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SCHOOL OF ENGINEERING
STATUS REPORT 1994-1995



THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

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TABLE OF CONTENTS

Foreword	6
Administration and Organisation	10
Undergraduate Studies	13
- Educational Philosophy	
- Degree Programmes	
- Degree Requirements	
- Admission Requirements	
- How to Apply	
Postgraduate Studies	21
- Disciplinary Programmes	
- Interdisciplinary Programmes	
- Admission Requirements	
- How to Apply	
Facilities	27
- Centre of Computing Services and Telecommunications (CCST)	
- University Library	
- Language Centre	
- Materials Characterisation and Preparation Centre (MCPC)	
- Microelectronics Fabrication Centre (MFC)	
- CAD/CAM Centre	
- Centre for Advanced Engineering Materials	
Research	31
- Funding Sources	
- Research Institutes and Centres	
Department of Chemical Engineering	39
- Faculty	
- Research Areas	
- Laboratories	
Department of Civil and Structural Engineering	43
- Faculty	
- Research Areas	
- Laboratories	

Department of Computer Science	47
- Faculty	
- Research Areas	
- Laboratories	
Department of Electrical and Electronic Engineering	53
- Faculty	
- Research Areas	
- Laboratories	
Department of Industrial Engineering	59
- Faculty	
- Research Areas	
- Laboratories	
Department of Mechanical Engineering	63
- Faculty	
- Research Areas	
- Laboratories	
Appendix 1 - Engineering Advisory Committee	68
Appendix 2 - Funded Research Projects	70







Prof. Joe H. Mize
Acting Dean

FOREWORD

Much has happened in our School during the past year. Our Founding Dean, Professor H. K. Chang, accepted the position Dean of Engineering at the University of Pittsburgh in the U.S. I have served as Acting Dean this year while an international search was conducted for a permanent Dean. I am most happy to report that the search has been completed successfully. Professor Ping Ko assumes the Deanship effective 1 May 1995. His initial statement to you is on the following page. Professor Ko comes to us from the University of California, Berkeley, where he was Professor of Electrical Engineering and Director of the Berkeley Microfabrication Facility. HKUST is indeed fortunate to attract this world-renowned engineer/scholar to assume this very important position. Professor Ko has a remarkable perspective of the "big picture" of Hong Kong's future role in

Southeast Asia, and an extraordinary vision of the critical role this university must play in the future. The School is in excellent hands for the challenging years ahead.

The year 1994-95 can be characterized as a year of continued rapid growth, consolidation, and stabilization. For the first time, no new departments were launched. However, a new undergraduate program in Computer Engineering was initiated and admitted 102 first year students. This interdisciplinary program is administered jointly by the Departments of Computer Science and Electrical and Electronic Engineering. In addition, two new interdisciplinary MSc programs were initiated in Material Science and Engineering and Environmental Science and Engineering. As the names imply, these programs are administered jointly by the Schools of Engineering and Science, with several Departments from each School participating.

An important new initiative launched this year is a School-coordinated program of Continuing Education. Several conferences, workshops, and seminars were conducted, attracting several hundred participants from industry. There will be a rapid increase in the number of such offerings in the future.

Our faculty establishment increased in size from 110 to 160 during the past year. Once again, we enjoyed great success in attracting many outstanding young faculty from the top universities in the world, and a number of very outstanding senior faculty who bring a wealth of experience and prestige to our School.

Our student enrollment has expanded rapidly. We now have some 1600 undergraduate and 390 postgraduate students.

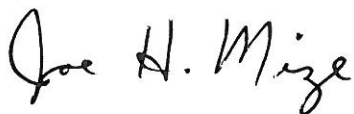
In research, our faculty are engaged in a total of 220 funded projects, including 110 newly funded projects initiated in 94/95, totalling some \$172 million. About one-third of these are from non-Government sources. Our faculty have been very successful in publishing the

results of their research in the better journals and international conferences. An increasing number of our faculty are involved in applied contract research, and in working with several industrial firms in Hong Kong and China. Our faculty have also developed joint research programs with several of the better universities in China.

Perhaps our proudest moment during the year was on 4 November 1994 when 285 engineering students received their degrees. In total, 224 baccalaureate degrees were granted, along with 60 Master's degrees. Significantly, the first Ph.D. degree granted by HKUST was awarded to Dr. Jack Lau by the faculty of our Electrical and Electronic Engineering Department.

The biggest immediate challenge to us is to achieve accreditation of all our undergraduate degree courses. This effort will be our number one priority in the year ahead.

We are proud of our accomplishments to date and realize that we still have many challenges ahead. Indeed, our School of Engineering is "On Line, and In Gear". We invite you to take a good look at this young School of Engineering. We think you will like what you see.



Joe H. MIZE
Acting Dean
March 1995



*Prof. Ping Keung Ko
Dean Designate*

It gives me great pleasure indeed to be the next Dean of Engineering. Hong Kong is my home: I was born and grew up here, and have always been looking for an opportunity to serve her. I still remember vividly the excitement in Prof. Chia-Wei Woo's eyes and voice in my first meeting with him in 1988, during which he described his dream of building this first-class institution of science and technology within a decade. The excitement was contagious. I have been a dreamer ever since.

While I have been with the faculty of HKUST for only one and a half years, my attachment to and affection for it can be traced back much further: I almost feel like an old-timer now. I drafted the original E&EE departmental planning report in 1988, and I have been providing regular inputs to the university and the E&EE department on various curricular and facility matters since 1989. In 1993, I finally fulfilled my promise to the Vice Chancellor, after two years of planning, to come back and help build the microelectronics program.

Being physically here at UST has given me a very good opportunity to fully grasp its potential as a significant contributor to higher education and industry, in both Hong Kong and China, in the coming decades. I also get to understand and appreciate the challenges, some quite major, that we are or will be facing in the task of fulfilling UST's potential and the community's high expectations of us. I have learned through my involvements in the Research Grants Council and the University Grants Committee the ways the local institutions operate and are funded, and how the development of UST fits into that context. I have spent quite some time exploring the educational and industrial environment in China, and now begin to understand better our roles in relation to that. It is with these understandings that I decided to take on the challenge of the deanship.

The founding dean and faculty have done an excellent job of laying down a solid foundation for the Engineering School, based on which we can continue our building tasks. With the faculty and student body close to reaching their matured sizes, it's the time to consolidate our achievements, understand our strengths, weaknesses, and challenges ahead; and construct an efficient and effective structure that can take us to our destination as a first-class modern Engineering School, in both teaching and research, in the next decade.

It's also the time to ask and think carefully what kind of engineers we should produce to fulfill our missions? what research areas we can make major contributions and thus focus on? and perhaps most importantly, how we can do all these given the limited resources we have?

We also have shorter-term issues we need to address rightaway. The less-than-ideal process of communications among the faculty, Departments, Schools, and the University is one, and the timely construction of our laboratory facilities for both teaching and research is another. We have already made tremendous progress on these issues since our Acting Dean, Joe Mize, took office five months ago. Although I won't be in office until May 1, 1995, I have been working closely with Joe on various matters important to the School's future to make sure that all loose ends are tied, and that the transition to a new era will be smooth and productive.

I believe the best way to keep our outstanding faculty is to provide them with an enabling environment in which they can be productive and successful in their work, so that their skills and knowledge can remain at the forefront and in high demand. Because only then will they develop a sense of belonging to UST and be destined to stay. Let's work together to create such an environment: the success of our institution depends on that.

A handwritten signature in black ink that reads "Ping Keung Ko". The signature is written in a cursive, flowing style.

Ping Keung Ko
Dean Designate
March 1995

ADMINISTRATION AND ORGANISATION



From left to right: Prof. Vincent Y.S. Shen/DH, Computer Science; Dr. Neil Mickleborough/Associate Dean; Prof. Joe H. Mize/Acting Dean; Prof. Chih-Kang Shen/DH, Civil & Structural; Prof. Michell M. Tseng/DH, Industrial; Prof. Ping Cheng/DH, Mechanical; Prof. Po-Lock Yue/DH, Chemical

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

Acting Dean of School of Engineering

Professor Joe H. Mize

Dean of School of Engineering (Designate)

Professor Ping Keung Ko

Associate Dean of School of Engineering

Dr. Neil Mickleborough

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

Professor Mitchell M. Tseng

Head of Department of Mechanical Engineering

Professor Ping Cheng

Director of Microelectronic 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



*Dr. Philip C. H. Chan
Associate Dean (Jan 94 - Dec 94)*

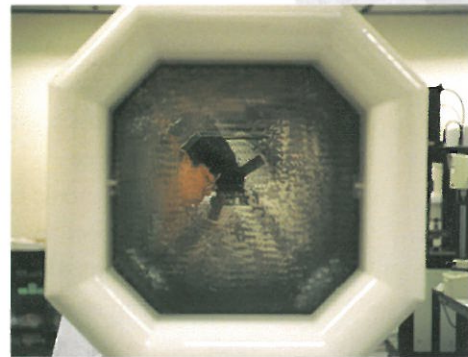


*Dr. Neil Mickleborough
Associate Dean (Jan 95 - present)*



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 additional elective courses in both the School of Science and the School of Business and Management.



A Mechanical Engineering student is performing a wind tunnel experiment.

The School also offers industrial training to provide students with a series of relevant, well-planned, and inter-related engineering experiences in an industrial atmosphere. The training is structured to help students develop initiative and managerial leadership skills in addition to intellectual and practical skills.

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 STUDIES

Undergraduate Enrolment

Dept.	1995-1996 Intake (Projected)	1994-95 Intake (1st Year Students)	1993-94 Intake (2nd Year Students)	1992-93 Intake (3rd Year Students)	Total Current Enrolment
Chemical Engineering	70	60	43	—	103
Civil & Structural Engineering	120	96	67	45	208
Computer Science	140	121	139	133	393
Electrical & Electronic Engineering	180	174	168	136	478
Industrial Engineering	55	53	34	—	87
Mechanical Engineering	95	85	69	42	196
Computer Engineering	88	102	—	—	102
Total	748	691	520	356	1567

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 second group of about 356 students graduating from its undergraduate programmes at the end of the current academic year. These graduates come from the Departments of Civil and Structural Engineering, Computer Science, Electrical and Electronic Engineering, and Mechanical Engineering.

*Engineering Students
applying 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	66	0	10	6	12	3	3	100
Minimum Credits Required			6	6	12			100
			36*					

* The minimum number of credits required to be taken outside the student's home department, including those from the Schools of Science, Business & Management, and Humanities & Social Science, is 36.

ADMISSION REQUIREMENTS

To qualify for admission to the University, applicants must:

- normally be at least 17 years of age by the first day of the academic year to which they are seeking admission;
- meet the general entrance requirements of the University and the requirements of the particular programme or programmes for which they are applying; and
- 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.

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



Students enjoying campus life.

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.



Students enjoying campus life.

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. The requirements are given for students who, either complete only Advanced Level subjects, or complete both Advanced Level and Advanced Supplementary subjects.

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, and 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 or students wishing to be admitted on the results of previous Advanced Level examinations 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.



Business & Management

J. Laime
Kwas Ball '94



Dr. Jack Lau, our first PhD graduate since the University opens, receives his degree in Electrical & Electronic Engineering at the congregation.

POSTGRADUATE STUDIES

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 1994 - 1995

Full-time

Dept.	MSc	MPhil	PhD	Total
Chemical Engineering	5	12	2	19
Civil & Structural Engineering	3	13	10	26
Computer Science	10	41	15	66
Electrical & Electronic Engineering	0	55	26	81
Industrial Engineering	9	9	5	23
Mechanical Engineering	0	5	21	26
Total	27	135	79	241

Part-time

Dept.	MSc	MPhil	PhD	Total
Chemical Engineering	6	0	0	6
Civil & Structural Engineering	10	1	5	16
Computer Science	17	11	7	35
Electrical & Electronic Engineering	16	12	6	34
Industrial Engineering	31	0	0	31
Mechanical Engineering	21	1	5	27
Total	101	25	23	149

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 60 students from 4 departments graduated from the Master's programmes of the School. It is anticipated that the number will rise to about 91 from 6 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.

Master of Science (MSc) in Environmental Science and Engineering

This programme is jointly offered by the School of Engineering and the School of Science. Departments such as Chemical Engineering, Civil & Structural Engineering, Mechanical Engineering, Biochemistry, Biology and Chemistry are involved in the design of this joint programme. The purpose of this programme is to train highly qualified personnel to conduct research and to make decisions on issues related to environmental sciences. Such issues include ecotoxicology and the effects of pollutants on biodiversity at the level of genetic material, species and habitats, particularly those related to Hong Kong and Southern China.

Master of Science (MSc) in Materials Science and Engineering

This multidisciplinary programme involves the Departments of Chemical Engineering, Electrical and Electronic Engineering, Mechanical Engineering, Chemistry and Physics. Materials science and engineering is crucial to the success of most industries in Hong Kong and the surrounding region. The programme aims to provide students with intelligent insight into today's material problems from many different yet coherent points of view. It emphasises the basic elements of material thermodynamics and kinetics, and modern instrumental characterisation. The programme is designed for the training of research and technical personnel for local and regional manufacturing industries.

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. Late applications may also 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 the application fee, overseas applicants may submit a bankdraft or certified bank cheque with the completed application form.

CENTRE OF COMPUTING SERVICES AND TELECOMMUNICATIONS (CCST)

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.

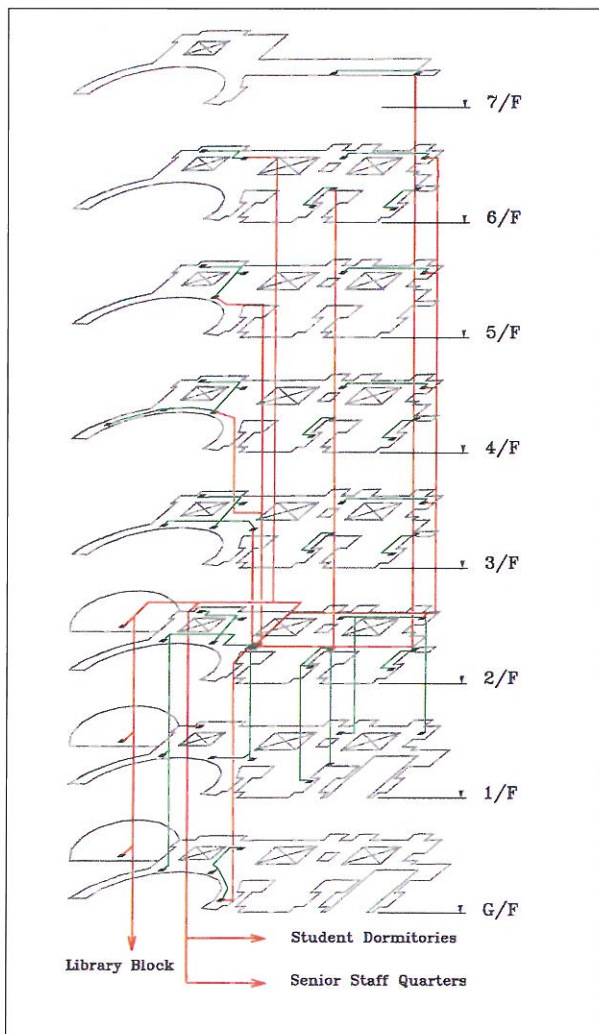
The HKUST computing environment is modelled after the distributed client-server architecture. The network backbone is a collection of advanced, high-speed FDDI (Fibre Distributed Data Interface) rings, each running at 100 megabits per second. The campus network is connected to Harnet (The Hong Kong Academic & Research Network) and to Internet in the United States. Network service is 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 composed of high-end computation and graphics workstations with FDDI interface and interconnected by a super high-speed gigaswitch. The supercomputing facilities installed include a 10.5 GFLOPS, 140 nodes Intel Paragon Massively Parallel Multi-Processor Supercomputer, a four-HP735 workstation cluster and an 8-processor SGI Onyx Reality Engine Symmetric Multi-Processor (SMP) machine.



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, which increased to 250,000 in 1994. During the 1995-1998 triennium, and thereafter, the Library plans to add about 50,000 items per year to provide support for the University's academic programmes.

The Library occupies five levels with over 10,000m² of floor space and 1,500 seats. Phase III construction of the campus, if approved, would see horizontal expansion at the second and third level to a total space of 13,000 square metres with a capacity for 1.2 million volumes.

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.

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.



Language Centre facilities are readily available to students and staffs.

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 Putonghua, 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 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 organisations. Any spare equipment capacity in the Centre is available to clients from other local tertiary institutions, government bodies, and private industry.



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

The Centre occupies about 4,000 m² of purpose-built laboratories and possesses a wide range of sophisticated equipment. 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.

MICROELECTRONICS FABRICATION CENTRE (MFC)

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 are being implemented. In 1995, technical capabilities will be upgraded with the completion of the Phase II laboratory with an area of 930m² and Class 100 clean room. Phase II will also allow MFC to extend its services to the private sector through various technical collaborations.

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, 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.



Staffs performing design work in the CAD/CAM Centre.

CENTRE FOR ADVANCED ENGINEERING MATERIALS

The Centre for Advanced Engineering Materials was established in early 1994 with an initial allocation of \$24 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 the 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.

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 advanced 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.



Reversing engineering using contour data obtained from a Coordinate Measurements Machine.

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 220 research projects in the School; Appendix 2 gives the titles and the names of the investigators of the 110 newly funded projects initiated in 94/95 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 Grants Committee (UGC) which funds tertiary institutions in Hong Kong, to support such aspects of research as conference travel, consumables, and general expenses.

RESEARCH

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 UGC. 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 UGC-funded tertiary institutions for allocation to research projects. In 1994/95 the total funds available to this University amounted to \$7.3 million. Awards are made on a competitive basis, are normally for one year, and normally do not exceed \$100,000 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.

UGC-funded Research Infrastructure Grant

As a UGC-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 normal funding pattern of disciplinary research. In 1994/95 the total funds available to the University among the four Schools amounted to \$21.7 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-UGC funding of an amount at least equal to that of the Research Infrastructure Grant awarded.

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

Bourns Inc.

Hutchison Telecom

Mass Transit Railway Corporation

DEC Corporation

Chrontel, Incorporated

Glaxo Hong Kong Ltd.

Hat Fash Ltd.

Intrusion-Prepakt (Far East) Limited

Hong Kong Government

Civil Aviation Department

Geotechnical Engineering Office

Health Services Research Committee

Industry Department

Kwun Tong District Board

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



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 cultivation 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.

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.



RESEARCH INSTITUTES AND CENTRES

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 actual software 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 (IMS)

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 the fabrication of microelectronic integrated circuits.

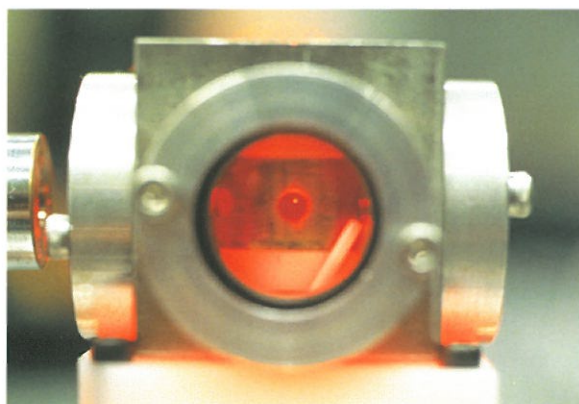
Institute for Environmental Studies

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.

At present, the Institute's focal point is on coordinating technical and administrative aspects of all major environmental research activities. Currently, 20 research projects in the environmental field, worth about \$15 million, are in progress.

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 \$15 million funding.

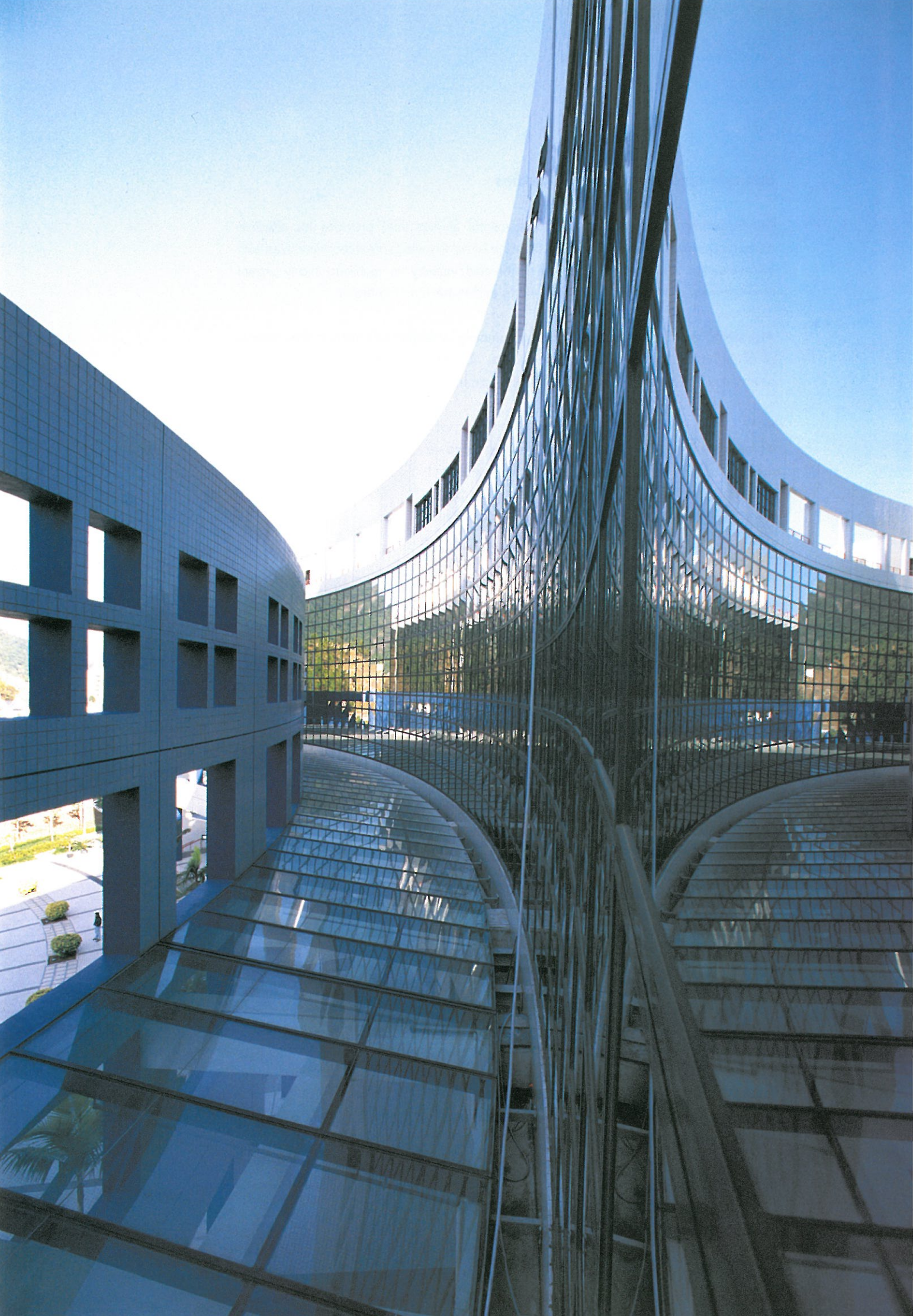


The study of atmospheric gas particle physiochemical interactions by levitating single aerosols in an electrodynamic balance.

Advanced Manufacturing Institute

The Advanced Manufacturing Institute was established in 1994 with an initial allocation of \$10 million. In order to remain competitive under the rapid transformation of the manufacturing sector, Hong Kong industry needs to up-grade its 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.





Prof. Po-Lock Yue
Head

"The Department of Chemical Engineering has entered the second year of its history with 99 undergraduates and 26 postgraduates enrolled. The faculty size has grown from 7 to 12, with several visiting lecturers/scholars contributing to the teaching and research programmes. We have implemented some curriculum changes to provide elective courses in Polymer Engineering and Biochemical Engineering, thus exposing students at an early stage to engineering subjects relevant to growing and emerging industries in Hong Kong and its surrounding region. The recruitment of high quality students continues to be a matter of top priority.

The undergraduate teaching laboratory is now equipped with a wide range of modular experiments, covering a wide range of chemical engineering unit operations and many applications in related fields such as environmental control. Students also have the opportunity to study and participate in process design with the aid of powerful process simulation software.

The faculty team has a truly international character with new additions from Canada, Australia and Germany. Major research thrusts have been developed in the areas of polymers and polymer studies, new environmental control methods and the development of a novel optical biosensor. Altogether seven projects are now supported by the Research Grants Council (RGC).

We are delighted to have been awarded a substantial grant by the Industry Department for the development of advanced technologies for environmental management in Hong Kong industries. The project will bring us closer to Hong Kong's industrial sector, to understand their needs and seek innovative solutions to their environmental problems. We look forward to increasing liaison and collaboration with industry in fulfilling our mission to conduct research that is relevant to Hong Kong.

The important issue of quality assurance of our academic programmes is currently being addressed. We are grateful to the Departmental Advisory Committee which has carefully examined the formative phase of the Department and has generously given us concrete suggestions for the next phase of development. The Department will be seeking for provisional accreditation by the Hong Kong Institute of Engineers in the coming year.

As we look forward to the next academic year, we will continue in our total commitment to build the only Department of Chemical Engineering in Hong Kong to the high standard we have set ourselves."

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.

DEPARTMENT OF CHEMICAL ENGINEERING

FACULTY

Professor and Head of Department:

Po-Lock YUE, BEng, PhD McGill

Reader:

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

Reinhard RENNEBERG, MSc *Donetsk and Moscow*; PhD *Inst of Molecular Biology (Berlin, Germany)*

Assistant Professors/Lecturers:

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

Furong GAO, BSc *E China Inst of Petroleum*; MSc, PhD McGill

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

Xijun HU, BSc *S China Inst of Tech*; PhD *Queensland*

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*

Jian YU, BEng *Zhejiang Inst of Tech*; MSc *Zhejiang*; PhD *British Columbia*

Visiting Assistant Professor/Lecturer:

Joe WONG, BSc McGill; MSc, PhD McMaster

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 world-wide. 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.



High-tech equipment for chemical analysis provides the supports needed for advanced Chemical Engineering research.

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

"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.



Prof. Chih-Kang Shen
Head

Inaugurated in 1991, the Civil and Structural Engineering Department is now in full operation at both undergraduate and postgraduate levels. Its undergraduate programme is being offered to students from Year 1 to Year 3 with a total of 210 students. In June 1995, the Department will see its first batch of graduates, the estimated number of which is 37. These students, produced with the efforts of the Department in the last three years, are dedicated to serve the civil infrastructure development of Hong Kong. At the postgraduate level, the Department has full-time and part-time students in all its MSc, MPhil and PhD programmes. The total number of postgraduate students in the Department has reached 35 full-time equivalent in Spring 1994/95. It is most heartening to note that the number of students joining the Department's full-time research programme is also on the rise. In 1994/95, almost 75% of its postgraduate students are full-time research students. These are the ones who are going to contribute to the Department's research work and eventually to realise the University's mission as the research university 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.

DEPARTMENT OF CIVIL AND STRUCTURAL ENGINEERING

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

Adjunct Professor :

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

Visiting Professors :

Edward D. SCHROEDER, BS, MS *Oregon State*; PhD *Rice*
Wilson H. TANG, BS, MS *Massachusetts Institute of Technology*; PhD *Stanford*

Associate Professor/Senior Lecturer:

Neil C. MICKLEBOROUGH, Dip.C.E. *Hobart Tech College*; MEng. *Carleton*;
PhD *Tasmania (Associate Dean of Engineering)*

Assistant Professors/Lecturers:

Chun-Man CHAN, BSc, MSc *Massachusetts Inst of Tech*; PhD *Waterloo*
Guang-Hao CHEN, BS *Zhejiang Agricultural*; MEng, PhD *Kyoto*
Mark J. DAVIDSON, BSc, PhD *Canterbury (Christchurch)*
Mohamed S. GHIDAOUI, BEng, MAsC, PhD *Toronto*
Lambros KATAFYGIOTIS, Dip *National Tech U of Athens*; MS, PhD *CalTech*
Jun-Shang KUANG, BSc *South China Inst of Tech*; PhD *Hong Kong and Cambridge*
Kin-Man LEE, BESC, PhD *Western Ontario*
Xiang-Song LI, BS *Tsing Hua*; MS, PhD *California (Davis)*
Zongjin LI, BEng *Zhejiang*; MS, PhD *Northwestern*
Irene M.C. LO, BSc *National Taiwan*; MSc, PhD *Texas (Austin)*
Duncan A. MCINNIS, BSc, MSc *Calgary*; PhD *Toronto*
Charles W.W. NG, MSc *Southampton*; PhD *Bristol*
Hai YANG, BS *Wuhan*; MEng, PhD *Kyoto*
Weixian ZHANG, BSc *Tongji*; MSc, PhD *Johns Hopkins*

Visiting Assistant Professor/Scholar :

Parmeshwar SHRESTHA, BS *Jadavpur*; MSc, PhD *California (Davis)*
Qingshi J. YANG, BSc *U of Science and Tech of China (Beijing)*; PhD *Concordia (Montreal)*

Part-time Lecturers :

Y. F. Willy LAI, MEng, PhD *Sheffield*

Y. C. MOK, BSc(Eng), MSc(Eng) *HK*; M.I.C.E.; M.I.Struct.E; M.H.K.I.E.; R.S.E.; A.P.

C. SIU, OBE; JP; BSc(Eng) *HK*; M.I.C.E.; M.H.K.I.E.

K. K. Paul WONG, BSc(Eng) *Newcastle Upon Tyne*; PhD *Leeds*

K. J. Samuel WONG, BSc(Eng) *HK*; LLB *Alberta*



Undergraduate beam test for stress analysis.

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 And Water Resource Studies

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 of Environmental Studies in this area of research.

LABORATORIES

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



Prof. Vincent Y. S. Shen
Head

"The Department of Computer Science has achieved the distinction of being the largest and the most diverse department on campus this year: with 43 faculty members representing 17 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 the four modern teaching labs, the Department has inaugurated two research labs last year: the Computer Engineering Research Laboratory and the Database Systems Research Laboratory. Equipment in these laboratories include 2 ATM switches, 4 SUN Sparc 20/612 servers, and various workstations with multi-media facility. These laboratories provide ample computing power and facilities to conduct research on high-speed networking and heterogeneous databases.

The faculty of the Department were involved in more than 50 sponsored research projects last year. Many of these projects may have immediate applications locally. For example, a VEHICLE and CONTAINER NUMBER recognition (VECON) system, a product of a research project on computer vision, has been licensed to a local software company for installation in a container depot in Shanghai, China. It is also undergoing beta testing at one of Hong Kong's busy container shipping terminals.

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 in November, 1993. Faculty, staff, and students from the Department initiated this project which offers Internet services to private and commercial users in Hong Kong. SuperNet is now the largest commercial Internet service provider in Hong Kong with more than 2,000 customer sites.

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."

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,

DEPARTMENT OF COMPUTER SCIENCE

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

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Professors:

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(Associate Head of Department)

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

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

Derick WOOD, Dip, BSc, PhD *Leeds*

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Herbert EDELBRUNNER, MS, PhD *Tech U of Graz*

Reader:

Jun GU, *Sci and Tech of China*; PhD *Utah*

Visiting Reader:

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PhD Illinois (Urbana-Champaign)
Kamalakar R.S. KARLPALEM, BSc Bombay; MS Indian Statistical Inst;
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Alex C.Y. KEAN, BCS, MSc Acadia; PhD British Columbia
Chung-Mong LEE, BSc, MSc, PhD Minnesota
Bo LI, BSc, MSc Tsinghua; PhD Massachusetts
Qing LI, BE Hunan; MSc, PhD Southern California
Zhaoping LI, BS Fudan; PhD CalTech
Jogesh K. MUPPALA, BE Osmania; MS Southwestern Louisiana; PhD Duke
Avi C. NAIMAN, BSc Framingham State Coll; MSc, PhD Toronto
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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; PhD, British Columbia

Visiting Assistant Professor/Lecturer:

Jelena V. MISIC, BSEE, MSEE, PhD Belgrade



Computer Science's Graphics Teaching laboratory

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 applications of logic, combinatorial optimisation, computational geometry, graph 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 systems, 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 focus in three main areas:

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

Technologies of relevance to these research areas 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.

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 Teaching Laboratory
Unix Teaching Laboratory I, II
Multimedia Teaching Laboratory
Database, Knowledge Base, and Systems Laboratory
Computer Engineering Laboratory
Graphics and Music Experimentation (GAME) Laboratory
AI/Robotics Laboratory



Postgraduate students working in the Graphics And Music Experimentation (GAME) laboratory.

"During the 1994-95 academic year, we have seen another year of aggressive growth of the Department. The total number of faculty and support staff has increased from 50 to 80 which is about a 60% increase in staff size. We have added 7 new faculty with 2 new professors, 2 new Senior Lecturers and 3 new Lecturers. We are particularly pleased with the number and quality of senior faculty added to this active Department to help provide the leadership in teaching, research and service.



*Prof. Peter W. Cheung
Head*

In September of 1994, we have admitted 173 year 1 students in EEE which is exactly 100% of our planned intake quota. With this number, the Department has also reached the full size for first year first degree intake. We are particularly proud that again, the quality of our entering students this year has the best Advanced Level test results in the whole university in addition to the fact that we have admitted the largest entering class in the entire university.

We have also awarded for the first time the B.Eng. (Hon) degree in Electronics Engineering to 121 graduating seniors this past October. We are also very pleased to report that our undergraduate programme leading to the B.Eng. (Hon) degree in Electronics Engineering has received full accreditation status during the interim period for the 1994 and 1995 graduating class by the Institution of Electrical Engineers (IEE) in U.K. and by the Hong Kong Institution of Engineers (HKIE). The Department thus became the first department in the School of Engineering that has received full accreditation recognition for our undergraduate degree course which is important and essential for our graduate seniors to meet the educational requirement for Charter Engineer membership with IEE and HKIE.

In conjunction with the Computer Science Department, we have admitted the first class of 102 first year students to the new Computer Engineering programme which is administered under the EEE Department. This is an important area for growth and development in the next few years.

In research, the faculty has continued to achieve remarkable results in terms of competitive research grants. Our faculty have received 15 out of 21 RGC Competitive Earmarked Research Grants totalling HK\$ 7.97 million, making us the top Department in terms of success rate and amount funded at HKUST. Our faculty have continued to publish in leading international journals and top conferences and are rapidly making our reputation as one of the best emerging EEE Department in this region and internationally. The Department is also proud to present the very first and only PhD thus far granted by HKUST during the university congregation in October, 1994.

I am proud that collectively, the Department has achieved the initial goals set by the founding faculty in the early years and is rapidly maturing in both status and in size. Looking ahead, there are yet many challenges but we have been fortunate to have the resources, the administrative support and most important of all, a group of highly talented, dynamic and committed faculty and staff to help us accomplish the missions of the Department. New faculty recruitment and faculty retention will no doubt be one of the key factors for our continue success."

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

As a classical discipline, electrical engineering can be defined simply as the theories and methods to generate, transmit, receive, modulate, control, and utilise electromagnetic waves and energy. However, electrical and electronic engineering has evolved into an exciting “high tech” discipline which covers a wide spectrum of modern technologies such as analogue and digital circuits, semiconductor devices and materials, optoelectronics, microelectronics, microprocessor and electronic memory devices, signal processing and communication, control and expert systems, computer networks, electromagnetic waves and telecommunication, energy systems and power distribution. Advances in electrical and electronic engineering in the past decade have 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.

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

(Director of Hong Kong Telecom Institute of Information Technology)

Eugene WONG, BS, AM, PhD *Princeton*

(Pro-Vice-Chancellor for Research and Development)

S. Simon WONG, BS *Minnesota*; MS, PhD *California (Berkeley)*

Visiting Professors:

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

(Dean of Engineering Designate)

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

Readers:

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(Director of *Microelectronics Fabrication Centre*)
Joseph SCHMITT, BS *Case Western Reserve*; MS, PhD *Stanford*

Visiting Associate Professor/Senior Lecturer:

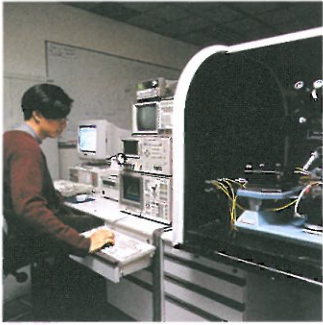
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Ho-Chi HUANG, BS, MS *National Taiwan*; PhD *Washington*
Zaheed KARIM, BS, MS, PhD *Southern California*
Tsz-Mei KO, BEE, MEE *Cooper Union*; PhD *Calif Inst of Tech*
Jack K.C. LAU, BS, MS *California (Berkeley)*; PhD *HK Univ of Sci & Tech*
Curtis C.S. LING, BS *Calif Inst of Tech*; MS, PhD, *Michigan*
Howard LUONG, BS, MS, PhD *California (Berkeley)*
Philip MOK, BSc, MSc, PhD *Toronto*
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*
Chi-Ying TSUI, BSc *HKU*; MSc, PhD *USC*
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)*

RESEARCH AREAS

Microelectronics



A student is performing an integrated circuit characterization test.

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.

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 the 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

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:

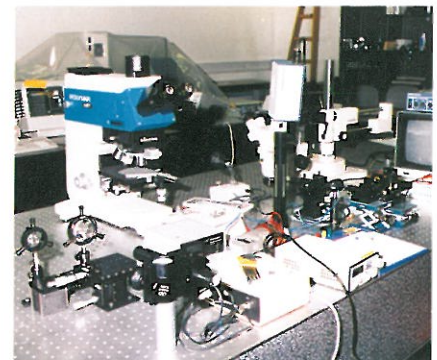
- information theory for space communications
- lossless and lossy data compression
- coding and error control mechanisms
- data encryption and system security

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 Optical Device Characterization research bench in operation in the Electrical & Electronic Engineering Lab.

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.

LABORATORIES

Basic Electronics Core Laboratory
Senior Project Laboratory
Modular 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-optics Laboratory
Optical Device Characterization Laboratory
Photonic Materials Laboratory
Photonic Materials Preparation Laboratory
Holography Laboratory
Broadband Network Laboratory
Digital 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



Prof. Michell M. Tseng
Head

"In the 1994-1995 academic year, our second year in operation, the Department of Industrial Engineering completed a remarkable year with 2 students receiving their master's degrees. We have 11 full time PhD students on board along with 49 other post-graduate students and 88 undergraduate students. More importantly, we have assembled a faculty of experienced and dynamic scholars. In combination, our faculty has accumulated more than seven decades of professorial experience in teaching in major universities around the world, and seven decades of relevant industrial experience. On the research agenda, our research projects not only produce scholarly papers, but also are relevant to Hong Kong industries. More than ten manufacturing and service industries have been actively working with this Department.

The opportunity to build a new Industrial Engineering Department at this time in Hong Kong has several important meanings. To begin with, the economic growth of this region is moving at breathtaking pace. There is a tremendous demand for knowledge and talent in industrial engineering.

Secondly, the industry throughout the world is going through a transition of a magnitude much greater than has ever happened before. The field of industrial engineering, or technical management in general, is going through major revisions. We have a rare opportunity to play a part in defining this important discipline and to challenge what has been taken for granted in the past.

Last but not the least, globalization of economic activity is perhaps the defining trend of our time. Sitting on the boundaries of several major economic forces here in Hong Kong, we witness wealth being created by scaling old economic barriers. Likewise, we can foresee that knowledge will be generated by reassessing traditional understandings of the value and productivity, including where, how and with whom we perform our work. In this regard, there is no place other than Hong Kong more appropriate for the study of Industrial Engineering.

Based on these beliefs, we have taken innovative approaches in developing the curriculum, laboratories and industry interactions. We emphasise systems design, engineering manufacturing systems, engineering management, human factors engineering and information technology. Several contemporary subjects such as business process re-engineering, systems integration, and service engineering have also been introduced."

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.

DEPARTMENT OF INDUSTRIAL ENGINEERING

FACULTY

Professor and Head of Department:

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Professor:

Joe H. MIZE, BSc *Texas Tech*; MSc, PhD *Purdue* (Acting Dean of Engineering)

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Reader:

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MSAE *Georgia Tech*; PhD *State U of New York, Buffalo*

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 Tsinghua*; MS *Tarleton State*; PhD *Texas A&M*

Z Bo TANG, BS *Qinghua*; MSc *Manchester Inst of Sci & Tech*; PhD *Connecticut*

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

Visiting Assistant Professor/Lecturer:

Lorinda HU, BA *Rutgers*; MS *Maryland*; PhD *USC*

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) Systems 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.

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.



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

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 emphasizes 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 Systems include 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 Systems 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 systems engineering includes, but is not limited to, routing, scheduling, allocation, industrial and service systems modelling, performance evaluation, and optimisation.

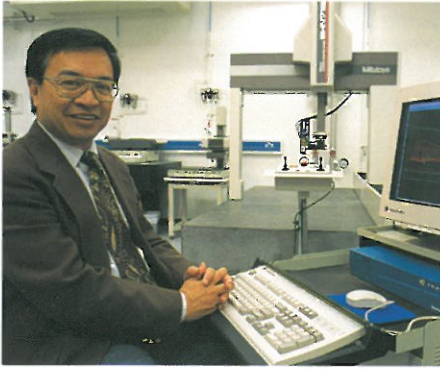
Human Factor Engineering

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 1995.

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



Prof. Ping Cheng
Head

"Professor Ping Cheng, a world renowned expert in heat transfer and energy conversion, has been appointed as the Department Head. Professor Cheng obtained his BS from Oklahoma State University, MS from MIT, both in mechanical engineering, and his Ph.D. in aeronautics and astronautics from Stanford University. He has performed seminal research work on radiative gasdynamics, porous-media heat transfer, and geothermal energy. He is a fellow of ASME and an associate editor of AIAA Journal of Heat Transfer and Thermophysics. Prior to joining HKUST, he was Professor and Chairman of Mechanical Engineering at the University of Hawaii.

The Department was successful in recruiting a number of highly talented young faculty as Lecturers last year: Dr. Y. Gao obtained his Ph.D. from the University of Birmingham in 1992; his specialty is in process control. Dr. W. Li obtained his Ph.D. from MIT in 1990 with specialization in adaptive control and industrial automation. Dr. J. K. Kim obtained his Ph.D. in 1991 from the University of Sydney; he is a specialist in fibre composites. Dr. David Lam obtained his Ph.D. from the University of California/Santa Barbara in 1991; his research interest is in advanced materials processing. Dr. H. Qiu obtained his Ph.D. from the University of Erlangen-Nuernberg, Germany in 1994; he is an experimentalist specialized in two-phase flow measurements. Dr. Q. P. Sun obtained his Ph.D. from Tsinghua University in 1989; his area of specialization is in the micromechanics theory of plasticity transformation. Distinguished visitors in the department included Professor Ren Wang of the Department of Mechanics in Peking University, who is a member of the Chinese Academy of Science, and Dr. David Young of the Lawrence Livermore National Laboratory, who is a recognized expert in variable structure control and robotics.

During the past year, Professor Yiu-Ming Mai was appointed as the Interim Director of the Centre for Advanced Engineering Materials while Dr. Matthew Yuen was appointed as the Interim Director of the CAD/CAM Centre. The mission of the Centre for Advanced Engineering Materials, with an initial funding of \$24 million, is to provide state of the art facilities to develop advanced engineering materials technology. The mission of the CAD/CAM Centre is to support multidisciplinary teaching and research in computer aided design and manufacturing, which is expected to make an impact on local manufacturing industries. Dr. S. C. Kot was appointed as Project Manager of the Wind Shear Project to design the world's first Operational Windshear Warning System for the new airport at Chek Lap Kok. Prof. P. Tong and Dr. T.Y. Zhang were nominated as the President and Secretary respectively of the Asian Society of Fracture Mechanics. Prof. P. Tong and Dr. S. Lee co-founded the local chapter of ASME, and were elected as Chairman and Vice Chairman of the chapter. Dr. Matthew Yuen and Dr. Y. Gao were invited to be a guest professor and a guest researcher at the Huazhong University of Science and Technology.

DEPARTMENT OF MECHANICAL ENGINEERING

To provide service to local electronic industries, a six-day workshop on electronic packaging with wide industrial participation was sponsored by the CAD/CAM Centre. A series of short courses/workshops on advanced materials and plastic packaging will be held later this year.

The Department is looking forward to the coming year with the establishment of a Mechatronics program. The recruitment of talented young faculty in the areas of mechatronics, energy, and microsystems will be one of the main efforts of the department. Equal importance will be placed on recruiting high quality undergraduate students. A Student Recruiting and Publicity Committee with six faculty members has been established. Plans are being made in the preparation of videos and brochures for publicity purposes."

The mission of the University is to train students who can actively contribute to the industrial and economic progress of Hong Kong and its region, and conduct research and development which are relevant to this progress. The objective of the Department is to help accomplish this mission by providing society with competent mechanical engineers and to become one of the world's leading mechanical engineering departments. The Department is recruiting high quality faculty and students, developing innovative and efficient teaching methods, carrying out relevant research and development, and building close ties with industry. It provides quality education to both undergraduate and postgraduate students and contributes to society, industry, and the knowledge base of engineering practice.

Departmental programmes aim to train students to deal with the technological issues of mechanical systems and advance the state of knowledge in the profession. The purpose is to prepare them to become productive and contributing members of their profession and future leaders of society, industry and academia.

FACULTY

Head of Department:

Prof. Ping CHENG, BS *Oklahoma State*; MS *MIT*; PhD *Stanford*

Professors:

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

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

(Interim Director of Centre for Advanced Engineering Materials)

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

Visiting Professors:

William T. CHEN, BSc *London*; MSc *Brown*; PhD *Cornell*
Chih-Ming HO, BSc *National Taiwan*; PhD *The Johns Hopkins*
C. POLYMERPOULOS, BSc *Oregon State*; MSc, PhD *Cornell*

Reader:

Tongxi YU, BSc, MSc *Peking*; PhD *Cambridge*

Associate Professors/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)

Visiting Associate Professor/Senior Lecturer:

David K.K. YOUNG, BS, MS, PhD *Illinois-Urbana Champaign*

Assistant Professors/Lecturers:

Lilong CAI, BEng *Tianjin, China*; PhD *Toronto*
Chih-Chen CHANG, BS *National Taiwan*; MS, PhD *Purdue*
Yongsheng GAO, BSc, MSc *Huazhong*; PhD *Birmingham*
Jang-Kyo KIM, BSc *Seoul National Univ*; MEng *Monash Univ*; PhD *Univ of Sydney*
David C.C. LAM, BSc *California (Berkeley)*; PhD *UC Santa Barbara*
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*
Weiping LI, BSc *Beijing U of Aeronautics & Astronautics*; MA, PhD *MIT*
Huihe QIU, BSc, MSc *Tianjin*; PhD *Erlangen-Nuernberg*
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*

Visiting Assistant Professors/Lecturers:

Qing-Ping SUN, BS, MS *Wuhan Inst of Hydraulic & Electric Engg*; PhD *Tsinghua*
Yu-Chong TAI, BSc *National Taiwan*; MSc, PhD *California (Berkeley)*

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 non-linear behaviour of structures and continua, the mechanical behaviour of both conventional and new engineering materials, computational mechanics for analyzing 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; advanced powder processing; desktop manufacturing; 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 surroundings. 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.

The sub-sonic wind tunnel is useful for both teaching and research in fluid mechanics.

Mechatronics and Manufacturing

Mechanical design, manufacturing, and control are at the heart of mechanical engineering in which engineers conceive, design, build and test innovative solutions to “real world” problems. The activities in the Mechanical Engineering Department are focused on mechatronics application in manufacturing industries such as electronics and plastics. Key areas such as electronic packaging and polymer processing are some of the multi-disciplinary research programs initiated by the Department.

Research work is being conducted in the areas of geometric modelling, intelligent design and manufacturing systems, manufacturing process modelling and optimization, in-process monitoring of manufacturing processes, rapid part manufacturing, motion control, prime-moving system control, mechatronics, measurement and inspection techniques, sensor technology, micromachining, and precision engineering. The basic research work is used to develop techniques and methodologies to solve practical problems. The integration of design and manufacturing, and the application of mechatronics in engineering systems are strongly emphasized. A mechatronics teaching programme is currently under development.

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.

LABORATORIES

Micromachines Laboratory
Solid Mechanics Laboratory
Thermofluid Mechanics Laboratory
Manufacturing Laboratory
Energy Conversion Laboratory
Aerosol Clean Room
Acoustics Laboratory
Experimental Method Laboratory
Automation Laboratory
Design Project Laboratory
Robotics/Control Laboratory
Metrology Laboratory
Materials Laboratory
Departmental Terminal Room
CAD/CAM Laboratory

APPENDIX 1: ENGINEERING ADVISORY COMMITTEE



Engineering Advisory Committee members admiring the pulsed laser deposition system.

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 three 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 1994 and offered valuable advice on curricular development, faculty evaluation, resource allocation and collaboration with industry. Another meeting is scheduled in May 25-27, 1995. Membership of the Committee is given below.

Sir Eric A. Ash, CBE, FRS

Professor
University College
London
UK

Prof. John Hopcroft

Joseph Silbert Dean of Engineering
Cornell University
USA

Dr. Stuart Reed

Director
Department of Environmental Protection
Hong Kong

Dr. York Liao

Executive Director
Varitronix Ltd.
Hong Kong

Prof. Karl S. Pister, NAE

Chancellor
University of California at Santa Cruz
USA

Dr. Casper Shih

President
China Productivity Centre
Taiwan
Republic of China

Prof. J.D. Plummer

Professor & Associate dean
Electrical & Electronics Dept.
Stanford University
Stanford
USA

Dr. John A. White, Jr.

Dean
College of Engineering
Georgia Institute of Technology
Atlanta
U.S.A.

Prof. Kwang-tzu Yang

Viola D. Hank Professor of Engineering
Aerospace & Mechanical Engineering
University of Notre Dame
Indiana
U.S.A.



Vice Chancellor/President, Prof. Chia-Wei Woo discussing with the Engineering Advisory Committee members.

RESEARCH INFRASTRUCTURE GRANTS (UNIVERSITY GRANTS COMMITTEE)

Development of variable road-use pricing models

YANG, Hai, Civil & Structural Engineering; ALPEROVICH, Gershon, Economics; LIU, Jiyin, Industrial Engineering

Technology for infrastructure wind loads and response monitoring systems

KATAFYGIOTIS, Lambros, Civil & Structural Engineering; CHEN, Jay-chung, Research Centre; TO, Wai-ming, Mechanical Engineering

COMPETITIVE EARMARKED RESEARCH GRANTS (RESEARCH GRANTS COUNCIL)

Chemical Engineering

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

GAO, Ping; CHAN, Chi-ming

Gas separation with composite polyamide membranes and with surface modified polyamide membranes

MI, Yongli; CHAN, Chi-ming

Controlled synthesis of submicron titanium dioxide particles for waste water treatment

CHAN, Chak-keung; CHAN, Chi-ming; PORTER, John

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

CHAN, Chi-ming; GAO, Ping; YUEN, Matthew M.F. (Mechanical Engineering)

De-odorisation of indoor air by a novel photocatalytic treatment method

YUE, Po-lock; PORTER, John

Civil and Structural Engineering

Prediction of ground subsidence induced by tunnelling in urban areas

LEE, Kin-man

Heavy metal removal from industrial waste waters by calcium stripping in fluidized bed operation

HUANG, Ju-chang; WAREHAM, David G.

APPENDIX 2: NEWLY FUNDED RESEARCH PROJECTS INITIATED IN 94/95

Two-stage anaerobic system for treating sulfate-laden organic industrial waste waters
WAREHAM, David G.; HUANG, Ju-chang

Plume interaction above an outfall diffuser
DAVIDSON, M.J.

An energy injected virtual mass resonant column system
LI, X.S.; SHEN, C.K.

Automatic design optimization techniques for tall structural concrete buildings
CHAN, Chun-man; MICKLEBOROUGH, Neil C.; CHANG, Tse-yung P.

Computer Science

Enhancement of Chinese input processing
FONG Lochovsky, Amelia; PONG, Man-chi

Spectral matching of Chinese musical instruments
HORNER, Andrew

Physically-based interactions and acoustic feedback in virtual environments
BACIU, George; HORNER, Andrew; SHEN, Helen C.

Visual CRT calibration: Measuring and modeling spatial interactions
NAIMAN, Avi C.

Performance of client-server computing systems with non-uniform request distribution
MUPPALA, Jogesh K.

A load-balanced distributed virtual machine approach to distributed and parallel processing
CHANSON, Samuel; AHMAD, Ishfaq; HAMDI, Mounir; MUPPALA, Jogesh; LAW, Lawrence (Centre of Computing Services & Telecommunications)

Logical foundations and automated support for cryptographic protocol analysis
GRAY, James W. III

Distributed relational database redesign methodologies and tools
KARLPALEM, Kamalakar

Diagnostic reasoning
KEAN, Alex

Dynamic object clustering with spatial planning applications
LI, Qing

Deformable pattern recognition: Modeling, detection and classification
YEUNG, Dit-yan; CHIN, Roland T.

Recognizing 3-D objects in buildings by mobile robot
LEE, Chung-mong

Towards intelligent behaviour of a multisensor system
SHEN, Helen C.

A framework for realizing distributed heterogeneous supercomputing systems
AHMAD, Ishfaq; HAMD, Mounir

Electrical and Electronic Engineering

CMOS compatible SOI power device technology
SIN, Johnny K.O.; KO, Ping K.; POON, Vincent M.C.

Sub 0.1 micron scalable CMOS integrated circuits based on silicon-on-insulator technology
CHAN, Philip C.H.; BUCHWALD, Aaron; KO, Ping K.; LAU, Jack; NGUYEN, Cuong T.

Optimal nonlinear digital filtering under structural constraints for image processing
ZENG, Bing

Chemo-mechanical polishing characterization, development, and modeling for planarization and 3-D micromachining
NGUYEN, Cuong T.; KO, Ping K.; WONG, Man

Physics, technology, and model of silicon MOSFET's with nanometer dimensions
KO, Ping K.; NGUYEN, Cuong; CHAN, Philip C.H.

Robust control of linear systems with parametric uncertainty
QIU, Li

Optoelectronic III-V multiple quantum well spatial light modulators
KARIM, Z.S.; KWOK, H.S.

Low temperature germanium thin film CMOS technology
WONG, Man; KWOK, H.S.; POON, Vincent M.C.; SIN, Johnny K.O.

Robot motion planning with nonholonomic constraints and applications to dextrous manipulation
LI, Zexiang

Millimeter-wave integrated phased array receivers
LING, Curtis C.

Analysis and design of cellular CDMA mobile communications networks
LETAIEF, K. Ben

Wavelet method for electromagnetic field computation in high-speed VLSI designs
ZHOU, Dian

Low temperature wafer bonding silicon-on-insulator technology

POON, Vincent M.C.; SIN, Johnny K.O.; WONG, Man

Radio resource management for wireless personal communications

CHUANG, Justin

Fundamentals of discrete event systems theory

CAO, Xi-ren

Industrial Engineering

Development of a methodology and a prototype environment to support manufacturing systems design

TSENG, Mitchell M.

Process performance assessment tool of surface mounted printed circuit board assembly in a concurrent engineering environment

LINN, Richard; SHIH, Heloisa

Mechanical Engineering

Generation of active optical switching effect in silicon using monolithic movable optical waveguide structures fabricated on silicon substrates

ZOHAR, Yitshak; WONG, Man (Electrical & Electronic Engineering)

Bonded repairs of damaged structures by using composite patch

LEE, Shi-wei Ricky; TONG, Pin; MAI, Yiu-wing

Vibration control of axially moving continua - Theoretical and experimental studies

CAI, Lilong

Widespread fatigue damage in aging airplanes

TONG, Pin

Fracture toughness and fatigue behaviour of piezoelectric materials

ZHANG, Tong-yi; TONG, Pin; MAI, Yiu-wing; XIAO, Rongfu (Physics)

Mechanisms of fracture and fatigue of sintered metals

LENG, Yang; MAI, Yiu-wing

Enhanced heat transfer by thermal dispersion in packed bed

HSU, Chin-tsau; TONG, Pin

Heat transfer characteristics of microcooling systems

ZOHAR, Yitshak; WONG, Man (Electrical & Electronic Engineering); HSU, Chin-tsau

DIRECT ALLOCATION GRANTS (RESEARCH GRANTS COUNCIL)

Chemical Engineering

Biodegradation of dyes by white-rot fungi and fungal enzymes
YU, Jian

Equilibrium and rate studies of pollutant removal by activated carbon
HU, Xijun

Civil & Structural Engineering

Bond characterization of rebar (smooth surface) - concrete interface
Li, Zongjin

Influence of toxic pollutants on organic removal in a hybrid biological reactor
CHEN, Guang-hao

Computation of distribution coefficients for toxic heavy metals
SHRESTHA, Parmeshwar L.

Structural model identification using dynamic data
KATAFYGIOTIS, Lambros S.

Analysis and formulation of finite difference and characteristic schemes for contaminant transport
GHIDAOU, Mohamed S.

Ultimate load analysis of cable-stayed bridges
KUANG, J.S.; CHANG, T.Y.P.

Plane strain hypoplasticity sand model
Li, Xiang-song

Computer Science

Non-blocking distributed objects
CHOY, Manhoi

Utilizing intercausal independence in Bayesian networks
ZHANG, Lianwen Nevin

Automated verification for distributed computing systems
CHEUNG, Shing-chi

Multidimensional visual coding in the brain

LI, Zhaoping

Dynamic loop scheduling for load balancing and memory locality in multiprocessor architectures

HAMIDZADEH, Babak

Visual language for behavior specification of reactive systems

CHAU, H. Lewis

Knowledge-based decision support

WUTHRICH, Beat

Learning to translate Chinese into English

WU, Dekai

Electrical & Electronic Engineering

Intelligent control with fuzzy systems

WANG, Li-xin

Cellular neural networks for Gabor filtering

SHI, Bertram

Low-power amplifiers and analog-to-digital converters for sensor signal conditioning

LUONG, Howard C.

Design automation for low power embedded systems

TSUI, Chi-ying

Development of an optical method for non-invasive assessment of anaemia

SCHMITT, Joseph M.

Intelligent control using fuzzy logic systems, with application to integrated planning and control of mobile robots

WANG, Li-xin

Analogue-to-digital conversion with digital signal postprocessing

NGUYEN, Truong-thao

Modular optoelectronic interconnects using flip-chip bonding

KARIM, Zaheed S.

Advanced BiCMOS device and circuit design for telecommunication applications

MOK, Philip K.T.

Industrial Engineering

Development of a foot sizing system for the Hong Kong male population

GOONETILLEKE, Ravindra S.

Fuzzy inference based selection of scheduling rules

SHIH, Heloisa M.

Comparative evaluation of the latest heuristic searching methods for production scheduling problems

LIU, Jiyin

Research and development of high precision manufacturing process

LEE, Ka-shek Neville

A personal computer-based process planning system

JONEJA, Ajay

To approximate the expected makespan of a stochastic project

WAN, Yat-wah

An intelligent random search approach to the knapsack problems

TANG, Zhuang-bo

The performance of the join-the-shortest-queue (JSQ) policy

WAN, Yat-wah

Automatic production management and control system based on petri and fuzzy inference

SHIH, Heloisa H.O.; LIIN, Richard

A conceptual environment for intelligent, adaptive fixture design support

SU, Chuan-jun

Mechanical Engineering

Advanced control of linear voice coil motors

LI, Weiping

A study of measurement-volume-effect using generalized Lorenz-Mie Theory by the slit constraint

QIU, Huihe

Experimental study of a new error correction method for precision motion control in machine systems

GAO, Yongsheng

Cyclic modelling of injection process with applications in machine settings selection
YUEN, Ming-fai Matthew; CHAN, Chi-ming (Chemical Engineering)

Characterization and modelling of voidage distribution at fiber/matrix interface
LAM, Chuen-chun David

Uniform shear tests of structural adhesives and composite laminate joints
KIM, J.K.

BOURNS INC.

Conductive polymer composites
CHAN, Chi-ming, Chemical Engineering

BRITISH COUNCIL

Development of integrated control models for expressways/traffic signal networks
YANG, Hai, Civil & Structural Engineering

ACTION LEARNING PROJECT FUND, HONG KONG POLYTECHNIC UNIVERSITY

Visualisation of structural engineering behaviour
MICKLEBOROUGH, Neil; WAREHAM, D.G.; CHANG, T.Y.P.; CHAN, C.M., Civil & Structural Engineering

Self-motivated learning systems in engineering education
DAVIDSON, Mark, Civil & Structural Engineering

GEOTECHNICAL ENGINEERING OFFICE, HONG KONG GOVERNMENT

A study of hydraulic fill performance in Hong Kong - Phase II
SHEN, C.K.; LEE, K.M.; LI, X.S., Civil & Structural Engineering

HEALTH SERVICES RESEARCH COMMITTEE, HONG KONG GOVERNMENT

Outpatient appointment scheme in random environment
LIU, Liming; WAN, Yat-wah, Industrial Engineering

HONG KONG TELECOM INSTITUTE OF INFORMATION TECHNOLOGY

IC technology for wireless communications
NGUYEN, C.; CHUANG, Justin; KO, Ping; LING, Curtis; LO, Tai-chi; BUCHWALD, Aaron, Electrical & Electronic Engineering

Computational study of the optical fibre manufacturing process to improve the optical and mechanical characteristics of the fibre
LEE, Hon-keung Steve, Mechanical Engineering

Wideband wireless personal communications
CHUANG, Justin; LETAIEF, K. Ben; MURCH, Ross; LING, Curtis; KO, T.M., Electrical & Electronic Engineering

INTRUSION-PREPAKT (FAR EAST) LIMITED

Site Investigation and Laboratory Testing - Marine Sand Study
SHEN, C.K.; LEE, K.M.; LI, X.S., Civil & Structural Engineering

KWUN TONG DISTRICT BOARD, HONG KONG GOVERNMENT

Survey study of traffic and transportation problems in Kwun Tong district
YANG, Hai; SHEN, C.K., Civil & Structural Engineering

R AND D CORPORATION LIMITED

Vehicle and container number recognition system
LEE, Chung-mong, Computer Science

SINO SOFTWARE RESEARCH CENTRE

Information resource integration and management

LEE, Dik L., Computer Science

A software to aid in landfill liner design for pollution

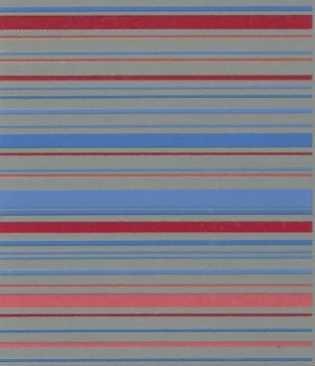
LO, Irene M.C., Civil & Structural Engineering; SHEN, Helen C., Computer Science

TCTS: Coarse translation tools for Chinese and English

WU, Dekai, Computer Science

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

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



on line
&
in GEAR

