USA

Professor Henry T. Yang, NAE
Dean
School of Engineering
Purdue University
West Lafayette, Indiana
USA

Professor Hiroyuki Yoshikawa
Vice-President
University of Tokyo
Tokyo
Japan

APPENDIX 2:

RESEARCH GRANTS

RGC DIRECT ALLOCATION GRANT

Chemical Engineering

Compositional dependence of water activities of ammonium sulfate - sulfuric acid - water mixtures.
Chan, Chak Keung

Civil and Structural Engineering

Analysis and design of stiffened tall building structures.
Kuang, J.S.

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.; Davidson, Mark J.

Analysis of framed slender reinforced concrete columns for long-term loading.
Mickleborough, Neil

Denitrification of high strength leachates on sequencing batch reactors.
Wareham, David G.

Computer Science

Parallel processing on a network of workstations.
Ahmad, Ishfaq

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

Architectures for metropolitan area networks.
Hamdi, Mounir

Comparing approaches to nonmonotonic and default reasoning.
Kaminski, Michael

Evaluation of algorithms to materialize distributed relational databases.
Karlapalem, Kamalakar

Federated knowledge and inference management systems.
Kean, Alex

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.

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

Electrical and Electronic Engineering

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.

Silicon based optical devices for optical communications.
Huang, Ho-Chi

Decoding with feedback for a Cascaded Reed-Solomon Convulational Code.
Ko, Tsz-mei

Hardware synthesis for pattern recognition algorithms.
Lau, Jack; Chan, Philip C.H.

Robust nonholonomic motion planning with collision-avoidance.
Li, Zexiang

Blind signal processing.
Liu, Ruey-wen

Advanced silicon-on-insulator (SOI) technology.
Poon, Vincent M.C.

Advanced monolithic power integrated circuit technology.
Sin, Johnny

Model-based sensor array processing for high resolution imaging.
Yau, Mark Sze-Fong

Mechanical Engineering

Enhanced heat transfer in packed channels with periodic flows.
Hsu, Chin-Tsau

Fracture behavior and toughening mechanisms of metal matrix composites.
Leng, Yang

Control of the fine-scale activity in a 2-D jet.
Zohar, Yitshak

Mesh generation for three dimensional solid models.
Yuen, Matthew M.F.

RGC COMPETITIVE EARMARKED RESEARCH GRANT

Civil and Structural Engineering

An apparatus to determine the soil-reinforcement interactive behavior.
Shen, Chih-Kang; Lee, Kin-Man

Computer Science

Architectures for high-speed fibre-optic networks.
Hamdi, Mounir

Image processing and pattern recognition using parallel pipeline architectures.
Lochovsky, Amelia C.W. Fong

Organizational activity support and information management.
Lochovsky, F.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

A visual environment for software understanding and prototyping.
Shen, Vincent

Symbolic and connectionist approaches to inductive learning.
Yeung, Dit-Yan

Electrical and Electronic Engineering

A novel technique for mixed circuit and device simulation.
Chan, Philip C.H.

Development of a quick turn technology for analog integrated circuit design.
Cheung, Peter W.; Chan, Philip C.H.; Lau, Jack

Development of silicon optoelectronic integrated circuits for optical communications.
Huang, Ho-Chi; Lo, Tai Chin

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

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

Export system for the design of jigs & fixtures of machined parts.
Yuen, Matthew M.F.

UPGC RESEARCH INFRASTRUCTURE GRANT

Research in mobile robotic materials transport systems.
Pong, Ting Chuen, CS; Yuen, Matthew M.F., ME; Cheung, Kwan Fai, EEE;
Huang, Ho-Chi, EEE

Land reclamation and geotechnical engineering in Hong Kong.
Chen, Jay-Chung, RC; Shen, Chih-Kang, CE; Lee, Kin-Man, CE

Integrated gas sensor technology research programme.
Nieveen, Wesley R., MCPC; Yu, Nai-Teng, CHEM; Fung, Kwok Kwong, PHYS;
Cheung, Peter W., EEE; Sin, Johnny K.O., EEE; Chan, Philip C.H., EEE;
Yau, Mark S.F., EEE

Research and development of silicon microwave monolithic integrated circuit (MMIC) process technology.
Hiraoka, H., CHEM; Lo, Tai Chin, EEE; Sin, Johnny K.O., EEE; Huang, Ho-Chi, EEE
Poon, Vincent M.C., EEE

Integrated study of contaminated sediment.
Lee, Ophelia C.W., CCST; Kot, See Chun, ME

Structural system identification and test bed dvelopment.
Chen, Jay-Chung, RC; To, Wai Ming, ME; Lee, Kin-Man, CE

Fabrication and mechanical behavior of in situ polymer composites.
Leng, Yang, ME; Tong, Pin, ME; Hiraoka, H., CHEM; Carlier, Paul R., CHEM;
Fung Kwok Kwong, PHYS

Toward establishing a digital image processing programme.
Cheung, Kwan Fai, EEE; Murch, Ross D., EEE; Tsang, Danny H.K., EEE;
Yau, Mark S.F., EEE; Au, Oscar, EEE; Lochovsky, Amelia C.W. Fong, CS;
Altman, Michael S., PHYS

An intelligent manufacturing system for the Hong Kong apparel industry.
Tam, Kar Yan, BIS; Yuen, Matthew M.F., ME; Yu, Kai Ming, ME;
Mak, Simon K.H., PVC-RDO; Jarvis, Christine W., RC

Parallel computation in solid and fluid mechanics.
Tong, Pin, ME; Hamdi, Mounir, CS; Chang, Paul T.Y., ME; Hsieh, Din Yu, MATH

A common Chinese computing infrastructure for different computer systems.
Law, Lawrence H.Y., CCST; Cheng, Victor Pat Leung, CCST; Pong, Man Chi, CS;
Yeung, Dit Yan, CS

Characterization and profiling of airborne particulate matters in Hong Kong.
Kwan, Joseph K.C., EMO; Kot, See Chun, ME; Fang, Ming, RC;
Wan, Terence S.M., CHEM

Application of mangrove ecosystems on domestic and industrial wastewater treatment.
Kot, See Chun, ME; Wong, Yuk-Shan, BIOL

Development of hemoglobin-based technologies and instrumentation.
Cheung, Peter W., EEE; Wong, J. Tze-Fei, BICH; Leung, Wa Hung, CHEM

Laser assisted chemical vapor deposition of advanced opto-electronic materials.
Wong, Man, EEE; Hiraoka, Hiroyuki, CHEM; Xiao, Rongfu, PHYS; Yang, Shihe, CHEM

Novel materials for magnetic storage science and technology.
Ko, Tze Man, ChE; Lo, Tai Chin, EEE; Yan, Xiao, PHYS; Altman, Michael S., PHYS; Hiraoka, H., CHEM; Sou, Iam Keong, PHYS; Szeto, Kwok Yip, PHYS

THE CROUCHER FOUNDATION

Remote sensing studies of marine pollution in Hong Kong/Pearl River Delta.
Chen, Jay-Chung, RC; Fang, Ming, RC; Kot, See Chun, ME; Hong, Huasheng, RC

CHRONTEL, INC., CA, USA

An integrated battery manager.
Lau, Jack, EEE

GEOTECHNICAL ENGINEERING OFFICE, HONG KONG GOVERNMENT

A study of hydraulic fill performance in Hong Kong.
Shen, Chih Kang, CE; Lee, Kin-Man, CE

HONG KONG TELECOM INSTITUTE OF INFORMATION TECHNOLOGY

Telecommunication networks: A neurocomputing approach to design, management, and control.
Wong, Michael K.Y., PHYS; George, Donald A., EEE; Jefferson,Thomas R., MGMT; *Szeto, Kwok Yip, PHYS; Tam, Kar Yan, BIS; Yeung, Dit Yan, CS*

Lightwave technology research programmes.
Kwok, Hoi-Shing, EEE; Wong, George K.L., PHYS; Sou, Iam Keong, PHYS; Wong, Kam Sing, PHYS; Yoo, Kwong Mow, PHYS; Hiraoka, Hiroyuki, CHEM; *Carlier, Paul R., CHEM; Leung, Wa Hung, CHEM*

HUTCHISON TELECOM

Wireless communication.
Liu, Ruey-wen, EEE; Au, Oscar, EEE; Ko, Tsz-mei, EEE; Murch, Ross D., EEE; *Tsang, Danny H.K., EEE; Yau, Mark S.F., EEE*

SINO SOFTWARE RESEARCH CENTRE

Hong Kong Supernet.
Shen, Vincent, CS

An information retrieval approach to software understanding.
Deerwester, Scott, CS

Environment for interactive access to accurate information in multidatabases.
Drew, Pamela, CS

Intelligent video manipulator.
Lee, Chung-Mong, CS; Cheng, Siu-Wing, CS

Compilation of input method specification.
Pong, Man-Chi, CS

Cause-effect analysis and graphing tool.
Thebaut, Stephen, CS

APPENDIX 3:

DISTINGUISHED LECTURES IN ENGINEERING

"Computing, Communication & the Information Age" by Prof. John E. Hopcroft, Joseph C. Ford Professor of Computer Science & Associate Dean for College Affairs in the College of Engineering, Cornell University, on 6 November 1992 (co-sponsored by the US National Academy of Sciences)

"Cellular & Tissue Engineering" by Prof. Robert M. Nerem, Institute Professor & Parker H. Petit Chair for Engineering in Medicine, Georgia Institute of Technology, on 27 November 1992

"Engineering Education for the 21st Century" by Prof. Nam P. Suh, Ralph E. & Eloise F. Cross Professor, Massachusetts Institute of Technology, on 18 January 1993

"The Dawning of the Age of Designer Materials" by Prof. S.N. Atluri, Institute Professor & Regents' Professor of Engineering, Georgia Institute of Technology, on 2 April 1993

"Identification, Evaluation & Mitigation of Ground Failure Risk" by Prof. James K. Mitchell, Professor of Civil Engineering, Emeritus, University of California, Berkeley, on 30 April 1993