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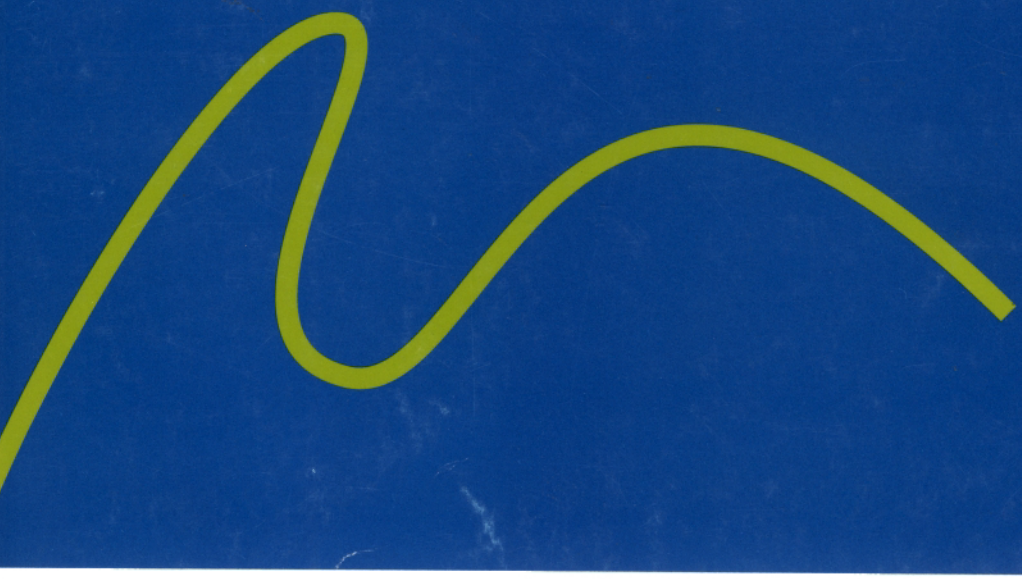
Mathematical and Computing Sciences Faculty Handbook 1994



UTS

Mathematical and Computing Sciences Faculty Handbook 1994

This handbook should be read in conjunction with the UTS Calendar and Student Information Guide. The University attempts to ensure that the information contained in the handbook is correct as at 22 September 1993. The University reserves the right to vary any matter described in the handbook at any time without notice.

UNIVERSITY OF TECHNOLOGY, SYDNEY
ADDRESSES AND TELEPHONE NUMBERS

POSTAL ADDRESS

PO Box 123
Broadway
New South Wales 2007 Australia

Telephone – all campuses except School of Legal Practice: (02) 330 1990
International: +61 2 330 1990
Fax: (02) 330 1551
Telex: AA 75004

STREET ADDRESSES

City Campus

- Broadway
  No. 1 Broadway, Ultimo
- Haymarket
  Corner Quay Street and Ultimo Road, Haymarket, Sydney
- Blackfriars
  Blackfriars Street, Chippendale
- Smail Street
  3 Smail Street, Ultimo
- Wembley House
  839-847 George Street, Sydney

Balmain Campus
(Being replaced by a new building in Harris Street, Ultimo, end 1994)

Corner Mansfield and Batty Streets
Balmain

Kuring-gai Campus

Eton Road
Lindfield
(PO Box 222, Lindfield, NSW, 2070)

St Leonards Campus

- Dunbar Building
  Corner Pacific Highway and Westbourne Street, Gore Hill
- Clinical Studies, Centenary Lecture Theatre and West Wing
  Reserve Road, Royal North Shore Hospital
- Gore Hill Research Laboratories
  Royal North Shore Hospital
- School of Legal Practice (College of Law)
  Corner Chandos and Christie Streets
  St Leonards
  Telephone: (02) 965 7000

Yarrawood Conference and Research Centre

Hawkesbury Road
Yarramundi 2753

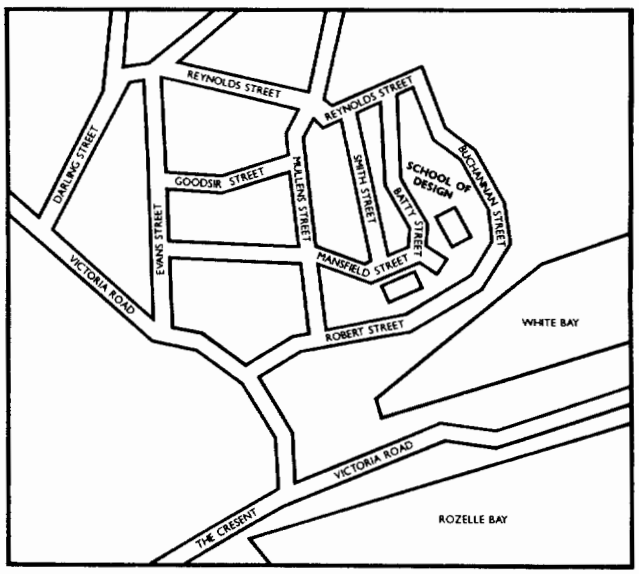
Stroud

Lot AFP 161894
The Bucketts Way
Booral 2425

CAMPUS MAPS

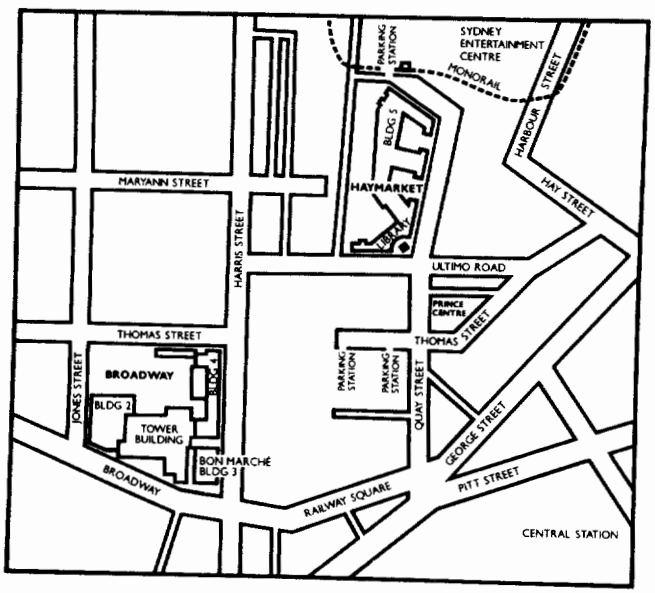
Balmain Campus

Corner Mansfield and
Batty Streets
Balmain



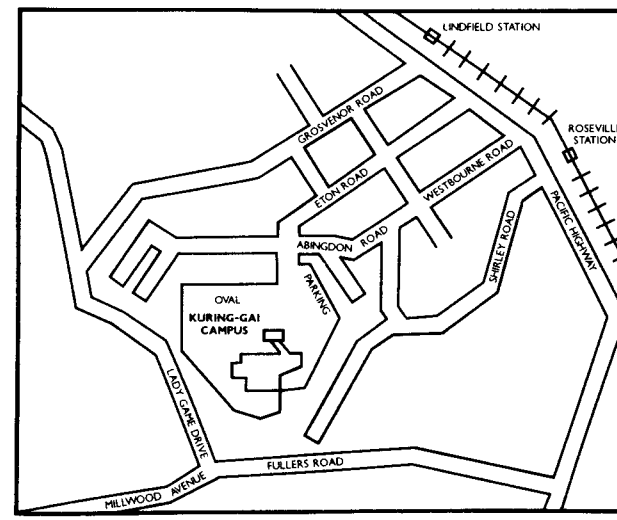
City Campus

- Broadway
  No.1 Broadway, Ultimo
- Haymarket
  Corner Quay Street and
  Ultimo Road
  Haymarket, Sydney
- Smail Street
  3 Smail Street, Ultimo
- Wembley House
  839-847 George Street
  Sydney



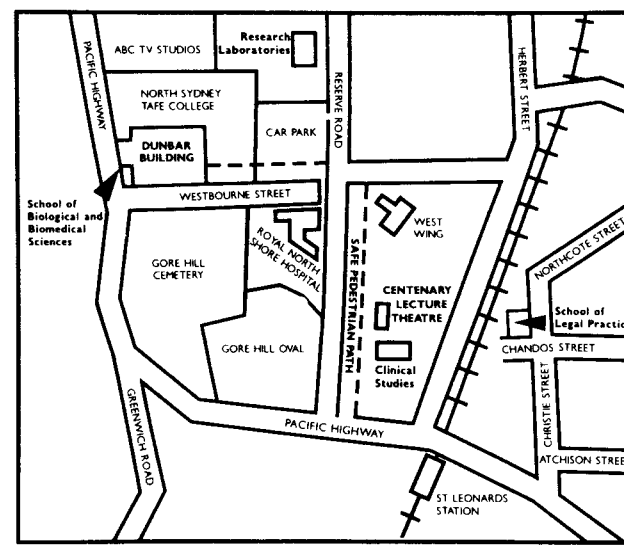
CAMPUS MAPS

Kuring-gai Campus
Eton Road
Lindfield



St Leonards Campus

- School of Biological and Biomedical Sciences
  Dunbar Building
  Corner Pacific Highway and Westbourne Street
  Gore Hill
- Clinical Studies, Centenary Lecture Theatre and West Wing
  Reserve Road, Royal North Shore Hospital
- Gore Hill Research Laboratories
  Royal North Shore Hospital
- School of Legal Practice (College of Law)
  Corner Chandos and Christie Streets
  St Leonards



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PREFACE

This handbook is one of a suite of ten publications comprising the University *Calendar* and nine faculty handbooks: Business; Design, Architecture and Building; Education; Engineering; Law and Legal Practice; Mathematical and Computing Sciences; Nursing; Science; and Social Sciences. Each handbook provides general information about the faculty as well as detailed information on the courses and subjects offered.

The *Calendar* contains the University By-law, which all students should read. It also contains a list of the University's courses, giving the name, abbreviation and title as indicated on the testamur. Copies of the *Calendar* are held in the University Library and in faculty offices, and may be purchased at the Co-op Bookshop.

The University also publishes a *Student Information Guide*, copies of which are provided free to students at enrolment. You should make sure that you read the student rules published in the guide. Information on the rights and responsibilities of students and on the services and facilities available is also given. The guide will assist you in your dealings with the University's administration and tell you whom to contact if you have a problem or need advice. Other publications providing information of a general nature are the UAC *Guide*, and the UTS Undergraduate and Postgraduate Studies Guides, all of which are available from the UTS Information Service.

For further information not provided in any of the publications mentioned, you should contact the UTS Information Service or your Faculty office. The latter will provide additional information on courses, methods of assessment, book lists and other faculty-specific information. If in doubt, don't hesitate to ask.

It is University policy to provide equal opportunity for all, regardless of race, sex, marital status, physical ability, sexual preference, age, political conviction or religious belief. The University also has an ethnic affairs policy to ensure that the University community is sensitive to the multicultural nature of Australian society and the cultural diversity within the University.

We hope you will enjoy your time as a student at UTS and wish you well in your studies.

FACULTY MISSION STATEMENT

The mission of the Faculty of Mathematical and Computing Sciences is to provide high quality, innovative programs of teaching, research and consulting, and continuing professional education to clients of wide backgrounds, both nationally and internationally. It is committed to technology transfer for the benefit of society by interacting closely with industry, business and government in research and development.

To support its mission, the Faculty aims to:

- excel in both the quality and professional relevance of its teaching programs, as well as the quality and intrinsic value of its research activities;
- preserve strong, effective links with industry, government, business, professional and community organisations;
- maintain a comprehensive range of educational programs to satisfy the spectrum of needs in the community;
- maintain a balanced portfolio of skills within its staff, which reflects perceived trends within the industries and disciplines addressed by the Faculty;
- expand research activities by promoting intra- and inter-faculty collaboration;
- encourage and facilitate the participation by staff in research activities;
- increase the participation rate of students in postgraduate programs – facilitated by the introduction of honours years;
- improve credit transfer arrangements to facilitate the movement of properly prepared students who wish to transfer between universities, or who move into the university sector with prior education and knowledge;
- ensure the principles of equity are observed in all aspects of the Faculty's work, with particular emphasis on the areas of importance identified in the University's Equity Plan;
- seek supplementary sources of external funding through research, joint ventures and entrepreneurial activities; and
- develop links with prestigious overseas universities and research institutions.

PRINCIPAL DATES FOR 1994 [1]

AUTUMN SEMESTER

January

5	School of Legal Practice enrolment day at St Leonards campus
10	Release of HSC results
14	Formal supplementary examinations for 1993 Spring semester students
17	Closing date for changes of preference to the Universities Admissions Centre (UAC) from 1993 NSW HSC applicants (by 4.30 pm)
20-31	Enrolment of students at City campus
26	Australia Day
28	Public school holidays end

February

1-17	Enrolment of students at City campus
2-7	Enrolment of new undergraduate students at City campus - includes UAC and direct applicants
7	Enrolment of all Teacher Education students at Kuring-gai campus
21	Enrolment of School of Biological and Biomedical Sciences students at St Leonards campus
28	Classes begin

March

11	Last day to enrol in a course or add subjects
11	Last day to change to upfront HECS payment
25	Last day to apply for leave of absence without incurring student fees/charges
31	HECS Census Date
31	Last day to withdraw from a subject without financial penalty

April

1	Public school holidays begin
1	Good Friday
4	Easter Monday
5-8	Vice-Chancellors' Week (non-teaching)
6	Graduation period begins
8	Public school holidays end
8	Last day to withdraw from a subject without academic penalty[2]
8	Last day to withdraw from a course without academic penalty[2]
22	Graduation period ends
25	Anzac Day
30	Last day to apply to graduate in Spring semester 1994

May

31	Closing date for undergraduate/postgraduate applications for Spring semester

June

13	Formal examination period begins
27	Public school holidays begin

SPRING SEMESTER

July

1	Formal examination period ends
4	School of Legal Practice enrolment day at St Leonards campus
4-8	Vice-Chancellors' Week (non-teaching)
8	Public school holidays end
22	Release of Autumn semester examination results
22	Formal supplementary examinations for Autumn semester students
25-29	Confirmation of Spring semester programs
26-27	Enrolment of new and readmitted students and students returning from leave/concurrent study

August

1	Applications available for undergraduate and postgraduate courses
1	Classes begin
4	Last day to withdraw from full-year subjects without academic penalty[2]
12	Last day to enrol in a course or add subjects
12	Last day to change to upfront HECS payment
26	Last day to apply for leave of absence without incurring student fees/charges (Spring enrolments only)
31	HECS Census Date
31	Last day to withdraw from a subject without financial penalty
31	Last day to apply to graduate in Autumn semester 1995

September

9	Last day to withdraw from a subject without academic penalty[2]
9	Last day to withdraw from a course without academic penalty[2]
26	Public school holidays begin
26	Graduation period begins
26-30	Vice-Chancellors' Week (non-teaching)
30	Closing date for undergraduate applications via UAC (without late fee)
30	Closing date for inpUTS Special Admission Scheme applications
30	Closing date for postgraduate applications (*to be confirmed*)
30	Graduation period ends

October

7	Public school holidays end
31	Closing date for postgraduate research and course award applications
31	Closing date for undergraduate applications via UAC (with late fee)
31	Closing date for undergraduate applications direct to UTS (without late fee)

November

14	Formal examinations begin

December

2	Formal examinations end
19	Public school holidays begin
23	Release of Spring semester examination results

[1] Information is correct as at 5 November 1993. The University reserves the right to vary any information described in Principal Dates for 1994 without notice.

[2] HECS/postgraduate course fees will apply after the HECS Census Date.

THE FACULTY OF MATHEMATICAL AND COMPUTING SCIENCES

From 1995, only new students and those enrolled in courses that have undergone major changes will receive a free handbook.

The Faculty of Mathematical and Computing Sciences consists of two Schools – Mathematical Sciences and Computing Sciences. Together, these disciplines form the basis of 'enabling technologies' for applications in most other disciplines.

Each school teaches towards its own professional degrees from undergraduate through to doctoral studies. Thus, all the course and student administration, and much of the staff and research management are conducted at the school level. Each school has, as a consequence, developed its own management structure appropriate for the support of its teaching and research programs. Teaching is carried out across all campuses of the University, with the exception of the Balmain campus.

The Faculty has a commitment to cooperative education, both of the work experience 'sandwich' form, and of the newer style cooperative scholarship format. The Faculty is active in research and has close liaison with industry in all aspects of its work.

The structure of the **School of Mathematical Sciences** reflects the orientation and emphases of its academic program. There are three units:

Mathematics
Computational Mathematics
Statistics and Operations Research

The School also provides a support service to all students of the University studying in various introductory mathematical or quantitative areas through its **Mathematics Study Centre**. Most of the teaching in the Centre occurs at an individual level and the Centre is open for at least 30 hours each week, with certain times devoted to particular areas of mathematics. Students can obtain help with individual problems, specific to a particular course. Alternatively, students with more systematic problems may study in the Centre on a regular basis, obtaining assistance from a tutor as necessary.

The structure of the **School of Computing Sciences** reflects the orientation and emphases of its academic work. There are two departments which are made up of two units:

Department of Computer Science
- Computer Methods Unit
- Computer Systems Unit

Department of Information Systems
- Information Systems Technology Unit
- Information Management Unit

The **Key Centre for Advanced Computing Sciences** is one of the seven original Key Centres established by the Commonwealth Government in 1985, and was the first federally-funded Centre for Advanced Computing Sciences in Australia. The Key Centre is based in the School of Computing Sciences and the School of Electrical Engineering; it is committed to research in computing, particularly through the development of links with industry.

The School of Computing Sciences presents a selection of Continuing Professional Education (CPE) courses each semester. These courses include Pascal Programming, COBOL Programming, UNIX/C and Auditing Computer Systems. The School also offers a selection of professionally oriented courses from time to time; these courses include database design, expert systems design, distributed databases and capacity planning. Enquiries on CPE courses should be directed to the Key Centre on 330 1331.

LIST OF COURSES AND CODES

The Faculty offers the following courses:

School of Mathematical Sciences

Bachelor of Science in Mathematics	MM01
Bachelor of Science (Honours) in Mathematics	MM02
Bachelor of Mathematics and Finance	MM03
Bachelor of Mathematics and Finance (Honours)	MM04
Graduate Diploma in Operations Research	MM52
Graduate Diploma in Statistics	MM65
Master of Science in Operations Research (by coursework)	MM53
Master of Science (by thesis)	MM51
Doctor of Philosophy	MM54
Graduate Certificate in Mathematical Sciences	MM56

School of Computing Sciences

Bachelor of Science in Computing Science	MC02
Bachelor of Information Technology	MC03
Graduate Diploma in Data Processing	MC52
Graduate Diploma in Information Technology Management	MC75
Master of Science in Computing (by coursework)	MC53
Master of Business in Information Technology Management	MC85
Master of Science (by thesis)	MC51
Doctor of Philosophy	MC54
Graduate Certificate in Applied Computing	MC57
Graduate Certificate in Advanced Information Technology	MC62
Graduate Certificate in Computer Science	MC60
Graduate Certificate in Human-Computer Interaction	MC65
Graduate Certificate in Information Systems	MC61
Graduate Certificate in Information Technology Management	MC63
Graduate Certificate in Programming Practice	MC64
Graduate Certificate in Software Quality Assurance	MC56

All enquiries regarding courses should be directed to the School Offices. For contact numbers refer to school sections of this handbook.

OFFICE LOCATION

The office of the Dean of Mathematical and Computing Sciences and general Faculty Office are located in Room 335 on the third floor of Building 4, Broadway, City campus. Staff associated with these offices are:

	Room	Extn
Dean		
Associate Professor J M Hughes	342A	1801

Faculty Administrator		
Miss F Ma	341	1880
Dean's Secretary		
Mrs I Ee	342	1800
Graduate Assistant		
Mr B Irvine	373	1806
Administrative Assistant		
Ms R Ball	335	1308

STATEMENT OF GOOD PRACTICE AND ETHICS IN INFORMAL ASSESSMENT

AIMS OF ASSIGNMENTS

In many subjects offered by the Faculty, students undertake assessment tasks in the form of assignments. The setting of assignments is intended to promote a number of educational aims, including furthering each student's learning of the subject, particularly the acquisition of practical skills; providing a means for staff to assess each student's learning; providing feedback to the student on his or her progress in learning; and providing feedback to staff on the effectiveness of their teaching.

These aims can be subverted if students deceive staff about the authorship of their work.

ACCEPTABLE BEHAVIOUR

Using sources Whenever anything from someone else's work is used, it is standard practice to indicate exactly where the information comes from. Acknowledgement is done by using a standard system of referencing, such as footnotes, end notes, the Harvard system, etc. The Guide to Writing Assignments (available from the Union Bookshop) explains how to use all these standard systems of reference.

Collaboration In some cases assignment guidelines may permit or require students to cooperate in developing a solution to part or all of an assignment. This may occur formally when a staff member assigns students to groups and indicates which components of the assignment they are to work on as a group and which components they are to work on individually.

It may also occur informally. For example, some assignments may involve an 'ideas gathering' phase followed by an 'execution' phase. Students may be permitted to collaborate informally on the preliminary phase(s), but be expected to work completely individually on the subsequent phase(s). In a programming assignment, for example, it is normally acceptable for one student to discuss with another student (or other person) the specifications of the task so as to determine the requirements (see below). Whether this collaboration could extend to subsequent phases (such as the design phase) would depend on the assignment guidelines; normally, collaboration in the design and subsequent phases is not permitted.

Depending on the type of assignment and degree of collaboration permitted it is possible to define several categories of collaboration:

- individual effort (the student is required to work on all phases entirely by himself or herself);
- group effort (the student is required to work on all phases as part of a formal group);
- mixed effort (the student is required or permitted to work on some or all phases as part of a formal or informal group).

Unless assignment guidelines specifically state otherwise, **a student should assume that an assignment requires a completely individual effort.** The forms of cooperative collaborative behaviour that are acceptable under most circumstances are:

- discussing assignment specifications with another student (or other person) with a view to clarifying what is required;
- getting help from another student (or other person) on technical matters that are not directly part of the assessment task (eg, on how to use some facility provided by the computer system, such as the editor);
- getting help from another student (or other person) in debugging a program. This is a common occurrence in computing; and
- obtaining help from a tutor.

Generally, what distinguishes the acceptable cases of collaborative behaviour from the unacceptable ones is the student's intention to deceive. For example, in an

assignment requiring a completely individual effort, a student may encounter some snag, such as an unfamiliar compiler diagnostic. If the student were to seek help from another student (or person) to remove the snag, then this would normally be considered acceptable behaviour. If, however, several students designed and coded a solution together, then disguised this collaboration, that would be unacceptable behaviour.

UNACCEPTABLE BEHAVIOUR

Outright lying This is seen most often in programming assignments, where the program does not run, or runs incorrectly, yet the output handed in is correct. The output has been 'tailored' using a word processor in an attempt to fool the marker. Lying is never acceptable behaviour.

Plagiarism Plagiarism is the action of taking and using as one's own the thoughts, writings, or inventions of another with the intention to deceive.

For example, if one student in a computing subject were to obtain a copy of another student's (or other person's) program, were to modify parts of the program (eg, change variable names) so as to disguise its origin, and then submit the modified program as his or her solution, then this would be considered plagiarism.

As another example, a student may obtain all or a major part of the solution to an assignment problem from a text book and, without acknowledging this, submit the solution as his or her own work.

As a further example, a student may use a source of information in an essay, without acknowledging the source. Such plagiarism may range from a sentence or two, or a table or diagram, to occasional cases where the entire paper consists of material copied from a book with only a few sentences added by the student. The student thus submits another's ideas as his or her own work.

Plagiarism is a form of cheating and is never acceptable.

Collusion Collusion occurs when a student combines with one or more other students (or other persons) to produce a common essay or solution to part or all of an assignment, disguises the shared origin of the solution, and submits the solution as his or her individual work.

Collusion is regarded as a form of cheating and is never acceptable.

SCHOOL OF MATHEMATICAL SCIENCES

The School of Mathematical Sciences offers two courses leading to Bachelor's degrees, postgraduate courses leading to qualifications at the Graduate Certificate, Graduate Diploma and Master's level and two research degree programs leading to Master's and Doctoral level qualifications. They are:

the Bachelor of Science in Mathematics, which is offered as a three-year Pass degree and a fourth year Honours degree;

the Bachelor of Mathematics and Finance, offered in conjunction with the School of Finance and Economics, as a three-year Pass degree and a fourth year Honours degree;

the Graduate Certificate in Mathematical Sciences;

the Graduate Diploma in Statistics;

the Graduate Diploma in Operations Research;

the Master of Science in Operations Research (by coursework);

the Master of Science, which is awarded on the basis of supervised research and presentation of a thesis;

the Doctor of Philosophy, which is awarded on the basis of supervised research and presentation of a thesis.

STAFF CONTACT LIST

All staff of the School of Mathematical Sciences are located on Levels 15 and 16 of the Tower Building (Building 1) on the City campus (Broadway).

When telephoning from outside the University all extension numbers should be prefixed by the digits 330.

Name	Extn	Room
Associate Professor Lindsay Botten *Head of School*	2247	1513
Mr Martin Caden *Senior Systems Programmer*	2253	1618
Associate Professor Graeme Cohen *Head, Mathematics Unit, and Director of Postgraduate Studies*	2262	1528

Name	Extn	Room
Ms Mary Coupland *Graduate Certificate Coordinator, inpUTS Coordinator for students with special needs and Academic Liaison Officer*	2241	1529
Ms Layna Groen	2266	1533
Mr Jeff Hogg	2238	1522
Dr Sam Huxham *Head, Statistics and Operations Research Unit*	2237	1551
Mr Tim Langtry	2261	1537
Dr Brian Lederer	2263	1558
Mr Ed Lidums	2235	1530
Mr Eric Lindsay *Technical Officer*	2254	1618
Dr Beverley Moore	2258	1550
Dr Gordon McLelland *Deputy Head of School and Director of Undergraduate Studies*	2259	1512
Miss Michelle Murray *School Clerk*	2246	1519
Mr Ken Ozanne	2256	1538
Mr Larry Park	2278	1560
Ms Eva Pejovic	2239	1539
Dr Peter Petocz	2264	1531
Mr Denis Porteus	2265	1559
Mr Bob Rozsasi	2245	1561
Dr Peter Sekhon	2257	1549
Professor Tony Shannon	2251	1527
Dr Geoff Smith *Exemption Coordinator and Honours Coordinator*	2236	1532
Mrs Jo Smith *Administrative Officer*	2250	1518
Mr Ron Sorli	2281	1548
Mr Brian Stephenson	2267	1547
Professor Barry Thornton *Head, Computational Mathematics Unit*	2252	1541
Mrs Vicky White *Wordprocessor Operator*	2249	1516
Ms Leigh Wood *Director, Mathematics Study Centre*	2268	1536
Mr Peter Wright	2243	1546
Dr Kim Yap	2244	1545
Dr Yakov Zinder	2279	1523

COMPUTING FACILITIES

The School of Mathematical Sciences operates a number of powerful minicomputer systems, all running versions of the UNIX operating system. These include a Sun Sparcstation 2, two Sun ELCs, a Sun Sparcstation 1, a Silicon Graphics 4/25S, a Silicon Graphics 4/20G and a MIPS M/800. In total, these systems include over five gigabytes of storage space. The Sun systems run SunOS, derived from the Berkley version of UNIX, while the other systems run AT&T System V UNIX. All of these systems are linked to the University's network via the School's TCP/IP subnet.

Access to the School's systems is available from three laboratories, owned and operated by the School for mathematics students, as well as from the various public access laboratories operated by the University's Information Technology Division. The School's laboratories provide terminals and Sun 3/50 workstations acting as X-terminals networked to a Sun server. They also provide IBM style PC 386 compatible computers linked via the School's Novell network. These PCs also act as terminals to any UNIX system in the University.

There are a number of limited access graphics instruments, including an HP 7580A A1 size drafting plotter, Silicon Graphics Iris 4D, PCs emulating graphics terminals, image processing hardware, and Postscript laser printers. An extensive library of in-house FORTRAN subroutines provide 2D and 3D graphics support.

The School has also acquired a significant quantity of software running on the Silicon Graphics, PCs, and Sun systems to support teaching and research in statistics, operations research, applied mathematics and computing. This is supplemented by software resources supplied centrally by the Information Technology Division.

Extensive use is made of the University's central facilities, which consist of an Amdahl 470V/8 system and a number of large Sun server systems. These can all be accessed from any PC laboratory in the University, via ethernet.

The School is also actively involved in two major regional computing consortiums. The Sydney Regional Centre for Parallel Computing operates a Thinking Machines Corporation CM5 parallel computer, located at the University of New South Wales and available to registered users via the AARNet. The Vislab Consortium operates a scientific visualisation project, with principal hardware components located at the University of Sydney, and available to users via AARNet.

UNDERGRADUATE PROGRAMS

Bachelor of Science in Mathematics (BSc)

Course code MM01

This degree aims to prepare students for employment in industry, commerce and government and to provide the foundation for higher studies in mathematics. It provides great flexibility by allowing students to follow a course of study which best suits their interests and aspirations. It aims to help students acquire sufficient experience and understanding in a broad range of mathematical disciplines to enable them to apply mathematical and computing techniques to industrial and commercial problems.

The course operates as a three-year Pass degree with a fourth year Honours degree. The basic structure of the Pass degree is as follows:

A core – providing a thorough grounding in the elements of mathematics, statistics, operations research, computing, and their applications. This component, occupying half of the Pass degree, is taught during the first two years of the full-time program.

A mathematics major – which occupies half of Year 3 of the full-time course (or Years 5 and 6 of the part-time course) and may be taken in one of the areas of applied mathematics, statistics or operations research. This framework provides for specialised study of a particular area of application. A major in operations research involves topics such as linear programming, simulation and optimisation. The statistics major aims to expose students to realistic statistical problems, preparing them to cope with data and its associated uncertainty and variability. Applied mathematics, particularly since the advent of computers, has developed a large collection of tools for the solution of practical problems. In many cases, these can be unified by a few basic geometric, analytic and algebraic ideas. The applied mathematics majors aim to develop these ideas and apply them in a variety of complex and practical situations.

Electives – which occupy one-third of the course and may be subjects from any school of the University chosen by students to strengthen their understanding in an area of their choice. Common choices are the major in computing offered by the School of Mathematical Sciences, an additional major in mathematics, a sub-major in financial management and various sub-majors in the sciences.

The computing major provides students with both practical and theoretical training in computer science (and its mathematical foundations), information systems and commercial computing, and a wide variety of applications. Because this major occupies the entire elective sequence, students who wish to pursue it are advised to commence it in their first year of study. However, because it is an elective major, students are not obliged to follow it to completion. The major is accredited at Level 1 by the Australian Computer Society and, accordingly, those who do complete it are eligible to apply for Associate Membership of that Society.

The course may be attempted on either a full-time or a part-time basis. Part-time students will be accommodated by the provision of some evening classes. It is expected that all part-time students will be able to attend classes for one afternoon and two evenings per week.

The standard full-time load for one semester is six subjects worth four credit points each and the standard part-time load for one semester is three subjects worth four credit points each. Most mathematics subjects involve two hours of lectures and a one-hour tutorial per week. Some subjects (especially those in computing) have additional laboratory hours.

Subject synopses and related details appear at the end of this section. As a general rule students should devote to home study about twice the number of hours per week that are allocated to lectures and tutorials.

FULL-TIME PROGRAM

Credit points for each subject are shown in parentheses.

Year 1

Autumn semester

34700 Discrete Mathematics (4cp)
34701 Algebra 1 (4cp)
34710 Calculus (8cp)
34770 Computing 1A (4cp)
Electives [1] (approx 4cp)

Spring semester

34711 Analysis 1 (4cp)

34751 Statistics 1 (4cp)
34790 Numerical Computing (4cp)
34802 Algebra 2 (4cp)
Electives [1] (approx 8cp)

Year 2

Autumn semester

34740 Introduction to Operations Research Models (4cp)
34803 Algebra 3 (4cp)
34815 Ordinary Differential Equations (4cp)
34817 Vector Calculus (4cp)
Electives [1] (approx 8cp)

Spring semester

34812 Analysis 2 (4cp)
34818 Complex Variables (4cp)
34821 Partial Differential Equations 1 (4cp)
34852 Statistics 2 (4cp)
34891 Numerical Methods A (4cp)
Electives [1] (approx 4cp)

Year 3

Year 3 of the full-time course comprises the Mathematics Major. This consists of a prescribed sequence of six subjects each worth four credit points taken from one of the four areas of statistics, operations research and physical and modern applied mathematics, together with 24 credit points of elective subjects[1].

PART-TIME PROGRAM

Year 1

Autumn semester

34700 Discrete Mathematics (4cp)
34710 Calculus (8cp)

Spring semester

34701 Algebra 1 (4cp)
34770 Computing 1A (4cp)
Electives [1] (approx 4cp)

Year 2

Autumn semester

34711 Analysis 1 (4cp)
34751 Statistics 1 (4cp)
Electives [1] (approx 4cp)

Spring semester

34740 Introduction to Operations Research Models (4cp)
34817 Vector Calculus (4cp)
Electives [1] (approx 4cp)

Year 3

Autumn semester

34790 Numerical Computing (4cp)
34802 Algebra 2 (4cp)
Electives [1] (approx 4cp)

Spring semester

34803 Algebra 3 (4cp)
34815 Ordinary Differential Equations (4cp)
Electives [1] (approx 4cp)

Year 4

Autumn semester

34812 Analysis 2 (4cp)
34821 Partial Differential Equations 1 (4cp)
Electives [1] (approx 4cp)

Spring semester

34818 Complex Variables (4cp)
34852 Statistics 2 (4cp)
34891 Numerical Methods A (4cp)

Years 5 and 6

Years 5 and 6 of the part-time course comprise the Mathematics Major. This consists of a prescribed sequence of six subjects each worth four credit points taken from one of the four areas of statistics, operations research and physical and modern applied mathematics, together with 24 credit points of elective subjects[1].

Note

For each semester in Years 5 and 6 students should choose subjects with an approximate value of 12 credit points.

[1] Students must attempt over the complete program elective subjects worth 48 credit points, distributed approximately as shown above in terms of credit point load. These electives may be chosen from subjects offered within the University and acceptable to the School of Mathematical Sciences. The most common choice of elective pattern is the computing major. Electives are discussed further below.

MAJOR AREAS OF STUDY

Students must complete at least one of the mathematics majors in the areas of statistics, operations research, modern applied mathematics or physical applied mathematics. Students may also choose to complete the major in computing.

• STATISTICS

FULL-TIME PROGRAM

Year 3

Autumn semester

34953 Statistical Inference (4cp)
34955 Regression Analysis (4cp)
34960 Probability (4cp)

Spring semester

34956 Design of Experiments (4cp)
34957 Quality Control (4cp)
34961 Stochastic Processes 1 (4cp)

PART-TIME PROGRAM

Years 5 and 6

Autumn semester

34953 Statistical Inference (4cp)
34955 Regression Analysis (4cp)
34961 Stochastic Processes 1 (4cp)

Spring semester

34956 Design of Experiments (4cp)
34957 Quality Control (4cp)
34960 Probability (4cp)

• OPERATIONS RESEARCH

FULL-TIME PROGRAM

Year 3

Autumn semester

34930 Simulation Techniques (4cp)
34931 Linear Programming (4cp)
34938 Financial Modelling Techniques (4cp)

Spring semester

34932 Optimisation Techniques (4cp)
34936 Decision Theory (4cp)
34961 Stochastic Processes 1 (4cp)

PART-TIME PROGRAM

Years 5 and 6

Autumn semester

34930 Simulation Techniques (4cp)
34938 Financial Modelling Techniques (4cp)
34961 Stochastic Processes 1 (4cp)

Spring semester

34931 Linear Programming (4cp)
34932 Optimisation Techniques (4cp)
34936 Decision Theory (4cp)

• PHYSICAL APPLIED MATHEMATICS[1]

Full-time program Year 3 and part-time program Years 5 and 6

Autumn semester

34922 Partial Differential Equations 2 (4cp)
34924 Mechanics (4cp)
34927 Deterministic Optimal Control (4cp)

Spring semester

34916 Mathematical Methods (4cp)
34925 Wave Theory (4cp)
34992 Numerical Methods B (4cp)

• MODERN APPLIED MATHEMATICS[1]

Full-time program Year 3 and part-time program Years 5 and 6

Autumn semester

34904 Algebra 4 (4cp)
34913 Modern Analysis (4cp)
34920 Integral Equations (4cp)

Spring semester

34914 Measure Theory (4cp)
34995 Advanced Numerical Analysis (4cp)
34996 Convexity and Optimisation (4cp)

[1] In order to complete the requirements for either of the two applied mathematics majors, students must complete at least 16 credit points from the major of their choice and select the remainder from the alternative major. Subjects on offer in these majors may vary from year to year and will depend on demand. Students interested in these majors should discuss their enrolment with the Director of Undergraduate Studies late in the year immediately prior to their intended enrolment.

• COMPUTING

FULL-TIME PROGRAM

Year 1

Autumn semester

31611 Information Systems (4cp)

Spring semester

34771 Computing 1B (4cp)
34781 Mathematical Foundations of Computing 1 (4cp)

Year 2

Autumn semester

31622 Commercial Programming Development (4cp)
34872 Computing 2 (4cp)

Spring semester
34873 Computing 3 (4cp)

Year 3

Autumn semester
34982 Mathematical Foundations of Computing 2 (4cp)
Computing Electives (approx 8cp)

Spring semester
34984 Language Theory (4cp)
Computing Electives (approx 8cp)

PART-TIME PROGRAM

Year 1

Spring semester
34781 Mathematical Foundations of Computing 1 (4cp)

Year 2

Autumn semester
31611 Information Systems (4cp)

Spring semester
34771 Computing 1B (4cp)

Year 3

Autumn semester
34872 Computing 2 (4cp)

Spring semester
34873 Computing 3 (4cp)

Year 4

Autumn semester
31622 Commercial Programming Development (4cp)

Years 5 and 6

Autumn semester
34982 Mathematical Foundations of Computing 2 (4cp)
Computing Electives (approx 8cp)

Spring semester
34984 Language Theory (4cp)
Computing Electives (approx 8cp)

COMPUTING ELECTIVES

As a requirement of the computing major, elective subjects in computing to a value of 16 credit points must be completed in Year 3 of the full-time program or in Years 5 and 6 of the part-time program. These subjects may be selected from the following list.

34975 Computer Graphics (4cp)
34976 Neural Networks (4cp)
34977 Formal Specification (4cp)
34983 Mathematical Foundations of Computing 3 (4cp)
34985 Digital Image Processing (4cp)
34986 Cryptology (4cp)

Subjects in this list will be offered subject to demand and staff availability. Alternatively, students may undertake subjects offered by the School of Computing Sciences, subject to the approval of the Head of the Computational Mathematics Unit. Students wishing to take elective subjects in the area of commercial information systems are advised to enrol in subjects in the areas of systems analysis (for example, 31621 Systems Analysis) and database theory (for example, 31631 Database) offered by the School of Computing Sciences.

ELECTIVE SUBJECTS OFFERED WITHIN THE BSc IN MATHEMATICS DEGREE

There are 48 credit points in the Bachelor of Science in Mathematics program allocated to elective subjects. Students may choose to complete these subjects in a number of ways:

- By completing one additional mathematics major, leaving 24 unspecified elective credit points to be completed in the case of most double majors, and 28 unspecified elective credit points to be completed in the case of a double major in Statistics and Operations Research.
- By completing the Computing major, leaving no unspecified elective hours.
- By completing subjects worth a total of 48 credit points from subjects offered by this School or by other schools of the University. Common choices of subjects include those forming recognised submajors in other disciplines such as financial management, physics and electronics.

Whatever subjects are chosen, it is necessary that the student has satisfied all prerequisites of the chosen subjects; the student's enrolment in a subject is approved by the school which offers that subject; and the student's choice of subjects is approved by the School of Mathematical Sciences.

In addition to subjects listed within the descriptions of the majors, the following subjects offered by the School of Mathematical Sciences may be taken as electives.

34692–6 Project (2–6 cp)
34807 History of Mathematics (4cp)
34894 Mathematical and Business Modelling (4cp)
34906 Differential Geometry (4cp)
34909 Seminar: Mathematics (4cp)
34934 Network Optimisation (4cp)
34935 Inventory Control (4cp)
34939 Seminar: Operations Research (4cp)
34959 Seminar: Statistics (4cp)
34979 Seminar: Computing (4cp)

Sub-majors are available in various areas including finance and physics. Students may contact the office of the School of Mathematical Sciences for details.

Bachelor of Science (Honours) in Mathematics (BSc(Hons))

Course code MM02

The Honours degree provides the opportunity for students to develop their level of competence in the area of mathematics chosen as their major in the BSc in Mathematics degree. The Honours degree is offered over one year on a full-time basis or two years on a part-time basis and consists of advanced coursework (comprising 75 per cent of the program) and a project (comprising the remaining 25 per cent). This project provides the opportunity for students to utilise the expertise developed by their coursework in an area of application. Students who complete the Honours degree will, accordingly, be well prepared to enter the workforce at a high level or to undertake graduate studies.

The precise selection of subjects to be offered in any strand in any given year will depend on the interests of students and the interests and availability of staff. Students should consult the Honours Coordinator, who will assist them in planning their program. This is of particular importance for part-time students since few subjects will be offered at night.

Admission to the Honours degree will be assessed individually according to the following criteria:

- Students who are eligible to graduate from the BSc in Mathematics degree with an average mark of 65 or more in Year 2 of the core and in their chosen major will be eligible for entry to the Honours degree.
- Students who have obtained qualifications equivalent to the BSc in Mathematics degree will, upon application, be considered for entry by the Head of the School of Mathematical Sciences, on the basis of assessed potential to complete the Honours degree.

The Honours program will require the completion of subjects worth 48 credit points in one year of full-time study or two years of part-time study. Honours will be offered in mathematics, statistics and operations research and will consist of nine coursework subjects each of four credit points and a project of 12 credit points.

Students contemplating taking Honours are advised to consult the Honours Coordinator or the Director of Undergraduate Studies on completing the core of the BSc in Mathematics degree. This will enable them to plan studies for the following years and make decisions at an early stage which will not close off options that otherwise would be available to them. Usually students decide to apply for Honours before the completion of the BSc but under the structure of the course, entry to Honours is possible even if the decision to do so is delayed until completion of the BSc.

Students who are deemed eligible for admission will be assigned a supervisor who will monitor their progress and supervise their project, which will be assessed by a report and seminar.

Students' final results will be based on the nine chosen Honours level subjects and the project. Satisfactory completion of the Honours program will result in the award of an Honours degree with the grades of First Class, Second Class (Division 1), or Second Class (Division 2).

The grade of Honours will be determined from an average mark of all Honours level subjects (subject numbers 340**) and the project weighted by the credit point values of the individual components. Grades of First Class, Second Class (Division 1) and Second Class (Division 2) Honours will be

awarded corresponding respectively to an average mark of 80 or greater, 65 to 79 and 50 to 64. An average mark of less than 50 will be regarded as a failure for the course and the student will be eligible to graduate with a pass BSc degree. A project that is of outstanding merit may justify an increase in the grade of Honours. A student with First Class Honours and outstanding results may be awarded a University Medal.

COURSE PROGRAM

The Honours degree consists of:

- 36 credit points of Honours level mathematics subjects (numbered as 340**) chosen in accordance with the rules below;
- a project whose weight is 12 credit points.

Honours will be offered in the mathematics, operations research and statistics strands, although some strands may not be offered in a given year. Each strand consists of:

- two compulsory subjects: 34013 Modern Analysis (Honours) and 34014 Measure Theory (Honours), each worth four credit points.

  It should be noted that some Honours level subjects have as prerequisites Modern Analysis (Honours) and Measure Theory (Honours) which may be taken in Year 3 of the BSc course. If this is not done then some Honours degree options (such as Stochastic Processes 2) will be unavailable. If these subjects are taken in Year 3, students will need to defer two of their Year 3 BSc electives to the Honours year.
- a further 28 credit points of mathematics Honours (340**) subjects of which at least 20 credit points must be taken from one of the nominated major strands (mathematics, operations research[1] or statistics);
- a 12 credit point project taken in the discipline of the major strand.

[1] Under certain circumstances, students attempting the operations research strand may be permitted to substitute one Year 3 (349**) subject for an Honours level (340**) option in order to satisfy subject prerequisites. Typically, this would involve students wishing to include the subject 34062 Stochastic Processes 2 in their program and being permitted to substitute 34960 Probability for one of the Honours (340**) options. Students must consult the Honours Coordinator or the Director of Undergraduate Studies to seek permission for such a substitution. There are no other exceptions to the general requirement of the 28/20 regulation rule referred to above.

Subjects offered in the various strands are:

Mathematics strand:

34019 Functional Analysis (4cp)
34023 Partial Differential Equations 3 (4cp)
34026 Fractal Geometry (4cp)
34028 Stochastic Optimal Control (4cp)
34029 Nonlinear Dynamical Systems (4cp)
34087 Analytic Number Theory (4cp)
34096 Convexity And Optimisation (Honours) (4cp)

Operations Research strand:

34031 Large-scale Mathematical Programming (4cp)
34033 Dynamic Optimisation (4cp)
34038 Corporate and Financial Decisions and Investment Analysis (4cp)
34040 Operations Research Models and Methodology (4cp)
34096 Convexity and Optimisation (Honours) (4cp)

Statistics strand:

34062 Stochastic Processes 2 (4cp)
34065 Time Series Analysis (4cp)
34066 Nonlinear Statistical Models (4cp)
34067 Multivariate Statistics (4cp)
34068 Statistical Modelling (4cp)
34069 Linear Models and Experimental Design (4cp)

Each strand is augmented by two seminar subjects, 34091 Honours Seminar 1 and 34092 Honours Seminar 2. These seminar subjects will be offered either by a visitor to the School or by members of the School's staff in some particular area of interest at the given time and play an important role in providing prospective graduate students with additional exposure to particular research areas of the School.

These strands may be amended as areas of significance and interest in the School change with time.

Bachelor of Mathematics and Finance (BMathFin)

Course code MM03

The years since deregulation of the Australian financial system have witnessed many sweeping changes and a considerable increase in the financial and economic activity of many Australian corporations. During this same period there has been an increasing use by major financial institutions of the sophisticated quantitative techniques that have been developed since the early 1970s. As a consequence, there is a demonstrated demand for a new type of graduate trained in both mathematics and finance.

To meet this need, the Bachelor of Mathematics and Finance degree has been jointly developed by the School of Mathematical Sciences and the School of Finance and Economics.

Students graduating from the BMathFin will have undertaken an integrated sequence of subjects in mathematics, statistics, finance, economics, accounting, business law and computing and so will have sound training in both the traditional theory of finance and the mathematical aspects of modern portfolio management techniques.

As a result, graduates should find interesting and rewarding employment in major financial institutions such as merchant banks, insurance companies and government instrumentalities.

The Bachelor of Mathematics and Finance is offered as a three-year Pass degree with a fourth year Honours degree (described below).

The Pass degree is offered on both a full-time and a part-time basis. The part-time course begins with a normal pattern of attendance of two nights and one afternoon per week. A standard program is given below. The final two years may require attendance at morning classes as some subjects, which form parts of other degrees, are not offered to part-time students at night. Programs will be arranged for students individually to incorporate the ten subjects of Year 3 of the full-time course over two years.

FULL-TIME PROGRAM

Year 1

Autumn semester

22105 Accounting A (5cp)
25110 Microeconomics (5cp)
34700 Discrete Mathematics (4cp)
34701 Algebra 1 (4cp)
34710 Calculus (8cp)

Spring semester

25209 Macroeconomics (5cp)
34711 Analysis 1 (4cp)
34751 Statistics 1 (4cp)
34790 Numerical Computing (4cp)
34802 Algebra 2 (4cp)

Year 2

Autumn semester

25210 Microeconomic Policy (5cp)
25308 Financial Institutions and Markets (5cp)
25314 Business Finance 1 (5cp)
34815 Ordinary Differential Equations (4cp)
34817 Vector Calculus (4cp)
34894 Mathematical and Business Modelling (4cp)

Spring semester

25905 Asset Pricing and Capital Markets Studies (Honours) (5cp)
34812 Analysis 2 (4cp)
34821 Partial Differential Equations 1 (4cp)
34852 Statistics 2 (4cp)
34936 Decision Theory (4cp)
79101 Law for Business (5cp)

Year 3

Autumn semester

25421 International Financial Management (5cp)
25906 Investment Analysis and Portfolio Management (Honours) (5cp)
34913 Modern Analysis[1] (4cp)
34955 Regression Analysis (4cp)
34960 Probability (4cp)

Spring semester

25502 Current Issues in Finance (5cp)
25606 Financial Time Series Analysis (5cp)
34914 Measure Theory[1] (4cp)
34961 Stochastic Processes 1 (4cp)
34992 Numerical Methods B (4cp)

PART-TIME PROGRAM

Year 1

Autumn semester

34700 Discrete Mathematics (4cp)
34710 Calculus (8cp)

Spring semester

22105 Accounting A (5cp)
25110 Microeconomics (5cp)
34701 Algebra 1 (4cp)

Year 2

Autumn semester

25209 Macroeconomics (5cp)
34711 Analysis 1 (4cp)
34751 Statistics 1 (4cp)

Spring semester

25210 Microeconomic Policy (5cp)
34817 Vector Calculus (4cp)

Year 3

Autumn semester

34790 Numerical Computing (4cp)
34802 Algebra 2 (4cp)
79101 Law for Business (5cp)

Spring semester

25308 Financial Institutions and Markets (5cp)
25314 Business Finance 1 (5cp)
34815 Ordinary Differential Equations (4cp)

Year 4

Autumn semester

34812 Analysis 2 (4cp)
34821 Partial Differential Equations 1 (4cp)
34894 Mathematical and Business Modelling (4cp)

Spring semester

25905 Asset Pricing and Capital Markets Studies (Honours) (5cp)
34852 Statistics 2 (4cp)
34936 Decision Theory (4cp)

Years 5 and 6

25502 Current Issues in Finance (5cp)
25421 International Financial Management (5cp)
25606 Financial Time Series Analysis (5cp)
25906 Investment Analysis and Portfolio Management (Honours) (5cp)
34913 Modern Analysis [1] (4cp)
34914 Measure Theory [1] (4cp)
34955 Regression Analysis (4cp)
34960 Probability (4cp)
34961 Stochastic Processes 1 (4cp)
34992 Numerical Methods B (4cp)

Note

Programs for Years 5 and 6 will be arranged for students individually. See the introduction to this section.

[1] Students proceeding to the Honours year will be required to substitute 34013 Modern Analysis (Honours) and 34014 Measure Theory (Honours) for the two pass-level subjects.

Bachelor of Mathematics and Finance (Honours) (BMathFin(Hons))

Course code MM04

The Bachelor of Mathematics and Finance degree is also offered at an Honours level, requiring an additional year of advanced study. Honours degree graduates will be particularly sought after and their additional skills would enable them to compete for the top jobs in the banking sector. It is expected that most students will opt to undertake this additional year comprising nine coursework subjects in advanced mathematics, statistics and finance, each worth four credit points, and a research project worth 12 credit points.

Admission to the Honours degree will be assessed individually according to the following criteria:

- Students who are eligible to graduate from the BMathFin degree at UTS with a credit average, (ie, an average mark of 65 or more) over all subjects in Years 2 and 3 will be eligible for entry to the Honours degree, subject only to the approval of the Heads of the Schools of Mathematical Sciences and Finance and Economics.
- Students who have obtained qualifications equivalent to the BMathFin degree will be considered for entry, upon application, by the Heads of the two participating Schools on the basis of their assessed potential to complete the Honours degree.

The Honours degree will require completion of subjects worth 48 credit points over one year of full-time study. The year

consists of nine coursework subjects of an advanced nature in mathematics, statistics and finance together with a substantial project. The project will involve a major investigation in some area of finance, and will provide students with the opportunity to apply the skills developed in their coursework. The project will be assessed on the basis of a thesis and a seminar presented to the staff of both Schools.

The assessment of students' results will take into account the Honours level coursework subjects, the thesis and the seminar, and Honours at the grades of First Class, Second Class (Division 1), Second Class (Division 2) and Third Class will be awarded for the successful completion of the course.

The Honours degree will be offered for the first time in 1994.

Listed below is the course program for the BMathFin(Honours) degree. All subjects, except the thesis, carry four credit points, and require attendance of three hours each week. The thesis carries 12 credit points.

COURSE PROGRAM

Year 4

Autumn semester

25910	Thesis (6cp)
25907	Advanced Microeconomics (4cp)
34062	Stochastic Processes 2 (4cp)
34065	Time Series Analysis (4cp)
34927	Deterministic Optimal Control (4cp)

Spring semester

25910	Thesis (6cp)
25908	Futures and Options (4cp)
25909	Advanced Corporate Finance (4cp)
34028	Stochastic Optimal Control (4cp)
34029	Nonlinear Dynamical Systems (4cp)
34066	Nonlinear Statistical Models (4cp)

POSTGRADUATE PROGRAMS

POSTGRADUATE RESEARCH DEGREES

The Master of Science (by thesis) and Doctor of Philosophy degrees provide the opportunity for graduates to extend and deepen their knowledge in specialised areas of mathematics by undertaking research under the supervision of a member of the academic staff.

The main interests within the School of Mathematical Sciences are in applied and computational mathematics, operations research and statistics. Although a wide range of topics can be covered by the staff, particular interests and specialisations exist in the following areas:

Clinical Trials and the Modelling of Medical Data

Inversion of Raman spectra of living cells; stability and uniqueness in compartmental models for medical applications; diabetic control; insulin sensitivity; modelling of glucose and C-peptide response curves.

Computational Mathematics and Computing

Lattice rules for numerical multiple integration; development of AMPL (A Mathematical Programming Language); database management system for diabetes; computer performance modelling; mathematical foundations of computing; computer aided instruction in mathematics.

Differential Geometry

Topology and Ricci curvature; integral formulas of submanifolds of a Riemannian manifold.

Geophysical Applications of Mathematics

Seismic ray theory for slightly heterogeneous structures; properties of normal rays; seismic wave propagation; seismic velocity inversion; inverse problems; radio frequency propagation in coal seams.

Mathematics Education

PhD education of industrial mathematicians; mathematical education of engineers; tertiary education in applied mathematics.

Number Theory

Recurring sequences; odd perfect numbers and related numbers; arithmetical functions.

Operations Research

Manpower planning; delivery of health services; modelling of energy systems; simulation techniques.

Optics and Electromagnetic Diffraction Theory

Diffraction properties of 1D and 2D periodic structures; optics of thin films.

Statistics

Medical applications of statistics; measurement and test design; permissible statistics; stationary Markov sequences; simulation and density estimation.

The medically related research of the School is conducted through the Centre for Biomedical Technology which was formed in 1990. The Centre is an interfaculty network of research and education teams working in the field of biomedical technology. It integrates the University's diverse expertise and resources to enhance the scientific and technological base for biomedical technology research and training for industry, health care providers and government. Other schools involved with the Centre are the School of Biological and Biomedical Sciences, the School of Physical Sciences, the School of Electrical Engineering, the School of Mechanical Engineering, the School of Computing Sciences and the Faculty of Nursing.

In addition to these research interests, the staff of the School of Mathematical Sciences are involved in consulting activities and have well established and continuing industrial contacts. The staff are also active in their respective professional societies and publish numerous books and journal articles.

FEES

There are no tuition fees associated with either the MSc (by thesis) or the PhD program. HECS scholarships are awarded to all candidates for postgraduate research degrees, and these exempt them from the normal HECS payments.

RECENT THESES

PhD theses

Hung W T, Modelling the Human Erythrocyte Sedimentation Rate, 1989

Ollerton R L, Adaptive Control and the Insulin Dependent Diabetic, 1990

Dobson R J, Modelling Host Regulation of Trichostrongylus Colubriformis, a Nematode Parasite of Sheep, 1992

MSc theses

Langtry T N, The Identification Problem in Compartment Modelling and the Role of Stability Analysis, 1987

Sayers M D, An Improved Lower Bound for the Total Number of Prime Factors of an Odd Perfect Number, 1987

Ollerton R L, Optimisation of Insulin Infusion Algorithms, 1988

Reuben A J, Mathematical Models of Erythrocyte Sedimentation, 1990

Haggar F, An Account of the Behaviour of Some Pairs of e(1) Variables, 1991

Lee J K, Strategies for Inversions for Some Geophysical and Medical Applications, 1991

Doctor of Philosophy (PhD)

Course code MM54

The PhD program provides an opportunity for graduates to acquire high level research skills and substantially deepen their knowledge in an area of the mathematical sciences by working under the guidance of a supervisor. The research program entails survey and mastery of a large body of literature in the chosen topic together with a substantial body of high level original work by the candidate. Students are also required to present seminars during the time of their enrolment and at the completion of their program.

The course is offered in full-time and part-time modes. For full-time enrolments the duration of the program is three years; for part-time enrolments it is six years. It is expected that part-time students will be able to devote 20 hours per week to the work towards the degree. All students are expected to maintain regular contact (at least weekly) with their supervisor.

Master of Science (by thesis) (MSc)

Course code MM51

The Master of Science program provides an opportunity for graduates to acquire research skills and deepen their knowledge in some areas of the mathematical sciences by working under the guidance of a supervisor who is a member of the full-time academic staff of the School. The research program entails survey and mastery of a substantial body of literature in the chosen topic together with original work from the

candidate. The degree is examined through the presentation of a thesis. Students are also required to present seminars during the time of their enrolment and at the completion of the program.

The course is offered in full-time and part-time modes. For full-time enrolments the normal duration of the program is two years; for part-time enrolments it is four years. It is expected that part-time students will be able to devote 20 hours each week to the work towards the degree. All students are expected to maintain regular contact (at least weekly) with their supervisor.

POSTGRADUATE COURSEWORK PROGRAMS

Master of Science in Operations Research (by coursework) (MSc)

Course code MM53

Operations research may be defined as the application of the methods of science to complex problems arising in the direction and management of large systems of people, machines, materials and money in industry, business, government and defence. This course aims to prepare graduates for high level professional work in the applications of operations research techniques to the problems of modern society.

The subjects in the program provide students with a suite of advanced techniques, together with the theoretical background for these methods. Studies in the fields of optimisation, mathematical programming, stochastic processes and the theory of finance, together with a broad survey of applications having industrial and social importance, will enable graduates to deal with high level professional work in operations research in business and industry.

FEES

The Master's degree in Operations Research is offered within a fixed quota and the course fees have been set in accordance with University policy. In 1993, the tuition fees were $1,900 for each semester of equivalent full-time study. Fees for part-time students are levied on a pro rata basis. The total cost of the course is then $3,800 at current rates. Fees are revised from year to year in accordance with University and Government policy. Students paying tuition fees will not be liable for HECS (the Higher Education Contribution Scheme).

COURSE STRUCTURE

The course has a length of 48 credit points and consists of six core subjects (24 credit points), 12 credit points of elective subjects (incorporated to enable students to develop complementary skills) and a substantial project of 12 credit points (requiring students to undertake a survey and a modest level of research in some area of application of the discipline). The normal attendance pattern involves two years of part-time study. However, it is possible to complete the degree through one year of full-time study.

Applicants for this course must be graduates who have high level skills in the mathematical sciences. In particular, they must have:

- a knowledge of statistics equivalent to 34852 Statistics 2;
- completed studies in operations research corresponding to either the Graduate Diploma in Operations Research, the undergraduate major in operations research or its equivalent;
- completed prerequisites in mathematics which are presumed in the core subjects of the degree.

Applicants not satisfying these prerequisites are advised to consider enrolling in the graduate diploma or the graduate certificate programs offered by the School. Applicants should discuss their eligibility for entry with the Head of the Statistics and Operations Research Unit or the Director of Postgraduate Studies.

The course is composed of the following elements:

A sequence of subjects
The subjects are taught through lectures, tutorials and reading.

A seminar subject
Students are required to perform a survey of current literature and present a discussion of current and prospective research in operations research.

A major report
Students are required to investigate an approved topic in operations research. They are required to present an extensive written report and also to give an oral presentation in the form of a seminar.

Three electives
The electives have been included within the program to enable students to round out their education in an appropriate manner. It is intended that these subjects be of senior undergraduate standard or higher. Typical choices will include additional studies in operations research, statistics or possibly subjects from some area of business or management. The electives will be chosen by the student and an academic adviser who will be appointed by the Director of Postgraduate Studies.

Students will have their registration discontinued for failure to complete the course in three years from the time of registration in the case of a full-time student, or in four and a half years in the case of a part-time student (not inclusive of periods of leave of absence), or for recording any three failures in the course (unsatisfactory progress as defined by the Faculty Board resolution, FBMC/92/70).

PART-TIME PROGRAM

Semester 1

34033	Dynamic Optimisation (4cp)
34040	Operations Research Models and Methodology (4cp)
	Electives (approx 4cp)

Semester 2

34031	Large-scale Mathematical Programming (4cp)
34038	Corporate Financial Decisions and Investment Analysis (4cp)
	Electives (approx 4cp)

Semester 3

34036	Stochastic Models in Operations Research (4cp)
34039	Seminar: Applications in Operations Research (4cp)
34097	Report [1] (6cp)

Semester 4

34097	Report [1] (6cp)
	Electives (approx 4cp)

[1] This is a year-long subject. Students are expected to devote approximately three hours each week to the Report in Semester 3 and six hours each week in Semester 4.

Graduate Diploma in Operations Research (GradDipOR)

Course code MM52

This course is designed to train professional people in the application of operations research principles and methods. It may be regarded as a training or retraining course for graduates from a wide range of disciplines providing they have a sound foundation in mathematics, statistics and computing, to approximately second-year level. It is ideally suited for subsequent entry into the Master of Science in Operations Research.

The subjects in the Graduate Diploma provide a coverage of standard operations research techniques and their theoretical foundations. The range of topics covered and the level of presentation is commensurate with that found in senior undergraduate studies in these disciplines.

The length of the course is 48 credit points comprising 40 credit points of coursework (ten subjects) and a project of eight credit points.

Applicants for this course will be graduates from a variety of disciplines who satisfy the basic entry requirements consisting of a knowledge of pure and applied mathematics and statistics that is sufficient to satisfy the prerequisites of the program's subjects and a knowledge of computer programming equivalent to the content of the subject 34790 Numerical Computing.

Applicants not satisfying these prerequisites are advised to consider enrolling in a graduate certificate course. Applicants for the Graduate Diploma program should discuss their eligibility with the Head of the Statistics and Operations Research Unit or the Director of Postgraduate Studies.

This course is offered with both full-time and part-time attendance patterns. The normal time to complete the course is one year for full-time students and two years for part-time students.

Students will have their registration discontinued for failure to complete the course in two years from the time of registration in the case of a full-time student, or in four years from the time of registration in the case of a part-time student (not inclusive of periods of leave of absence), or for failure in any subject three times (unsatisfactory progress as defined by the Faculty Board resolution, FBMC/92/71).

It is expected that the normal pattern of attendance will be part-time. Shown below is the course structure for part-time attendance over a period of two years. All subjects except the project carry four credit

points and require attendance of three hours each week. The project carries eight credit points and requires six hours of attendance each week.

FEES

The Graduate Diploma in Operations Research is offered within a fixed quota and the course fees have been set in accordance with University policy. In 1993, the tuition fees were at $1,900 for each semester of equivalent full-time study. Fees for part-time students are levied on a pro rata basis. The total cost of the course is then $3,800 at current rates. Fees are revised from year to year in accordance with University and Government policy. Students paying tuition fees will not be liable for HECS (the Higher Education Contribution Scheme).

PART-TIME PROGRAM

Semester 1	
34740	Introduction to Operations Research Models (4cp)
34852	Statistics 2 (4cp)
34930	Simulation Techniques (4cp)
Semester 2	
34931	Linear Programming (4cp)
34935	Inventory Control (4cp)
34936	Decision Theory (4cp)
Semester 3	
34934	Network Optimisation (4cp)
34938	Financial Modelling Techniques (4cp)
34961	Stochastic Processes 1 (4cp)
Semester 4	
34932	Optimisation Techniques (4cp)
34997	Project (8cp)

Graduate Diploma in Statistics (GradDipStats)

Course code MM65

The Graduate Diploma in Statistics aims to train graduates in the methods and principles of applied statistics. The course provides access to training or retraining in statistics to at least the level of skill attained by students completing the BSc degree with a major in statistics. Students will be expected to have had some exposure to statistics, usually the equivalent of two subjects to the second-year level. Some mathematical background is also necessary.

A knowledge of statistical methodology is becoming ever more important for graduates in many disciplines. Degree courses in the sciences, in engineering and in business often do not provide the exposure to statistics which graduates find they need in employment. Thus, this course is suitable for such graduates and also for those who have completed degrees in pure or applied mathematics without a major in statistics.

The subjects in the Graduate Diploma provide a coverage of standard statistical techniques and their theoretical foundations. The range of topics covered and the level of presentation is commensurate with that found in senior undergraduate studies in these disciplines.

The length of the course is 48 credit points, consisting of 40 credit points of coursework (ten subjects) and a project of eight credit points.

Applicants for this course will be graduates from a variety of disciplines who satisfy the basic entry requirements consisting of a knowledge of statistics and pure and applied mathematics that is sufficient to satisfy the prerequisites of the program's subjects and a knowledge of computer programming equivalent to the content of the subject 34790 Numerical Computing.

Prospective applicants will be assessed by the Director of Postgraduate Studies and the Head of the Statistics and Operations Research Unit, and those who have not completed the necessary prerequisites will be required to enrol in appropriate subjects, either in a miscellaneous mode of study or as part of a graduate certificate program.

Students will have their registration discontinued for failure to complete the course in two years from the time of registration in the case of a full-time student, or in four years from the time of registration in the case of a part-time student (not inclusive of periods of leave of absence), or for failure in any subject three times (unsatisfactory progress as defined by the Faculty Board resolution, FBMC/92/71).

It is expected that the normal pattern of attendance will be part-time. Shown below is the course structure for part-time attendance over a period of two years.

FEES

At present no quota is available for this course and it is necessary to charge full fees. In 1993, the total cost of the course was $7,600.

PART-TIME PROGRAM

Semester 1

34930 Simulation Techniques (4cp)
34953 Statistical Inference (4cp)
34955 Regression Analysis (4cp)

Semester 2

34956 Design of Experiments (4cp)
34957 Quality Control (4cp)
34960 Probability (4cp)

Semester 3

34961 Stochastic Processes 1 (4cp)
Electives [1] (approx 8cp)

Semester 4

34936 Decision Theory (4cp)
34997 Project (8cp)

[1] The electives are included to enable students to select topics which enhance their knowledge of the application of statistics in their chosen field. Students should discuss possible options with the Head of the Statistics and Operations Research Unit (or nominee).

Graduate Certificate in Mathematical Sciences

Course code MM56

The Graduate Certificate in Mathematical Sciences has been developed in response to a demand for short courses in statistics, operations research, and computational and applied mathematics. It provides those employed in industry with access to additional training or retraining in quantitative disciplines.

The course has a flexible structure and the wide range of subjects offered in the other postgraduate and undergraduate courses of the School of Mathematical Sciences would be available to intending students. Students may undertake any sequence of subjects offered by the School with a total value of 12 credit points, provided that individual subject prerequisites are satisfied. Approved elective subjects from other schools of the University may also be taken with the consent of the Head of School.

Applicants will normally be expected to hold a Bachelor's degree, or higher qualification, from a recognised tertiary institution. Applicants who do not possess such qualifications will be considered on an individual basis. Prior to their admission, all applicants will be required to discuss their preferred program of study with the Graduate Certificate Coordinator in order to ensure that they have the requisite background knowledge for their chosen subject sequences. A fee of $600 per subject is payable.

A number of coherent subject sequences in the areas of computational mathematics, applied mathematics, operations research and statistics are possible. Samples of these are listed below. Some computing subjects require extra attendance for laboratories. Details are given in the subject descriptions.

COMPUTATIONAL MATHEMATICS

Sequence A

Theme: Numerical Analysis

Presumed knowledge

Equivalent to tertiary-level courses in calculus, linear algebra and differential equations.

Program of study

34790 Numerical Computing (4cp)
34891 Numerical Methods A (4cp)
34992 Numerical Methods B (4cp)

Sequence B

Theme: Mathematical Computer Science (1)

Presumed knowledge

Equivalent to an introductory tertiary-level course in discrete mathematics.

Program of study

34770 Computing 1A (4cp)
34771 Computing 1B (4cp)
34781 Mathematical Foundations of Computing 1 (4cp)

Sequence C

Theme: Mathematical Computer Science (2)

Presumed knowledge

This sequence provides for an extension of the material prescribed in Sequence B. It is, therefore, presumed that students will have a working knowledge of Pascal or MODULA-2 and abstract data structures, as well as some experience with abstract algebraic structures (such as groups) and a functional programming language such as Miranda.

Program of study

34872 Computing 2 (4cp)
34873 Computing 3 (4cp)
34982 Mathematical Foundations of Computing 2 (4cp)

Sequence D

Theme: Mathematical Cryptology

Presumed knowledge

Equivalent to introductory-level courses in calculus and linear algebra.

Program of study

34790 Numerical Computing (4cp)
34803 Algebra 3 (4cp)
34986 Cryptology (4cp)

Sequence E

Theme: Neural Networks

Presumed knowledge

Equivalent to tertiary-level courses in statistics, multivariable calculus and matrix algebra.

Program of study

34790 Numerical Computing (4cp)
34802 Algebra 2 (4cp)
34976 Neural Networks (4cp)

MATHEMATICS

Sequence A

Theme: Differential Equations

Presumed knowledge

Equivalent to tertiary-level courses in multivariable calculus, real and complex analysis and linear algebra.

Program of study

34815 Ordinary Differential Equations (4cp)
34821 Partial Differential Equations 1 (4cp)
34922 Partial Differential Equations 2 (4cp)

Sequence B

Theme: Modern and Linear Algebra

Presumed knowledge

Equivalent to an introductory tertiary-level course in matrix algebra.

Program of study

34700 Discrete Mathematics (4cp)
34802 Algebra 2 (4cp)
34803 Algebra 3 (4cp)

Sequence C

Theme: Analysis with applications to Probability Theory

Presumed knowledge

Equivalent to tertiary-level courses in analysis, (ordinary) differential equations, and linear algebra.

Program of study

34812 Analysis 2 (4cp)
34913 Modern Analysis (4cp)
34914 Measure Theory (4cp)

Sequence D

Theme: Mathematical Control Theory

Presumed knowledge

Equivalent to introductory tertiary-level courses in calculus and linear algebra.

Program of study

34815 Ordinary Differential Equations (4cp)
34817 Vector Calculus (4cp)
34927 Deterministic Optimal Control (4cp)

OPERATIONS RESEARCH

Sequence A

Theme: Financial Modelling

Presumed knowledge

Equivalent to introductory tertiary-level courses in statistics and calculus.

Program of study

34740 Introduction to Operations Research Models (4cp)
34936 Decision Theory (4cp)
34938 Financial Modelling Techniques (4cp)

Sequence B

Theme: Techniques of Mathematical Programming

Presumed knowledge

Equivalent to introductory tertiary-level courses in statistics, calculus and matrix algebra.

Program of study

34740 Introduction to Operations Research Models (4cp)
34931 Linear Programming (4cp)
34932 Optimisation Techniques (4cp)

Sequence C

Theme: Simulation and Decision Support

Presumed knowledge

Equivalent to introductory tertiary-level courses in statistics and elementary scientific computing.

Program of study

34740 Introduction to Operations Research Models (4cp)
34930 Simulation Techniques (4cp)
34936 Decision Theory (4cp)

Sequence D

Theme: Optimisation and Applications

Presumed knowledge

Equivalent to introductory tertiary-level courses in statistics, matrix algebra and operations research models, together with knowledge of computerised simulation (as in 34930 Simulation Techniques).

Program of study

34931 Linear Programming (4cp)
34934 Network Optimisation (4cp)
34935 Inventory Control (4cp)

STATISTICS

Sequence A

Theme: Analysis of Experimental Data

Presumed knowledge

Equivalent to introductory tertiary-level courses in statistics and calculus.

Program of study

34852 Statistics 2 (4cp)
34955 Regression Analysis (4cp)
34956 Design of Experiments (4cp)

Sequence B

Theme: Industrial Applications of Statistics

Presumed knowledge

Equivalent to introductory tertiary-level courses in statistics and calculus.

Program of study

34852 Statistics 2 (4cp)
34955 Regression Analysis (4cp)
34957 Quality Control (4cp)

Sequence C

Theme: Stochastic Modelling

Presumed knowledge

Equivalent to introductory tertiary-level courses in statistics and calculus.

Program of study

34852 Statistics 2 (4cp)
34960 Probability (4cp)
34961 Stochastic Processes 1 (4cp)

Sequence D

Theme: Mathematical Statistics

Presumed knowledge

Equivalent to introductory tertiary-level courses in statistics and calculus.

Program of study

34852 Statistics 2 (4cp)
34953 Statistical Inference (4cp)
34960 Probability (4cp)

NUMERICAL LISTING OF SUBJECTS

The following table indicates for each subject its number and name, the semester or semesters in which it is offered (these are subject to change), the credit point value, the number of contact hours, and prerequisites and corequisites (indicated by c). The letters A and S refer to Autumn and Spring semesters, respectively, and Y is used for a year-long subject. As a general guide, three contact hours suggests two hours of lectures and one tutorial hour per week, and five contact hours suggests a further two hours of laboratory work per week.

Subject Number	Subject Name	Semester Offered	Credit Points	Contact Hours	Prerequisite
22105	Accounting A	A,S	5	3	
25110	Microeconomics	A,S	5	3	
25209	Macroeconomics	A,S	5	3	25110
25210	Microeconomic Policy	A,S	5	3	25110
25308	Financial Institutions and Markets	A,S	5	3	25110, 25209
25314	Business Finance 1	A,S	5	3	22105, 34751, 25308c
25421	International Financial Management	A	5	3	25314
25502	Current Issues in Finance	S	5	3	25308, 25314
25606	Financial Time Series Analysis	S	5	3	34817, 34955
25905	Asset Pricing and Capital Markets Studies (Honours)	S	5	3	25314
25906	Investment Analysis and Portfolio Management (Honours)	A	5	3	25905
25907	Advanced Microeconomics	A	4	3	By consent
25908	Futures and Options	S	4	3	By consent
25909	Advanced Corporate Finance	S	4	3	By consent
25910	Thesis	Y	12	9	By consent
31611	Information Systems	A	4	4	
31622	Commercial Programming Development	A	4	5	33134, 34790
34013	Modern Analysis (Honours)	A	4	3	34802, 34812
34014	Measure Theory (Honours)	S	4	3	34013
34019	Functional Analysis	S	4	3	34014
34023	Partial Differential Equations 3	A	4	3	34922
34026	Fractal Geometry		4	3	34014

Subject Number	Subject Name	Semester Offered	Credit Points	Contact Hours	Prerequisite
34028	Stochastic Optimal Control	S	4	3	34927, 34062
34029	Nonlinear Dynamical Systems	S	4	3	34815, 34013
34031	Large-scale Mathematical Programming	S	4	3	34932
34033	Dynamic Optimisation	A	4	3	34790, 34931, 34961
34036	Stochastic Models in Operations Research	A	4	3	34931, 34961, 34033
34038	Corporate and Financial Decisions and Investment Analysis	S	4	3	34938
34039	Seminar: Applications in Operations Research	A	4	3	By consent
34040	Operations Research Models and Methodology	A	4	3	By consent
34062	Stochastic Processes 2	A	4	3	34960, 34961, 34014
34065	Time Series Analysis	A	4	3	34960, 34961
34066	Nonlinear Statistical Models	S	4	3	34955, 34065
34067	Multivariate Statistics	A	4	3	34953, 34955
34068	Statistical Modelling	A,S	4	3	34956
34069	Linear Models and Experimental Design	S	4	3	34956, 34067
34087	Analytic Number Theory	A	4	3	34803, 34818
34091	Honours Seminar 1		4	3	By consent
34092	Honours Seminar 2		4	3	By consent
34096	Convexity and Optimisation (Honours)	A	4	3	34013
34097	Report	Y	12	9	By consent
34098	Project (Honours)	Y	12	9	By consent
34692–6	Project		2–6		By consent
34700	Discrete Mathematics	A,S	4	3	
34701	Algebra 1	A,S	4	3	
34710	Calculus	A,S	8	6	
34711	Analysis 1	A,S	4	3	34710
34740	Introduction to Operations Research Models	A,S	4	3	34751c

Subject Number	Subject Name	Semester Offered	Credit Points	Contact Hours	Prerequisite
34751	Statistics 1	A,S	4	3	34710
34770	Computing 1A	A,S	4	5	34700c
34771	Computing 1B	S	4	5	34781c
34781	Mathematical Foundations of Computing 1	S	4	3	34700, 34770
34790	Numerical Computing	A,S	4	5	34710, 34711c
34802	Algebra 2	A,S	4	3	34701
34803	Algebra 3	A,S	4	3	34802
34807	History of Mathematics	A,S	4	3	
34812	Analysis 2	A,S	4	3	34711, 34821c
34815	Ordinary Differential Equations	A,S	4	3	34710, 34802c
34817	Vector Calculus	A,S	4	3	34710
34818	Complex Variables	S	4	3	34711, 34817
34821	Partial Differential Equations 1	A,S	4	3	34815, 34817c
34852	Statistics 2	A,S	4	3	34751
34872	Computing 2	A	4	5	34771
34873	Computing 3	S	4	3	34711, 34872, 34803c
34891	Numerical Methods A	S	4	3	34711, 34790, 34815
34894	Mathematical and Business Modelling	A	4	5	34751, 34790
34904	Algebra 4	A	4	3	34803
34906	Differential Geometry	A	4	3	34802, 34815, 34817
34909	Seminar: Mathematics		4	3	By consent
34913	Modern Analysis	A	4	3	34802, 34812
34914	Measure Theory	S	4	3	34913
34916	Mathematical Methods	S	4	3	34922
34920	Integral Equations	A	4	3	34913c
34922	Partial Differential Equations 2	A	4	3	34818, 34821
34924	Mechanics	A	4	3	34815, 34817
34925	Wave Theory	S	4	3	34922
34927	Deterministic Optimal Control	A	4	3	34815, 34817
34930	Simulation Techniques	A	4	3	34751, 34790c
34931	Linear Programming	A	4	3	34740, 34802c

Subject Number	Subject Name	Semester Offered	Credit Points	Contact Hours	Prerequisite
34932	Optimisation Techniques	S	4	3	34711, 34931
34934	Network Optimisation	A	4	3	34931c
34935	Inventory Control	S	4	3	34930c
34936	Decision Theory	S	4	3	34751
34938	Financial Modelling Techniques	A	4	3	34711, 34751
34939	Seminar: Operations Research		4	3	By consent
34953	Statistical Inference	A	4	3	34852
34955	Regression Analysis	A	4	3	34852
34956	Design of Experiments	S	4	3	34955
34957	Quality Control	S	4	3	34852
34959	Seminar: Statistics		4	3	By consent
34960	Probability	A,S	4	3	34852c
34961	Stochastic Processes 1	A,S	4	3	34852
34975	Computer Graphics	A	4	3	34790, 34802
34976	Neural Networks	A	4	3	34751, 34790, 34802, 34817
34977	Formal Specification	S	4	3	34982
34979	Seminar: Computing		4	3	By consent
34982	Mathematical Foundations of Computing 2	A	4	3	34803, 34873
34983	Mathematical Foundations of Computing 3	S	4	3	34982, 34984c
34984	Language Theory	S	4	3	34982
34985	Digital Image Processing	S	4	3	34790, 34802
34986	Cryptology	A	4	3	34790
34992	Numerical Methods B	S	4	3	34790, 34821
34995	Advanced Numerical Analysis	S	4	3	34913
34996	Convexity and Optimisation	S	4	3	34913
34997	Project (Graduate Diploma)	S	8	6	By consent
79101	Law for Business	A,S	5	3	

ALPHABETICAL LISTING OF SUBJECTS

Advanced Numerical Analysis	34995
Algebra 1	34701
Algebra 2	34802
Algebra 3	34803
Algebra 4	34904
Analysis 1	34711
Analysis 2	34812
Analytic Number Theory	34087
Calculus	34710
Commercial Programming Development	31622
Complex Variables	34818
Computer Graphics	34975
Computing 1A	34770
Computing 1B	34771
Computing 2	34872
Computing 3	34873
Convexity and Optimisation	34996
Convexity and Optimisation (Honours)	34096
Corporate and Financial Decisions and Investment Analysis	34038
Cryptology	34986
Decision Theory	34936
Design of Experiments	34956
Deterministic Optimal Control	34927
Differential Geometry	34906
Digital Image Processing	34985
Discrete Mathematics	34700
Dynamic Optimisation	34033
Financial Modelling Techniques	34938
Formal Specification	34977
Fractal Geometry	34026
Functional Analysis	34019
History of Mathematics	34807
Honours Seminar 1	34091
Honours Seminar 2	34092
Information Systems	31611
Integral Equations	34920
Introduction to Operations Research Models	34740
Inventory Control	34935
Language Theory	34984
Large-scale Mathematical Programming	34031
Linear Models and Experimental Design	34069
Linear Programming	34931
Mathematical and Business Modelling	34894
Mathematical Foundations of Computing 1	34781
Mathematical Foundations of Computing 2	34982
Mathematical Foundations of Computing 3	34983
Mathematical Methods	34916
Measure Theory	34914
Measure Theory (Honours)	34014
Mechanics	34924
Modern Analysis	34913
Modern Analysis (Honours)	34013
Multivariate Statistics	34067
Network Optimisation	34934
Neural Networks	34976
Nonlinear Dynamical Systems	34029
Nonlinear Statistical Models	34066
Numerical Computing	34790
Numerical Methods A	34891
Numerical Methods B	34992
Operations Research Models and Methodology	34040
Optimisation Techniques	34932
Ordinary Differential Equations	34815
Partial Differential Equations 1	34821
Partial Differential Equations 2	34922
Partial Differential Equations 3	34023
Probability	34960
Project (Graduate Diploma)	34997
Project (Honours)	34098
Project	34692 34696
Quality Control	34957
Regression Analysis	34955
Report	34097
Seminar: Applications in Operations Research	34039
Seminar: Computing	34979
Seminar: Mathematics	34909
Seminar: Operations Research	34939
Seminar: Statistics	34959
Simulation Techniques	34930
Statistical Inference	34953
Statistical Modelling	34068
Statistics 1	34751
Statistics 2	34852
Stochastic Models in Operations Research	34036
Stochastic Optimal Control	34028
Stochastic Processes 1	34961
Stochastic Processes 2	34062
Time Series Analysis	34065
Vector Calculus	34817
Wave Theory	34925

Subjects offered by other faculties

Accounting A	22105
Advanced Corporate Finance	25909
Advanced Microeconomics	25907
Asset Pricing and Capital Markets Studies (Honours)	25905
Business Finance 1	25314
Current Issues in Finance	25502
Financial Institutions and Markets	25308
Financial Time Series Analysis	25606
Futures and Options	25908
International Financial Management	25421
Investment Analysis and Portfolio Management (Honours)	25906
Law For Business	79101
Macroeconomics	25209
Microeconomic Policy	25210
Microeconomics	25110
Thesis	25910

SUBJECT DESCRIPTIONS

Guide to subject descriptions

The subject descriptions shown below indicate the subject number and name, the number of credit points for the subject (eg, 4cp), and the number of formal contact hours per week (eg, 3 hpw). Also shown are the prerequisites or corequisites, if any, and a brief outline of the content.

Prerequisites are subjects which must be completed before taking the subject to which they refer. Corequisites may be completed before or be taken concurrently with the subject to which they refer.

34013 MODERN ANALYSIS (HONOURS)

(4cp); 3 hpw
prerequisites 34812 Analysis 2, 34802 Algebra 2
As for 34913 Modern Analysis. Additional content: topological spaces, continuous functions, compactness, separation properties.

34014 MEASURE THEORY (HONOURS)

(4cp); 3 hpw
prerequisite 34013 Modern Analysis (Honours)
As for 34914 Measure Theory. Additional content: the pi-lambda theorem, Fubini's theorem, Hahn decomposition, Radon-Nikodym theorem and conditional probability.

34019 FUNCTIONAL ANALYSIS

(4cp); 3 hpw
prerequisite 34014 Measure Theory (Honours)
Banach spaces. Bounded linear transformations. Spectrum. Dual space. Adjoint operator. Hahn-Banach theorem. Compact operators. Riesz theory. Fredholm integral equations. Fredholm alternative. Application to potential theory. Hilbert spaces. Operators and adjoints. Riesz representation theorem. Orthogonality. Orthonormal bases. Abstract Fourier theory. Self-adjoint operators. Projections. Compact operators. Spectral theory for compact operators. Application to Sturm-Liouville theory. Fourier series.

34023 PARTIAL DIFFERENTIAL EQUATIONS 3

(4cp); 3 hpw
prerequisite 34922 Partial Differential Equations 2
First-order equations. Classification of second-order linear equations. Wave equation. D'Alembert's formula. Poisson's formula. Huygen's principle. Heat Equation. Maximum principles. Regularity of solutions. Nonlinear problems. Laplace's equation. Properties of harmonic functions. Green's functions. Method of images. Integral equations. Fredholm theory. Application to Dirichlet and Neumann problems. Introduction to scattering theory. Scattering of plane waves by cylinders.

34026 FRACTAL GEOMETRY

(4cp); 3 hpw
prerequisite 34014 Measure Theory (Honours)
Review of relevant aspects of metric space theory, compactness, and contraction mappings. The space of fractals. Collage Theorem. Chaotic dynamics on fractals. Fractal dimension; theoretical and experimental determination. Fractal interpolation. Julia sets; attractors of iterated function systems, applications to Newton's method. Parameter spaces and Mandelbrot sets. Measures on fractals. Application to computer graphics.

34028 STOCHASTIC OPTIMAL CONTROL

(4cp); 3 hpw
prerequisites 34927 Deterministic Optimal Control, 34062 Stochastic Processes 2
Formulation of stochastic control problems. Examples of controls. The Hamilton-Jacobi-Bellman equation. Necessary and sufficient conditions. Reduction to Markov controls. Dynamic portfolio strategies. The optimal portfolio selection problem. Discussion of solutions in various particular cases.

34029 NONLINEAR DYNAMICAL SYSTEMS

(4cp); 3 hpw
prerequisites 34815 Ordinary Differential Equations, 34013 Modern Analysis (Honours)
Review of linear systems. Nonlinear systems. Phase plane analysis. Linearisation. Local stability and instability. Global asymptotic stability. Stable and unstable manifolds. Limit cycles and strange attractors. Introduction to chaos theory. Asymptotic methods. The methods of Poincaré and Lindstedt. The method of averaging. Applications to the theory of finance.

34031 LARGE-SCALE MATHEMATICAL PROGRAMMING

(4cp); 3 hpw
prerequisite 34932 Optimisation Techniques
Theory and computational methods for optimising large-scale linear and nonlinear programs; variance of the simplex method and approximation approaches to the solution of large-scale linear programs, decomposition (Dantzig-Wolfe and Bender's), exploitation of sparsity, combinatorial problems, methodology.

34033 DYNAMIC OPTIMISATION

(4cp); 3 hpw
prerequisites 34790 Numerical Computing, 34931 Linear Programming, 34961 Stochastic Processes I
Bellman's principle of optimality. Recursive relations. Production scheduling. Resource allocation. Equipment replacement. Two or more state variables.
Continuous state variables. Application to linear and nonlinear programming. Computational feasibility. Stochastic state space. PDP formulations. Markov decision processes. Approximation in policy space with discounting.

34036 STOCHASTIC MODELS IN OPERATIONS RESEARCH

(4cp); 3 hpw
prerequisites 34931 Linear Programming, 34033 Dynamic Optimisation, 34961 Stochastic Processes I
Stochastic linear programming (two-stage linear programming formulations and change-constrained programming). Finite horizon probabilistic dynamic programming. Markov chains and Markovian decision processes and probabilistic inventory models (infinite horizon continuous review).

34038 CORPORATE AND FINANCIAL DECISIONS AND INVESTMENT ANALYSIS

(4cp); 3 hpw
prerequisite 34938 Financial Modelling Techniques
Options: concepts and valuation models; current issues and developments. Capital structure and theory of the firm: the effects of personal and corporate tax; current issues. Dividend policy.

34039 SEMINAR: APPLICATIONS IN OPERATIONS RESEARCH

(4cp); 3 hpw
prerequisite by consent
Recognition of problem areas suited to the application of operations research techniques such as simulation, queueing theory, mathematical programming and inventory control. Human resources planning and scheduling in companies and facilities. Cohort analysis, Markov-based examples, effects of computerisation and technological change. Application to areas of the public sector including location of emergency services, capacity planning over time and service level decisions. Class discussion of ongoing and prospective applications of operations research.

34040 OPERATIONS RESEARCH MODELS AND METHODOLOGY

(4cp); 3 hpw
prerequisite by consent
Critical analysis of recent studies from the literature, from the point of view of the OR methodology used. Development of alternative formulations of problems and their solutions. Case studies of the basic model prototypes (linear, network, dynamic and stochastic). At least one case study will

involve the use of continuous and/or discrete event simulation using a high level language such as SimScript II.5.

34062 STOCHASTIC PROCESSES 2

(4cp); 3 hpw
prerequisites 34960 Probability, 34961 Stochastic Processes I, 34014 Measure Theory (Honours)
Formal definitions of probability space and stochastic processes. Martingales. Riemann-Stieltjes integration. Brownian motion and related processes. Stochastic calculus and stochastic differential equations. Financial applications.

34065 TIME SERIES ANALYSIS

(4cp); 3 hpw
prerequisites 34960 Probability, 34961 Stochastic Processes I
Model identification, estimation, diagnostic examination and forecasting for time series. Nonseasonal/seasonal, stationary/nonstationary and linear/nonlinear time series are considered. Models covered are Box-Jenkins, time series regression, exponential smoothing, transfer functions and classical regression.

34066 NONLINEAR STATISTICAL MODELS

(4cp); 3 hpw
prerequisites 34955 Regression Analysis, 34065 Time Series Analysis
Nonlinear regression; least squares estimation; hypothesis testing. Use of SAS. Multivariate nonlinear regression. Nonlinear simultaneous equation models; method of moment estimators.

34067 MULTIVARIATE STATISTICS

(4cp); 3 hpw
prerequisite 34953 Statistical Inference, 34955 Regression Analysis
Multivariate normal distribution: definition; moments; characteristic function; estimation of mean and covariance matrices; Wishart distribution; Hotelling's T^2. Multivariate linear regression; principal components. Factor analysis. Cluster analysis.

34068 STATISTICAL MODELLING

(4cp); 3 hpw
prerequisite 34956 Design of Experiments
Revision of linear models and exponential families. Generalised linear models. Applications including logistic regression and contingency tables. Modelling using statistical distributions; continuous distribution models; discrete distribution models.

34069 LINEAR MODELS AND EXPERIMENTAL DESIGN

(4cp); 3 hpw
prerequisites 34956 Design of Experiments, 34067 Multivariate Statistics
Linear models; the linear model of less than full rank, the analysis of variance, completely randomised and randomised block designs. Response surfaces. Incomplete block designs. Repeated measures designs.

34087 ANALYTIC NUMBER THEORY

(4cp); 3 hpw
prerequisites 34803 Algebra 3, 34818 Complex Variables
Divisibility, prime numbers and the fundamental theorem of arithmetic; arithmetical functions and Dirichlet multiplication; some asymptotic analysis involving arithmetical functions. Characters of finite Abelian groups; Dirichlet's theorem on primes in arithmetic progressions. The Riemann zeta funtion; analytic proof of the prime number theorem.

34091 HONOURS SEMINAR 1

(4cp); 3 hpw
prerequisite by consent
This subject will provide an opportunity for students to benefit from the specialist knowledge of a visitor to the School or to undertake a course in an area of specific staff research or knowledge.

34092 HONOURS SEMINAR 2

(4cp); 3 hpw
prerequisite by consent
As for 34091.

34096 CONVEXITY AND OPTIMISATION (HONOURS)

(4cp); 3 hpw
prerequisite 34013 Modern Analysis (Honours)
As for 34996 Convexity and Optimisation. Additional content: general constrained optimisation theory, application to calculus of variations, introduction to applications in optimal control theory.

34097 REPORT

(12cp); 9 hpw
prerequisite by consent
An applied or theoretical study in an area chosen in consultation with the project supervisor who will be appointed by the Head of School. This is a year-long subject. Students are expected to spend three hours per week on their project in Autumn semester and six hours per week in Spring semester.

34098 PROJECT (HONOURS)

(12cp); 9hpw
prerequisite by consent
Students will perform an independent investigation of an area of the mathematical sciences chosen in consultation with a supervisor who will be appointed by the Head of School. This is a year-long subject. Students are expected to spend three hours per week on their project in Autumn semester and six hours per week in Spring semester.

34692–34696 PROJECT

(2–6cp); 1–5hpw
prerequisite by consent
An investigation of a topic selected by the student with the approval of the Director of Undergraduate Studies (or nominee).

34700 DISCRETE MATHEMATICS

(4cp); 3 hpw
Graphs, paths, trees. Set operations. Indexing and recurrence relations. Propositional and predicate calculus. Semigroups, lattices and Boolean algebras. Permutations, combinations, partitions, counting and allocation problems.

34701 ALGEBRA 1

(4cp); 3 hpw
Complex numbers; polar form, de Moivre's theorem, exponential form, regions in the complex plane. Polynomials; remainder and factor theorems, synthetic division, Descarte's Rule of Signs, relations between roots and coefficients. Systems of linear equations; Gaussian elimination, homogeneous systems. Matrices; matrix algebra, elementary matrices, inverse matrix, application to systems of linear equations, LU decomposition. Determinants; definition and properties, methods of evaluation, Cramer's Rule, adjoint form for inverse matrix, characteristic equation. Vectors; algebra of vectors, dot and cross products, triple products, applications to trigonometry and three-dimensional coordinate geometry.

34710 CALCULUS

(8cp); 6 hpw
Graphical introduction to limits, continuity and differentiation. Graphical introduction to the Mean Value Theorem. Applications of differentiation. Riemann integration and the Fundamental Theorem of Calculus. Applications of integration to areas, volumes, length of curves and surface areas. Logarithmic and exponential functions. Trigonometric and inverse trigonometric functions. Hyperbolic and inverse hyperbolic functions. Methods of integration. Improper integrals.

34711 ANALYSIS 1

(4cp); 3 hpw
prerequisite 34710 Calculus
Convergence of sequences, limit theorems. Points sets; the least upper bound axiom, nested interval property and Bolzano-Weierstrass theorem; application to sequences. Limit of a function; limit theorems, continuity, discussion in terms of sequences. Properties of continuous functions on a closed interval. Differentiation; the Mean Value Theorem. Taylor's Theorem with remainder; L'Hôpital's rule. Infinite series; convergence tests for series of positive terms, absolute and conditional convergence, alternating series. Improper integrals; convergence tests. Power series and radius of convergence. Taylor and Maclaurin series; associated numerical problems.

34740 INTRODUCTION TO OPERATIONS RESEARCH MODELS

(4cp); 3 hpw
corequisite 34751 Statistics I
Formulation of problems and construction of models. Examples from linear and other mathematical programming, network models, dynamic programming, inventory control, Bayesian decision analysis, financial techniques, stochastic processes, simulation, heuristics, game theory and queueing theory.

34751 STATISTICS 1

(4cp); 3 hpw
prerequisite 34710 Calculus
Descriptive statistics. Probability. Random variables; expectation. Standard probability distributions. Concepts of sampling. Confidence intervals and hypothesis testing. Inference about means, variances and proportions. Goodness of fit tests. Non-parametric tests. Linear regression and correlation.

34770 COMPUTING 1A

(5cp); 5 hpw
corequisite 34700 Discrete Mathematics
Problem-solving and algorithm development using a modern functional programming language (Miranda). Informal introduction to algebraic methods of specification, development and proof of programs. Use of Miranda to implement equational specifications: guarded equations, block structure, lists and list comprehensions, types, polymorphism, abstract data types, currying and higher order functions (map, filter, fold), lazy evaluation and infinite lists.

34771 COMPUTING 1B

(5cp); 5 hpw
corequisite 34781 Mathematical Foundations of Computing I
Problem solving and algorithm development using a functional language (Miranda) and an imperative language (Modula-2). Syntactic and semantic features of Miranda and Modula-2. Control structures in Modula-2; external modules, procedures, scope of identifiers, scalar and elementary structured data types. Formal specification and refinement techniques. Modular design. Investigation of a range of algorithms and recursively defined data types.

34781 MATHEMATICAL FOUNDATIONS OF COMPUTING 1

(4cp); 3 hpw
prerequisites 34700 Discrete Mathematics, 34770 Computing IA
Historical overview of computing machinery. Introduction to deterministic finite automata. Design of combinatorial circuits and clocked sequential circuits. The von Neumann architecture. Elementary data types; representation of values and realisation of operators. Registers, arithmetic and logic units, data path. The fetch-execute cycle. Introduction to the theory of computation; algorithms as function definitions, the halting problem, Church's thesis. Introduction to the lambda calculus.

34790 NUMERICAL COMPUTING

(4cp); 5 hpw
prerequisite 34710 Calculus;
corequisite 34711 Analysis I
Elements of the C language including control structures, functions, arrays and I/O. Basic program design techniques and their implementation in C. Preprocessor facilities, standard libraries, function prototyping and restricted identifier scope. Introduction to numerical computing. Treatment of errors. Solution of nonlinear equations in one variable; bisection and Newton's methods. Linear equations in several variables; Gaussian elimination, iteration. Numerical integration; trapezoidal and Simpson's rules, extrapolation. Non-numerical applications; sorting, searching, text processing.

34802 ALGEBRA 2

(4cp); 3 hpw
prerequisite 34701 Algebra I
Vector spaces; Euclidean and general vector spaces. Subspaces. Linear independence; basis and dimension. Row and column spaces. Inner product spaces. The Gram-Schmidt process. Change of basis. Linear transformations. Eigenvalues and eigenvectors; diagonalisation, similarity, symmetric matrices. Applications to quadratic forms, conic sections, powers of a matrix and difference equations. Complex vector spaces. Complex inner product spaces. Unitary, normal and Hermitian matrices.

34803 ALGEBRA 3

(4cp); 3 hpw
prerequisite 34802 Algebra 2
Sets, relations and functions. Order relations. Posets and lattices. Semigroups. Generators. Quotient semigroups. Finite state machines. Languages. Monoids. Groups. Normal subgroups. Quotient groups. Lagrange's theorem. Homomorphisms. Permutation groups, orbits and symmetries. Rings and ideals. Quotient rings. Fields. Introduction to finite fields and coding theory.

34807 HISTORY OF MATHEMATICS

(4cp); 3 hpw
Greek mathematics and the works of Eudoxus, Euclid, Archimedes, Appolonius and Pappus. Renaissance mathematics; cubics and quartics. The rise of analysis; Newton, Leibnitz, the Bernoullis, Euler. Early modern mathematics; Lagrange, Laplace, Legendre, Carnot, Desargues. The 19th century; Gauss to Klein. Some 20th century developments.

34812 ANALYSIS 2

(4cp); 3 hpw
prerequisite 34711 Analysis I;
corequisite 34821 Partial Differential Equations I
Cauchy sequences; cluster points of sequences, convergence of Cauchy sequences, sequential compactness of the real line. Continuous and uniformly continuous functions; further properties of continuous functions on a closed interval. Mean Value Theorem and Fundamental Theorem of Calculus. Sequences and series of functions; uniform convergence, continuity, integrability and differentiability of series of functions; Weierstrass M-test. Power series. Fourier series; applications to ordinary differential equations and boundary value problems.

34815 ORDINARY DIFFERENTIAL EQUATIONS

(4cp); 3 hpw
prerequisite 34710 Calculus;
corequisite 34802 Algebra 2
First-order equations. Theory of linear equations. Auxiliary equations and undetermined coefficients. Variation of parameters. Laplace transforms, step functions, convolution. Eigenvalues and matrix exponentials. Qualitative properties of solutions. Phase plane. Stability. Linear and nonlinear systems. Predator-prey problems.

34817 VECTOR CALCULUS

(4cp); 3 hpw
prerequisite 34710 Calculus
Partial derivatives. Multiple integrals. Vector fields. Line and surface integrals. Green's, Gauss' and Stokes' theorems.

34818 COMPLEX VARIABLES

(4cp); 3 hpw
prerequisites 34711 Analysis I, 34817 Vector Calculus
Analytic functions of a complex variable. Cauchy's integral theorem. Laurent series. Singularities of analytic functions. The residue theorem. Contour integration. Conformal mapping.

34821 PARTIAL DIFFERENTIAL EQUATIONS 1

(4cp); 3 hpw
prerequisite 34815 Ordinary Differential Equations; corequisite 34817 Vector Calculus
Solution of boundary value problems by separation of variables. Sturm-Liouville theory. Fourier series. Two dimensional problems. Infinite domain problems. Fourier integrals and Fourier transforms. Green's function methods. Laplace transform methods for elementary boundary value problems.

34852 STATISTICS 2

(4cp); 3 hpw
prerequisite 34751 Statistics I
Probability distributions. Moment generating functions. Bivariate distributions. Distribution of functions of random variables. Order statistics. Standard sampling distributions. Central Limit Theorem. Properties of point estimators. Maximum likelihood estimation.

34872 COMPUTING 2

(4cp); 5hpw
prerequisite 34771 Computing IB
Specification, design, implementation and testing of software using imperative and functional languages. Further investigation of abstract data types (ADTs) (list, stack, queue, dequeue, tree, graph, etc); formal specification of ADTs, static and dynamic

implementation in an imperative language, requisite features of C and C++. Introduction to order notation and efficiency considerations. Algorithm analysis, searching and sorting algorithms. Further investigation of functional programming; functional implementation of ADTs, recursion and induction on lists.

34873 COMPUTING 3

(4cp); 3 hpw
prerequisites 3471I Analysis I, 34872 Computing 2; corequisite 34803 Algebra 3
Further work on specification of abstract data types and advanced implementation issues. Systematic techniques of algorithm design and analysis; associated mathematical methods, complexity, efficiency, program verification. Applications. Object-oriented programming; implementation of flexible and reliable software.

34891 NUMERICAL METHODS A

(4cp); 3 hpw
prerequisites 3471I Analysis I, 34790 Numerical Computing, 34815 Ordinary Differential Equations
Solution of nonlinear equations. Analysis of convergence. Error analysis. Lagrange interpolation, cubic splines, Bezier curves. Numerical differentiation and integration; Newton-Cotes adaptive methods, Gaussian quadrature, methods involving Richardsonian extrapolation. Approximation theory; least squares and orthogonal polynomials, economisation of power series using Chebychev polynomials, rational approximations. Vector and matrix norms. Numerical linear algebra; LU factorisation, iterative methods, Jacobi method. Householder reduction, QR algorithm. Initial value problems for ordinary differential equations; Taylor series methods, open Runge-Kutta methods, multistep methods.

34894 MATHEMATICAL AND BUSINESS MODELLING

(4cp); 5 hpw
prerequisites 3475I Statistics I, 34790 Numerical Computing
Modelling; linear programming, simulation, project management, decision trees, input-output tables, elementary financial modelling. Application to decision making in business and other areas. Use of spreadsheets for numerical modelling; high level features, graphics, optimisation functions, regression functions, database facilities. Programming in the macro language.

34904 ALGEBRA 4

(4cp); 3 hpw
prerequisite 34803 Algebra 3
Polynomials in splitting fields; Euclidean constructions, finite fields, normal extensions, Galois fields, primitive and cyclotomic polynomials. Latin squares. Modular arithmetic. Elements of graph and coding theories.

34906 DIFFERENTIAL GEOMETRY

(4cp); 3 hpw
prerequisites 34802 Algebra 2, 34815 Ordinary Differential Equations, 34817 Vector Calculus
Graphs and level surfaces. Vector fields. The tangent space. Surfaces. Vector fields on surfaces. Orientation. The Gauss map. Geodesics and parallel transport. The Weingarten map. Curvature of plane curves. Curvature of surfaces. Arc length and line integrals. Parametrised surfaces. Local equivalence of surfaces and parametrised surface. Rigid motions and congruences. Isometries.

34909 SEMINAR: MATHEMATICS

(4cp); 3 hpw
prerequisite by consent
Group studies of selected topics in mathematics. The topics will vary from year to year and will be chosen in accordance with student interest and staff availability.

34913 MODERN ANALYSIS

(4cp); 3 hpw
prerequisites 34802 Algebra 2, 34812 Analysis 2
Metric space axioms. Open and closed sets. Interior and closure. Sequences in a metric space. Sequential compactness. Contraction mapping theorem. Application to existence theorems for differential equations. Continuous mappings between metric spaces. Normed linear spaces. Banach spaces. Bounded linear maps. Operators and functionals. Dual spaces. Hilbert spaces.

34914 MEASURE THEORY

(4cp); 3 hpw
prerequisite 34913 Modern Analysis
Measures and outer measures. Measure spaces. Lebesgue measure on the real line. Measurable functions. Step functions. Definition of the abstract Lebesgue integral. Monotone convergence theorem. Dominated convergence theorem. Probability spaces. Independence. Borel-Cantelli lemmas. Laws of large numbers.

34916 MATHEMATICAL METHODS

(4cp); 3 hpw
prerequisite 34922 Partial Differential Equations 2
Theory of distributions. The Fourier transform and applications to partial differential equations. Introduction to the calculus of variations. Euler-Lagrange equations. The brachistochrone problem. Eigenvalue problems. Lagrangian and Hamiltonian mechanics. Lagrange's equations of motion. Hamilton's principle. The principle of least action.

34920 INTEGRAL EQUATIONS

(4cp); 3 hpw
corequisite 34913 Modern Analysis
Existence theory for Fredholm and Volterra integral equations using contraction mappings. Compact integral operators. Green's functions.

34922 PARTIAL DIFFERENTIAL EQUATIONS 2

(4cp); 3 hpw
prerequisites 34818 Complex Variables, 34821 Partial Differential Equations I
Bessel's equation and Bessel functions. Boundary value problems for partial differential equations involving Bessel's equation. Legendre's equation and Legendre's associated equation. Legendre functions and associated Legendre functions. A thorough treatment of Laplace transforms. Inverse Laplace transforms using complex variable methods.

34924 MECHANICS

(4cp); 3 hpw
prerequisites 34815 Ordinary Differential Equations, 34817 Vector Calculus
Kinematics and dynamics of a particle. Projectile motion. Oscillations. Conservative forces and central forces. Theory of planetary motion. Rigid bodies.

34925 WAVE THEORY

(4cp); 3 hpw
prerequisite 34922 Partial Differential Equations 2
Acoustic waves in fluids. Waves on a liquid surface. Elastic waves in solids. Electromagnetic waves.

34927 DETERMINISTIC OPTIMAL CONTROL

(4cp); 3 hpw
prerequisites 34815 Ordinary Differential Equations, 34817 Vector Calculus
Introduction to optimal control problems for ordinary differential equations. Linear problems and bang-bang controls. Nonlinear problems and Pontryagin's maximum principle. Necessary conditions. Sufficient conditions. Various endpoint conditions. Calculus of variations. Dynamic programming. Infinite horizon problems. Applications to optimal economic growth and to optimal investment and consumption decisions.

34930 SIMULATION TECHNIQUES

(4cp); 3 hpw
prerequisite 34751 Statistics I;
corequisite 34790 Numerical Computing
Survey of the types of problems amenable to study by simulation. Use of Activity Cycle Diagrams to describe systems of interacting entities. Statistical models. Input data analysis. Output analysis. Verification and validation. Comparison of system designs. Random number generation. Tests for random numbers. Random variate generation. Investigation of variance reduction techniques. Application of simulation techniques to specific operations research problems such as inventory control, queueing theory etc. Simulation with SEESIM, Sigma and SimScript II.5.

34931 LINEAR PROGRAMMING

(4cp); 3 hpw
prerequisite 34740 Introduction to Operations Research Models;
corequisite 34802 Algebra 2
Formulation of linear problems. Revision of the simplex method and its variants. Applications of linear programming. Use of computer packages in solution. The revised simplex method and Karmarkar's method. Duality and the dual simplex method. Sensitivity analysis and parametric pro-

gramming. Goal programming and integer programming using simplex method-based techniques. Advanced techniques.

34932 OPTIMISATION TECHNIQUES

(4cp); 3 hpw
prerequisites 34711 Analysis I, 34931 Linear Programming
Unified treatment of the solutions of models derived from real-life situations; use of classical optimisation techniques. Derivation and application of Kuhn-Tucker theorem. Selected algorithms of nonlinear programming. Quadratic programming, separable programming. Integer programming, Branch and Bound technique. Geometric programming.

34934 NETWORK OPTIMISATION

(4cp); 3 hpw
corequisite 34931 Linear Programming
Transportation problems. The transportation simplex method. Assignment problems. Transshipment problems. Shortest path problems. Maximum flow problems. Project planning and scheduling. CPM cost models. Network simulation models. Minimum cost network flow problems. The network simplex method.

34935 INVENTORY CONTROL

(4cp); 3 hpw
corequisite 34930 Simulation Techniques
Economic order quantity. Production lot size. Quantity discounts. Shortage models. Single period model. Safety stock approach. Service level approach. Periodic review system. ABC classification. Simulation models. Dynamic EOQ. Wagner-Whitin algorithm and Silver-Meal heuristic. Classical optimisation methods. Materials requirements planning.

34936 DECISION THEORY

(4cp); 3 hpw
prerequisite 34751 Statistics I
Influence diagrams. Sensitivity analysis. Using sample information. Normal prior distributions. Beta prior distributions. Risk analysis. Value of information. Preferences. Multi-attribute utility. Classical vs Bayesian methods.

34938 FINANCIAL MODELLING TECHNIQUES

(4cp); 3 hpw
prerequisites 34711 Analysis I, 34751 Statistics I
Introduction to models of the standard problems of financial management and the mathematical techniques for their solution; asset and liability management, planning day-to-day operations and the firm's financing and investment decisions. Net-present value. Capital budgeting problem; investment under certainty, investment decisions under uncertainty. The debt-capacity decision; debt maturity and timing decisions, dividend policy, internal financing and growth.

34939 SEMINAR: OPERATIONS RESEARCH

(4cp); 3 hpw
prerequisite by consent
Group studies of selected topics in operations research. The topics will vary from year to year and will be chosen in accordance with student interest and staff availability.

34953 STATISTICAL INFERENCE

(4cp); 3 hpw
prerequisite 34852 Statistics 2
Estimation; sufficiency, completeness. Hypothesis testing; decision problems, Neyman-Pearson lemma, best tests, uniformly most powerful tests, sequential probability ratio test, minimax and Bayesian tests. Distribution free methods; estimation and hypothesis testing. Further theory of inference.

34955 REGRESSION ANALYSIS

(4cp); 3 hpw
prerequisite 34852 Statistics 2
Simple linear regression. Analysis of variance. Multiple regression. Polynomial regression. Regression diagnostics. Model building. Introduction to generalised linear models. Use of computer packages such as SAS, SPSS, MINITAB and GLIM, and the use of APL.

34956 DESIGN OF EXPERIMENTS

(4cp); 3 hpw
prerequisite 34955 Regression Analysis
Single factor analysis of variance; completely randomised design, fixed effects model, expected mean squares, relation to multiple regression model, random effects

model. Further analysis; orthogonal contrasts, multiple range tests. Randomised block design. Latin squares. Factorial (crossed) experiments; interaction, mixed models. Nested factors. Cross-nested designs; 2^f factorials, Yates' method, confounding, fractional replication. Further topics; analysis of covariance, split-plots, power. Use of computer packages MINITAB, SPSS, SAS and GLIM.

34957 QUALITY CONTROL

(4cp); 3 hpw
prerequisite 34852 Statistics 2
Total quality control. Statistical Process Control. Acceptance sampling. Taguchi methods. Reliability. Repeatability and reproductibility.

34959 SEMINAR: STATISTICS

(4cp); 3 hpw
prerequisite by consent
Group studies of selected topics in statistics. The topics will vary from year to year and will be chosen in accordance with student interest and staff availability.

34960 PROBABILITY

(4cp); 3 hpw
corequisite 34852 Statistics 2
Probability; axioms including sigma-fields. Combinatorics; occupancy problems, probability of a union. Conditional probability. Independence. Random variables. Expectations. Conditional expectation. Central limit theorem. Weak and strong laws of large numbers.

34961 STOCHASTIC PROCESSES 1

(4cp); 3 hpw
prerequisite 34852 Statistics 2
Markov chains; classification of states, limiting properties. Poisson process. Markov processes; birth-death processes, limiting distributions, application to queueing models. Brownian motion.

34975 COMPUTER GRAPHICS

(4cp); 3 hpw
prerequisites 34790 Numerical Computing, 34802 Algebra 2
Hardware; capabilities of typical devices such as plotters and raster scan instruments. Standard system software including point plotting and line drawing (Bresenham's algorithm), transformations (scaling, translations, rotations) in two dimensions, clipping and windowing. Area filling algorithms; flood-fill, raster scan. Three-dimensional drawing; transformations, projections (orthogonal and perspective), homogeneous coordinates, floating horizon hidden surface algorithm. Curve and surface interpolation – cubic splines, Bezier curves and surfaces, B-splines. Graphic standards; GKS, PHIGS.

34976 NEURAL NETWORKS

(4cp); 3 hpw
prerequisites 34751 Statistics I, 34790 Numerical Computing, 34802 Algebra 2, 34817 Vector Calculus
Fundamental concepts; theories of mind and brain (ancient to modern), cybernetics (deterministic systems, feedback, communication, control, adaptation), brain theory (neurons, brain structures, representation), rise of connectionism (the von Neumann bottleneck, the parallel distributed processing paradigm). Neural network models and learning algorithms; associative nets (Hebbian learning), the Perceptron (error-correcting rule), multi-layer networks (back-propagation, Boltzmann machines), interactive activation and Grossberg models (competitive learning), Barto model (reinforcement learning). Applications; travelling salesman problem, NETtalk (a network that learns to talk).

34977 FORMAL SPECIFICATION

(4cp); 3 hpw
prerequisite 34982 Mathematical Foundations of Computing 2
Introduction to the mathematical basis of formal specification theory. Linguistic systems and models of specification systems. Software development by linguistic transformations. A comparative study of the principles and practices of important formal specification methods used in modern software construction; algebraic specification, the Vienna Development Method, Z.

34979 SEMINAR: COMPUTING

(4cp); 3 hpw
prerequisite by consent
Group studies of selected topics in computing. The topics will vary from year to year and will be chosen in accordance with student interest and staff availability.

34982 MATHEMATICAL FOUNDATIONS OF COMPUTING 2

(4cp); 3 hpw
prerequisites 34803 Algebra 3, 34873 Computing 3
Introduction to the logical, foundations of formal program semantics; associated verification methods, operational and denotational semantics. Lambda and combinatorial calculi, applications to functional programming languages.

34983 MATHEMATICAL FOUNDATIONS OF COMPUTING 3

(4cp); 3 hpw
prerequisite 34982 Mathematical Foundations of Computing 2
corequisite 34984 Language Theory
Additional topics in the denotational semantics of applicative and imperative programming languages. Algebraic semantics; initial and final algebra approaches to specification of data types, initial algebraic specification of languages. Theory of computation; computability, Turing machines, the Church-Turing thesis, decidability, complexity issues, completeness and tractability.

34984 LANGUAGE THEORY

(4cp); 3 hpw
prerequisite 34982 Mathematical Foundations of Computing 2
Chomsky's categorisation of grammars; regular and context-free grammars and languages. Finite state recognisers. Parsing strategies; recursive descent and table-driven parsers. Operational semantics and program transformation; language design, translation and implementation of a simple, block-structured imperative language. Issues in the implementation of functional languages; combinator compilation, strict and lazy evaluation, supercombinators.

34985 DIGITAL IMAGE PROCESSING

(4cp); 3 hpw
prerequisites 34802 Algebra 2, 34790 Numerical Computing
Preliminaries; human vision, digital image models, image geometry and transformations, display devices. Image transforms; the Fourier transform, convolution, cross correlation and auto correlation, basic transform theorems. The discrete Fourier transform and its properties; fast Fourier transform implementation, aliasing, leakage. The two-dimensional transform and its implementation. Image enhancement and restoration; histogram modification techniques, low, high and band-pass filters, image sharpening and smoothing, pseudo-colouring. Models of degradation, inverse filtering, removal of linear blur, frequency modification. Image segmentation; point, line and edge detection, the Hough transform, thresholding and region segmentation.

34986 CRYPTOLOGY

(4cp); 3 hpw
prerequisite 34790 Numerical Computing
Divisibility and prime numbers; the fundamental theorem of arithmetic, congruences, applications, Fermat's Theorem. Applications to primality testing and factorisation; Fermat's and Pollard's p-1 methods. Multiplicative functions; Euler's function, sum and number of divisors, perfect numbers. Cryptology; block ciphers, exponentiation ciphers, public key cryptography, knapsack ciphers. Continued fractions, application to factorisation.

34992 NUMERICAL METHODS B

(4cp); 3 hpw
prerequisites 34790 Numerical Computing, 34821 Partial Differential Equations I
Solution of ordinary differential equations. Initial value problems; single-step and multi-step methods. VSVO, extrapolation and implicit methods. Stiff differential equations. Stability theory. Boundary value problems; shooting, finite difference and finite element methods. Differential eigenvalue problems. Solution of partial differential equations; finite difference and finite element methods. Optimisation; methods for unconstrained nonlinear optimisation, steepest descent, damped Newton-Raphson and matrix updating techniques. Overdetermined systems.

34995 ADVANCED NUMERICAL ANALYSIS

(4cp); 3 hpw
prerequisite 34913 Modern Analysis
Differentiation in normed linear spaces. Mean Value Theorem and Taylor's Theorem in Banach spaces. Product spaces and partial differentials. Nonlinear equations and the Newton-Kantorovich method.

34996 CONVEXITY AND OPTIMISATION

(4cp); 3 hpw
prerequisite 34913 Modern Analysis
Convex sets in a linear space. Affine sets and hyperplanes. Algebraic interior and closure. Separation theorems. Geometric Hahn-Banach theorem. Convex functions. Epigraphs. Subdifferentiability and differentiability. Duality. Polars. Support functions. Linear and convex programming. Kuhn-Tucker conditions.

34997 PROJECT (GRADUATE DIPLOMA)

(8cp); 6 hpw
prerequisite by consent

An applied study in an area chosen in consultation with a project supervisor appointed by the Head of School.

Subjects offered by other faculties

Students should consult the relevant Faculty and its handbook for any late changes to subject information.

22105 ACCOUNTING A

(5cp); 3 hpw

Introduction, setting out the nature of accounting and its relationships together with double entry bookkeeping's unique ability to record market activity. The body of the course, dealing with the accounting process (journals to ledger), double entry bookkeeping, definition of the elements of financial statements, using control accounts, control of cash, using accrual accounting, inventory, non-current assets, preparation of financial statements and the so-called limitations of the historical cost model.

25110 MICROECONOMICS

(5cp); 3 hpw
Basic market theory. Demand theory. Elasticity of demand. Short-run cost theory. Short-run supply theory, long-run cost theory. Resource market theory. Perfect and monopolistic competition. Oligopoly and monopoly. Firm behaviour, theory of competition policy. Theory of trade. Market failure theory. Income redistribution. Industry policy, regulation.

25209 MACROECONOMICS

(5cp); 3 hpw
prerequisite 25110 Microeconomics
Inflation and unemployment. Aggregate supply and demand. National accounts. Elementary income determination theory. Interest rates and expenditure. The monetary sector. Combining money and expenditure sectors. The balance of payments. Prices, wages and the Phillip's curve. Stagflation.

25210 MICROECONOMIC POLICY

(5cp); 3 hpw
prerequisite 25110 Microeconomics
The need for public regulation and/or control of business activity. Microeconomic policy formulation; theory of firms and markets, restrictive trade practices, consumer protection; small business. Industry policy, tariffs and structural change. Foreign investment. Resources policy.

25308 FINANCIAL INSTITUTIONS AND MARKETS

(5cp); 3 hpw
prerequisite 25209 Macroeconomics
Financial intermediation. Interest rate determination. Financial market theory, bond pricing, foreign exchange market futures, options and swaps. The financial system and the Reserve Bank. Introduction to banking. Equity market.

25314 BUSINESS FINANCE 1

(5cp); 3 hpw
prerequisites 22105 Accounting A, 34751 Statistics I;
corequisite 25308 Financial Institutions and Markets
Consumption/investment decision; investment decision and techniques for evaluation. Factors affecting investment; the concept of risk, the pricing of risk, investment decisions under risk, the financing decision. Sources of finance, leasing. Capital structure theories, dividend policy.

25421 INTERNATIONAL FINANCIAL MANAGEMENT

(5cp); 3 hpw
prerequisites 25314 Business Finance I, 25308 Financial Institutions and Markets
International financial management; mechanics and functions of foreign exchange markets, exchange rate determination and parity relationships, forecasting, measurement of foreign exchange risk, multinational working capital management, trade finance, financing foreign operations, long-term asset and liability, international taxation management.

25502 CURRENT ISSUES IN FINANCE

(5cp); 3 hpw
prerequisite 25314 Business Finance I
Anomalies in asset pricing. Re-examination of market efficiency. Performance evaluation. Portfolio insurance and investment management. Immunisation in asset and liability management. Corporate control. Capital raising and public offers. Capital structure. Corporate restructuring.

25606 FINANCIAL TIME SERIES ANALYSIS

(5cp); 3 hpw
prerequisites 34817 Vector Calculus, 34955 Regression Analysis
Financial returns, their definitions and behaviour. Models of price volatility. Forecasting standard deviations. Testing the random walk hypothesis. Testing the market efficiency hypothesis. Forecasting trends in prices. Valuing options.

25905 ASSET PRICING AND CAPITAL MARKETS STUDIES (HONOURS)

(5cp); 3 hpw
prerequisite 25314 Business Finance I
The contribution of Markowitz and others to modern portfolio theory and the CAPM, including market equilibrium and efficient market assumptions; empirical tests. Relating to the CAPM and its derivatives. Arbitrage pricing theory. Pricing models for contingent claims, options and futures. Efficient capital markets, theory and evidence.

25906 INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT (HONOURS)

(5cp); 3 hpw
prerequisite 25905 Asset Pricing and Capital Markets Studies (Honours)
Equilibrium models. Performance Measures. Pricing Instruments. Options. Return Profiles. Option Valuation Models. Market Efficiency. Share market analysis. Fixed Income Securities. International Diversification.

25907 ADVANCED MICROECONOMICS

(4cp); 3 hpw
prerequisite by consent
The theory of choice. State preference theory. The mean–variance criteria. Capital market equilibrium CAPM and APT. Efficient capital markets, theory and evidence.

25908 FUTURES AND OPTIONS

(4cp); 3 hpw
prerequisite by consent
Introduction to derivative securities. Basic arbitrage arguments. Geometric Brownian motion model of asset pricing movements. Ito's lemma. Risk-neutral valuation and the Black-Schole's model. Currency and futures options. Hedging techniques. Interest-rate-derivative securities. Alternatives to Black-Schole's option pricing.

25909 ADVANCED CORPORATE FINANCE

(4cp); 3 hpw
prerequisite by consent
A selection of the classic papers in corporate finance. Current research work, Australian empirical work. Major issues involved in the firm's investment and financing decisions, the interaction of these activities and investor behaviour in the markets for the firm's securities.

25910 THESIS

(12cp); 9 hpw
prerequisite by consent
A thesis on a topic chosen by the student in consultation with his/her supervisor.

79101 LAW FOR BUSINESS

(5cp); 3 hpw
Legal philosophy. Legal history. Constitutional law; torts, crime, property, contracts, consumer protection.

SCHOOL OF COMPUTING SCIENCES

The School offers the following courses:

Undergraduate courses

Bachelor of Science in Computing Science

Bachelor of Information Technology

Postgraduate courses

Graduate Diploma in Data Processing

Graduate Diploma in Information Technology Management

Master of Business in Information Technology Management

Master of Science in Computing (by coursework)

Master of Science (by thesis)

Doctor of Philosophy

Graduate Certificates

City campus

Graduate Certificate in Advanced Information Technology

Graduate Certificate in Computer Science

Graduate Certificate in Human-Computer Interaction

Graduate Certificate in Information Systems

Graduate Certificate in Information Technology Management

Graduate Certificate in Software Quality Assurance

Kuring-gai campus

Graduate Certificate in Applied Computing

Graduate Certificate in Programming Practice

ACADEMIC ADVISERS FOR 1994

UNDERGRADUATE COURSES

	Room	Ext
Bachelor of Science in Computing Science		
Mr John Tu	523	1856
Dr Sattiraju Prabhakar	515	1851
Ms Janet Smith	362	1833
Mr Jim Underwood	356	1831
Bachelor of Information Technology		
Mr Chris S Johnson	360	1834
Projects Coordinator		
Mr Peter Bebbington	353	1828
Academic Liaison Officer (Special Conditions, Disability)		
Mr Peter Bebbington	353	1828
Electives Coordinator		
Mr Chris W Johnson	522	1855

POSTGRADUATE COURSES

Graduate Diploma in Data Processing		
Ms Jean Robb	364	1836
Master of Science in Computing		
Professor John Debenham	437	1837
Master of Business in Information Technology Management and articulated courses		
Ms Jean Robb	364	1836
International Programs		
Ms Judy Hammond	359	1822

Each adviser has specific consultation times. These are displayed on the ground floor noticeboards.

COMPUTING FACILITIES

All laboratory computing equipment within the School is inter-connected via an Ethernet Local Area Network (LAN). The communication protocol used is Transmission Control Protocol/Internet Protocol (TCP/IP).

The School is equipped with a number of network servers as described in the following table.

Name	Machine/ Model	Disk Space	Fundamental Server Purpose
syzygy	Sun 4/470	4.0 GByte	Login, X-Window, Print, PCNFS Server
yak	Sun 4/75	0.4 GByte	Login, X-Window
ultimo	Sun 3/260	1.2 GByte	Source Binaries
ultima	Sun 3/260	1.2 GByte	Communication (gateway, ftp, news, mail)
chancho	Sun Sparcstation	10.4 GByte	Login, X-Window

Ultimo also acts as the print server for the IBM 9375 minicomputer.

The diverse range of computing equipment available to students within the School includes:

- UNIX workstations from Sun Microsystems and Silicon Graphics
- PC compatible microcomputers
- Macintosh microcomputers
- Applix 1616 microcomputers
- IBM minicomputer using VSE/SP VM/SP
- ASCII terminals
- X-terminals

Other specialised computing equipment such as INMOS Transputer systems, computer video interfacing and graphics plotters are available to advanced students.

As an aid to all users of the School's computing resources, a Help Desk service is maintained. Staff are available for consultation during normal laboratory hours and are located in Room 4/447. They may also be contacted by telephone on 330 1842.

Access to computing laboratories

Access to the School's computing laboratories is directly related to courses undertaken by students or specific research activities as determined by the coordinating supervisor and School requirements.

Access privileges to the School's computing laboratories can be categorised as follows:

General access

Limited access

Restricted access

To ensure maximum utilisation of the School's computing laboratories and to provide students extended hours of access, numerous laboratories have been equipped with electronic security doors, commonly referred to as 'E-Doors'. To gain access to these laboratories a special card, referred to as an 'E-Card', is required. It is similar to the student identification card, containing a photographic image and other details.

E-Cards are issued to everyone who is required to utilise the School's computing laboratories. These can be obtained at the commencement of each semester. Registration takes place at the Systems Resource Centre on the fourth floor of Building 4.

Normal hours of access to computing laboratories during semesters are 9.00 am to 9.00 pm. Restricted hours are in effect during examination times and between semesters.

Students should note that it is an offence to eat or drink in the laboratories. Students found doing so will be requested to leave the laboratory and disciplinary action may be initiated by the School for repeated offences.

General access computing laboratories

General access computing laboratories are available for general use by all students enrolled in the School of Computing Sciences.

Level	Room No	Laboratory
2	230	Macintosh Laboratory
4	442	PC Laboratory
4	443	Sun Laboratory

The Sun Laboratory currently contains X-terminals, IBM Terminals and PC compatible computers. This may change as equipment is upgraded.

Limited access computing laboratories

Limited access computing laboratories are available to students undertaking courses specifically requiring the facilities of those laboratories. These laboratories are frequently booked by teaching staff presenting specialised computing courses and are unavailable for general student activity during this period.

Level	Room No	Laboratory
2	228	Advanced PC Laboratory
2	229	Sun 386i Laboratory
2	233	Sun SLC Laboratory
2	234	Experimental System Laboratory

Restricted access computing laboratories

Access is offered to individual students as determined by teaching staff coordinating courses specifically requiring the facilities of the laboratory. These laboratories are generally restricted to research students and students undertaking special projects. They have been developed and equipped in conjunction with the Key Centre for Advanced Computing Sciences, a teaching and research centre funded by the Australian government.

Level	Room No	Laboratory
2	235	Parallel Processing Laboratory
2	237	Distributed Database Laboratory
2	239	Computer Graphics Laboratory

ITD computing laboratories

The Information Technology Division (ITD) maintains three laboratories within the School of Computing Sciences. Support staff of the School manage the consumables and deliver printouts. Equipment maintenance and similar services are provided by the ITD.

Level	Room No	Laboratory
4	438	Amdahl Terminal Room (not in use)
4	440	ITD Workstation Laboratory
4	444	ITD PC Laboratory

STAFF CONTACT LIST

All staff in the School of Computing Sciences are located in Building 4, City campus, with the exception of those with room numbers starting with 'K' (located at Kuring-gai campus).

[1] Academic staff on leave during Autumn 1994

[2] Academic staff on leave during Spring 1994

Name	Extn Prefix 330-	Room
Mr Peter Bebbington *Director, Undergraduate Studies*	1828	353
Mr Jeff Clark	1827	355
Mr John Colville[1]	1854	524
Mr Brent Curtis	1860	532
Professor John Debenham *Director, Postgraduate Studies, and Director, Key Centre for Advanced Computing Sciences*	1837	437
Assoc Prof Jenny Edwards *Head of School*	1844	340
Mr Jamal El-Den	1830	366
Dr George Feuerlicht *Head, Information Technology Unit*	1835	363
Assoc Prof Michael Fry *Director, External Development*	1821	630
Mrs Judy Hammond	1822	359
Professor Igor Hawryszkiewycz	1809	372
Professor Brian Henderson-Sellers	1189	338
Assoc Prof Tom Hintz *Alternate Head of School*	1865	548
Dr Bruce Howarth *Head, Computer Systems Unit*	1859	530
Dr Barry Jay	1814	514
Mrs Sharyn Jenner *School Administrator*	1805	337
Mr Sanjay Jha	1858	526
Ms Deidrie Jinks	1826	369

Mr Chris S Johnson	1834	360
Mr Chris W Johnson	1855	522
Mr Brendan Kitts	1657	358
Mrs Elaine Lawrence	5482	K2.127
Dr Tom Osborn	1852	519
Dr John Potter[1]	1850	517
Dr Sattiraju Prabhakar	1851	515
Mr Richard Raban	1829	365
Mr Cedric Richardson	1866	368
Dr Robert Rist	1849	516
Miss Jean Robb *Director, Graduate Education*	1836	364
Mr Des Saunders *Cooperative Education Officer*	1804	374
Ms Janet Smith	1833	362
Mr Lin Smith	5415	K2.128
Dr Kevin Suffern *Head, Computing Methods Unit*	1845	511
Mr Ury Szewcow	1862	534
Mr John Tu	1856	523
Mr Jim Underwood *Head, Information Systems Management Unit*	1831	356
Mr Vlad Wietrzyk	1861	533
Mr David Wilson	1832	354
Mr Bernard Wong	1825	357
School Office	1803	335
Key Centre	1331	436
Interface Room	1868	447

UNDERGRADUATE PROGRAMS

Bachelor of Science in Computing Science (BSc)

Course code MCO2

The aim of the course is to provide a sound education in all aspects of computing for students who intend to make a career in the profession. It is intended that the course will provide a suitable background covering all aspects of computing science, short of the actual design and construction of 'hardware' systems.

The course has been designed to provide for an in-depth study of computing science and its applications, and, in addition, support subjects are included to enable the graduate to fulfil an appropriate function in the sphere of business activity. It is intended that the formal studies will be treated in a manner which will encourage initiative. Not only will the course provide a suitable framework for a professional career, it will also form a basis from which postgraduate studies may begin.

The course consists of six academic semesters of full-time study or the equivalent in part-time attendance and a period of Industrial Training.

Holders of the degree are granted exemption from the Associate examinations of the Australian Computer Society.

GRADING OF THE BSc

The School of Computing Sciences grades students for awards by a two-stage process involving first qualifying, and then grading students.

The subjects to be included in the grading process are the core subjects, excluding those normally taken during Stages 1 and 2 of the part-time course or first year of the full-time course. All core subjects must be passed. Any of those subjects which have been failed and subsequently passed will be included with a raw mark of 50 per cent.

QUALIFYING

Pass degree

A student with an average raw mark of 50 per cent or greater will qualify for a Pass degree.

GRADING

Honours degree

The raw marks required to achieve the Honours grades in 1992 and 1993 were:

First Class Honours 75 per cent
Second Class Honours 68 per cent

The grading of qualifying students is carried out by the School's Examination Review Committee on an individual basis. The Committee is provided with the following information on each qualifier:

- any failures, including subject details and whether or not a failure was of a technical nature;
- the subject details and marks for all electives undertaken;
- the time taken to complete the course in terms of stages, excluding periods of leave of absence; and
- the average mark for each stage during the course.

The policy for awarding Honours is currently under review.

INDUSTRIAL TRAINING

All students in the BSc(Computing Science) are required to pass the two Industrial Training subjects. There are a substantial number of prerequisites for Industrial Training which are noted in the Subject Description section. Full-time students normally undertake Industrial Training after completing Stage 2 of the course, part-time students, after completing Stage 4.

To gain credit for Industrial Training, students are required to obtain an approved, full-time job within the information industry. The duration of Industrial Training is nine months for full-time students and 18 months for part-time students. During Industrial Training students are required to behave in a professional manner, and are required to keep the School informed of the status of their employment at all times so that the School is able to assess their experience. Each year the School of Computing Sciences publishes an *Industrial Training Student Guide* (for full-time students) which sets out in detail what is required to pass the subject. Students are advised to obtain a copy of this guide from the School Office and to study it carefully.

Although the securing of suitable employment during Industrial Training is the student's responsibility, the School provides assistance to all Industrial Training students. Students who wish to benefit from the direct assistance of the School in finding an Industrial Training position should refer to the *Industrial Training Student Guide* (available in April) for the procedure to be followed.

Those who wish to seek an Industrial Training position without the direct assistance of the School should first make an appointment to see the School's Cooperative Education Officer, who will provide a description of the requirements of an Industrial Training position. If a student finds employment, a second appointment must be made to see the School's Cooperative Education Officer to obtain certification that the employment is suitable for Industrial Training.

Full-time Industrial Training students are assessed by members of the academic staff who normally visit students during the first semester of their employment.

In general, students find Industrial Training extremely beneficial in relating the final year of coursework to the practical needs of the information industry, and this experience can be cited when applying for graduate career positions.

LABORATORY SESSIONS

Laboratory sessions are designed to give students formal tuition in using computer systems and to give practical experience of the coursework. Every laboratory session is attached to a specific subject. (For example, Commercial Programming Development involves five hours attendance each week, lectures and tutorials for three hours and the laboratory session for two hours.) Full-time students normally have laboratory sessions totalling six hours per week scheduled in each semester, excluding the Industrial Year; and part-time students normally have laboratory sessions of three hours per week scheduled in each semester.

EXEMPTIONS

Exemptions may be granted on the basis of recent academic study (within the last five years) towards a degree. Students must be able to demonstrate that the knowledge is current. Exemption from core subjects may be granted where subjects successfully completed previously coincide with BSc subjects.

Exemptions are usually processed by the School immediately following enrolment.

Exemptions for holders of TAFE Associate Diplomas

Holders of TAFE Associate Diplomas who are admitted to the course will be eligible for the following exemptions.

Associate Diploma of Business (Commercial Data Processing)

31611 Information Systems (4cp)
2402C Systems Analysis and Design 1
2402D Computing 1

51370 Human Communication (3cp)
8559C Business Communication

31669 Social Implications of Computers (3cp)
2402Y Computers in Business and Society

31622 Commercial Programming Development (4cp)
2402A Programming Concepts
2402B COBOL 1
2402E COBOL 2
2402J Programming Workshop

31648 Business Tools and Applications (4cp)
2402K Development Tools 1
2402H Microcomputer Packages
2402S Database Systems

31621 Systems Analysis (4cp)
2402F Systems Analysis and Design 2
2402R Systems Analysis and Design 3

31641 Systems Design (4cp)
2402R Systems Analysis and Design 3
2402X Systems Development Workshop

Unspecified IS/CS electives (16cp)

TOTAL 42cp

Associate Diploma of Business (Microcomputer Systems)

31611 Information Systems (4cp)
8519K Business Systems
2403AG Data Fundamentals

31648 Business Tools and Applications (4cp)
2403AA Microcomputer Systems Usage
2403AC Single-user Operating Systems
2403AD Electronic Spreadsheets
2403AE Database Packages

51370 Human Communications (3cp)
8559H Business Communication Writing
8559J Business Communication Organisational

Unspecified electives (24cp)

TOTAL 35cp

Associate Diploma of Business (Records and Information Systems)

31611 Information Systems (4cp)
2402H Microcomputing
2421M Business Information Flows
2421P Information Retrieval
2421U Data Collection and Analysis

51370 Human Communications (3cp)
8559H Business Communication Writing
8559J Business Communication Organisational

Unspecified electives (24cp)

TOTAL 31cp

Associate Diploma of Engineering (Electrical Engineering)

31613 Computer Systems Architecture 1 (4cp)
2840BC Computer Principles
2840CN Digital Computers 1
2840CP Digital Computers 2

31632 Communications and Networks (4cp)
2840AL Electronic Communications Systems
2840BB Computer and Data Communications 1
2840CG Computer and Data Communications 2

31888 Logic Design (4cp)
2840AE Digital Electronics 1
2840BG Digital Electronics 2

51370 Human Communication (3cp)
6990R Vocational Communication
6990S Industrial Communication

Unspecified electives (24cp)

TOTAL 39cp

Elective exemptions

Exemption from electives may only be granted on the basis of recent academic study towards a degree, except for TAFE

award holders. Students must be able to demonstrate to the Subject Coordinators that their knowledge is current.

At the discretion of the Director of Undergraduate Studies, exemption from some electives may be granted where a student has successfully completed:

- specific computing elective subjects where either the subject was previously completed at UTS, or the subject is substantially the same as a UTS subject in content and level;
- subjects which correspond in content and level to some subjects in a formal UTS sub-major provided that the remaining subjects in the sub-major are taken to a total of 24 credit points;
- subjects which correspond in content and level to some subjects in a coherent staged group of UTS subjects in another discipline, provided that the remaining subjects in the group are taken to a total of 20 credit points in the discipline; or
- a coherent staged group of elective subjects to which there is no equivalent at UTS.

Pre-1989 course

A list of equivalents for the pre-1989 (old) course is given below. Note that the list is in the order of the old course structure and that the equivalent subjects may not necessarily be available in the same semester. Students should check the new course program listed over page (full-time and part-time) for availability.

Pre-1989 subject		Hours	Equivalents		CP	HPW
Year 1						
Autumn semester						
31401	Mathematics 1	3	31615	Discrete Mathematics	4	5
31818	Computer Systems 1	2	31613	Computer Systems Architecture 1	4	3
31841	Information Systems 1 (Lab)	5	31611	Information Systems	4	4
31850	Programming Principles 1 (Lab)	9	31614	Programming Principles	5	7
31914	Financial Methods 1	3	31617	Accounting Fundamentals	4	3
51370	Human Communication	2	51370	Human Communication	3	2
Spring semester						
31814	Programming Principles 2	4	31623	Computer Systems Architecture 2	4	5
31816	Information Systems 2	3	31902	Auditing the Computer	4	3
31842	Commercial Programming 1 (Lab)	7	31622	Commercial Programming Development	4	5
31845	Mathematics 2 (Lab)	7	31626	Probability and Statistics	4	3
31915	Financial Methods 2	3	31647	Management Control Systems	4	3
Year 2						
Autumn semester						
31819	Systems Analysis and Design 1	3	31621	Systems Analysis	4	3
31832	Data Communications and Computer Networks	3	31632	Communications and Networks	4	5
31843	Programming Techniques (Lab)	6	31624	Data Structures and Algorithms	4	5

Pre-1989 subject		Hours	Equivalents		CP	HPW
31844	Operating Systems (Lab)	6	31633	Operating Systems	4	5
	Elective	3				
	Elective	3				
Spring semester						
31820	Systems Analysis and Design 2	3	31641	Systems Design	4	4
31835	Programming Packages	3	31048	Business Tools and Applications	4	3
31852	Commercial Programming 2 (Lab)	6	31642	On-line Systems	4	5
31861	Information Systems 3 (Lab)	6	31631	Database	4	4
	Elective	3				
	Elective	3				
Year 3						
Autumn semester and Spring semester						
	Industrial Training					
Year 4						
Autumn semester						
31761	Theoretical Computer Science	3	31655	Theory of Computer Science	4	4.5
31833	Simulation	3	31636	Simulation and Modelling	4	4
31846	Communications Programming (Lab)	6	31653	Communications Software	4	6
31848	Languages and Processors (Lab)	6		CS/IS Elective	4	3
	Elective	3				
	Elective	3				
Spring semester						
31133	Social Implications of Computers[1]	2	31669	Social Implications of Computers	3	3
31759	Information Systems Case Study	5	31662	Information Systems Case Study	5	6
31825	Data Processing Management	3	31658	Project Management[2]	4	4.5
31834	Economic and Industrial Analysis[1]	2	23105	Microeconomics (Business Faculty)	4	3
31847	Performance Evaluation (Lab)	6	31666	Performance Evaluation	4	6
	Elective	3				
	Elective	3				

[1] Students who have done 31133 Social Implications of Computers but NOT 31834 Economic and Industrial Analysis, must take 23105 Microeconomics in the Faculty of Business.

[2] 31658 Project Management – Autumn semester only.

STANDARD FULL-TIME PROGRAM FOR THE FINAL YEAR OF A PRE-1989 COURSE

Autumn semester		CP	HPW
31655	Theory of Computer Science	4	4.5
31658	Project Management	4	4.5
31653	Communications Software	4	6
31636	Simulation and Modelling	4	4
	Elective/s	8	6
	Total	**24**	**25**
Spring semester			
31669	Social Implications of Computers	3	3
31662	Information Systems Case Study	5	6
31666	Performance Evaluation	4	6
	Elective/s	12	9
	Total	**24**	**24**

Electives (for pre-1989 students)

Students are required to complete a total of 32 credit points of approved electives as part of their degree course. These will normally be taken as two elective subjects per semester for full-time students (after Year 1) and one per semester for part-time students (after Year 2). Students may take their electives from other faculties. A minimum of 20 credit points **must** be taken in an approved sequence or sub-major from within the School of Computing Sciences or from another school or faculty in the University. The remaining 12 credit points may be taken from further courses within the School or elsewhere.

For the purposes of determining completion of elective requirements, the School will award four credit points for every three hours of electives completed up until the end of 1992.

Students in the School of Computing Sciences are not permitted to enrol in certain subjects as electives where there is a substantial overlap with any core subjects. In general, this applies to any service subject taught by the Faculty of Mathematical and Computing Sciences. Some examples of non-approved subjects are Simulation Techniques, Statistics 1, Computing 1, etc. If you are in any doubt, you should consult an Academic Adviser or the Electives Coordinator.

Recommended full-time program

Credit point values are shown in parentheses.

Year 1

Autumn semester

31611 Information Systems (4cp)
31613 Computer Systems Architecture 1 (4cp)
31614 Programming Principles (5cp)
31615 Discrete Mathematics (4cp)
31617 Accounting Fundamentals (4cp)
51370 Human Communication (3cp)

Spring semester

31621 Systems Analysis (4cp)
31622 Commercial Programming Development (4cp)
31623 Computer Systems Architecture 2 (4cp)
31624 Data Structures and Algorithms (4cp)
31625 Software Engineering (4cp)
31626 Probability and Statistics (4cp)

Year 2

Autumn semester

31631 Database (4cp)
31632 Communications and Networks (4cp)
31633 Operating Systems (4cp)
31636 Simulation and Modelling (4cp)
CS/IS Elective 1 (4cp)
Elective 1 (4cp)

Spring semester

31641 Systems Design (4cp)
31642 On-line Systems (4cp)
31647 Management Control Systems (4cp)
31648 Business Tools and Applications (4cp)
CS/IS Elective 2 (4cp)
Elective 2 (4cp)

Year 3

Autumn semester

31696 Industrial Training (0cp)

Spring semester

31697 Industrial Training (0cp)

Year 4

Autumn semester

31653 Communications Software (4cp)
31655 Theory of Computer Science (4cp)
31658 Project Management (4cp)
CS/IS Elective 3 (4cp)
Elective 3 (4cp)
Elective 4 (4cp)

Spring semester

31662 Information Systems Case Study (5cp)
31666 Performance Evaluation (4cp)
31669 Social Implications of Computers (3cp)
CS/IS Elective 4 (4cp)
Elective 5 (4cp)
Elective 6 (4cp)

Recommended part-time program

Year 1

Autumn semester

31611 Information Systems (4cp)
31615 Discrete Mathematics (4cp)
31617 Accounting Fundamentals (4cp)

Spring semester

31613 Computer Systems Architecture 1 (4cp)
31614 Programming Principles (5cp)
51370 Human Communication (3cp)

Year 2

Autumn semester

31621 Systems Analysis (4cp)
31622 Commercial Programming Development (4cp)
31623 Computer Systems Architecture 2 (4cp)

Spring semester

31624 Data Structures and Algorithms (4cp)
31625 Software Engineering (4cp)
31631 Database (4cp)

Year 3

Autumn semester

31632 Communications and Networks (4cp)
CS/IS Elective 1 (4cp)
Elective 1 (4cp)

Spring semester

31633 Operating Systems (4cp)
31648 Business Tools and Applications (4cp)
31626 Probability and Statistics (4cp)

Year 4

Autumn semester

31641 Systems Design (4cp)
31642 On-line Systems (4cp)
CS/IS Elective 2 (4cp)

Spring semester

31636 Simulation and Modelling (4cp)
31647 Management Control Systems (4cp)
Elective 2 (4cp)

Year 5

Autumn semester

31655 Theory of Computer Science (4cp)
31658 Project Management (4cp)
CS/IS Elective 3 (4cp)
31698 Industrial Training (0cp)

Spring semester

31653 Communications Software (4cp)
Elective 3 (4cp)
Elective 4 (4cp)
31698 Industrial Training (0cp)

Year 6

Autumn semester

31669 Social Implications of Computers (3cp)
31666 Performance Evaluation (4cp)
CS/IS Elective 4 (4cp)
31699 Industrial Training (0cp)

Spring semester

31662 Information Systems Case Study (5cp)
31699 Industrial Training (0cp)
Elective 5 (4cp)
Elective 6 (4cp)

ELECTIVES

Electives provide the opportunity for students to include in their program some advanced computing subjects, subjects of personal interest which need not be related to computing, or subjects to form a sub-major in another discipline. A total of 40 credit points is allocated to elective subjects.

A student is required to take:

1. A computing elective stream of 16 credit points. These may be chosen from the Information Systems Department or the Computer Science Department, or both. However, a strand taken predominantly from a single department is preferred over a collection of unrelated subjects.

2. A further stream of 24 credit points which will be one of the following:

   a) a formal sub-major of 24 credit points from a UTS faculty
   or
   b) at the discretion of the Director of Undergraduate Studies or the Electives Coordinator, a number of subjects from another UTS discipline or another institution, at least 20 credit points of which form a coherent staged group. A staged group is one where there is a pattern of prerequisites between the subjects that shows progression of at least three levels. A coherent group is one in which all subjects are from the one area of knowledge. This may leave the student with four credit points to take a 'free' subject from any discipline. (Special arrangements may be made for the study of a foreign language at another University.)
   or
   c) at least 16 credit points of electives from the School of Computing Sciences (in addition to the 16 compulsory School of Computing Sciences elective credit points already taken as part of '1' above). This choice will leave students with up to eight 'free' credit points to complete the 24 credit points of 'other' electives required to complete Part 2.

Electives from other universities

Students wishing to do electives outside the University **must** see the Electives Coordinator to discuss the proposal. Special approval must be sought well before the intended semester of study. You may undertake subjects outside the University as electives **only** if no comparable subject is offered by the University.

PROJECTS

In lieu of elective(s) students may take one four-credit point project, two four-credit point projects, or one eight-credit point project over one, or two, semesters. In many cases, these projects may be completed over the Christmas or between-semester breaks, if desired. Please note that a maximum of eight credit points may be taken as project.

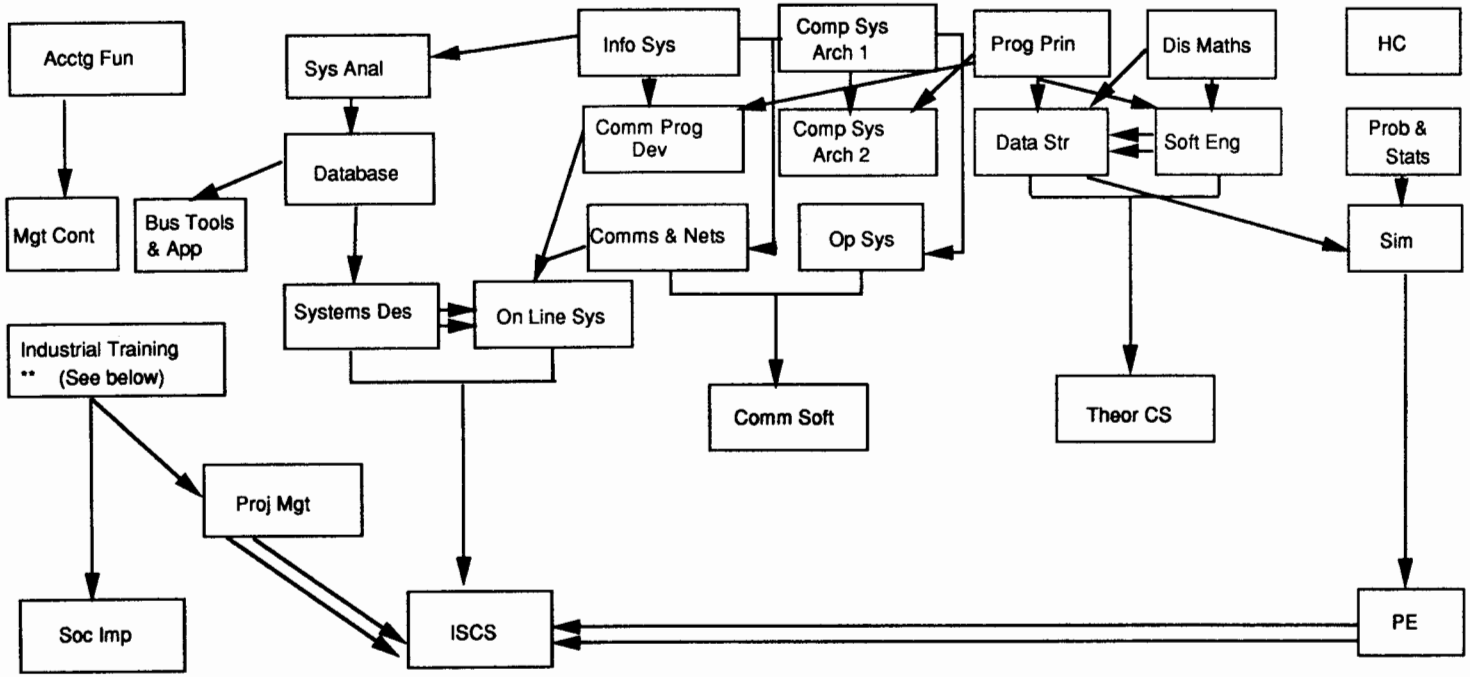
A list of projects nominated by various staff members may be viewed on the Suns, by logging in as **projects** and following the instructions. Students should also fill out a Project Registration form, available from the Projects Coordinator, who will answer any enquiries. Students who have their own ideas for projects may approach relevant staff members to be their supervisors and must also see the Projects Coordinator for approval.

Students may not use as a project work done in the normal course of duties as an Industrial Training student or as a part-time student. However, a student may do a project which is related to work if it is carried out outside of normal work hours. In this case, the student's work supervisor would probably become a joint supervisor of the project.

As a general guide, a student doing a four credit point project is expected to spend a **minimum** of eight hours a week on the project.

Refer to the Bachelor of Science prerequisite chart on the next page.

Prerequisite Chart for Core Subjects in the B Sc (Comp Sc)



A horizontal arrow Subject 2 ⟸ Subject 1 means that Subject 2 cannot be done before Subject 1.

** Prerequisites for Industrial Training are that four fulltime semesters or equivalent should have been completed and, before registering, students must have passed (or been exempted from) a minimum of thirteen core subjects including Systems Analysis, Commercial Programming Development, Operating Systems, Data Structures & Algorithms, Human Communications and all their prerequisites.

SUB-MAJORS

Mathematics

Credit points: 24 (minimum)
Contact person: Mr J Hogg
Phone: 330 2238 Room: 1522

- **Mathematics – Operations Research (OR)(24 credit points)**

Subject name	Subject number	Semester offered	CP	HPW
Compulsory subjects				
31885	Advanced Mathematics	A	4	3
34740	Introduction to Operations Research Models	A,S	4	3
34931	Linear Programming	A,S	4	3
Choose 12 credit points, subject to prerequisite rules				
34936	Decision Theory	S	4	3
34934	Network Optimisation	S	4	3
34938	Financial Modelling Techniques	A	4	3
34935	Inventory Control	A	4	3
34932	Optimisation Techniques	S	4	3

- **Mathematics – Statistics (28 credit points)**

Subject name	Subject number	Semester offered	CP	HPW
Compulsory subjects				
31885	Advanced Mathematics	A	4	3
34852	Statistics 2	S	4	3
34960	Probability	A,S	4	3
34955	Regression Analysis	A	4	3
34957	Quality Control	S	4	3
34956	Design of Experiments	S	4	3
34961	Stochastic Processes 1	A,S	4	3

- **Mathematics – Operations Research/Statistics (24 credit points)**

Subject name	Subject number	Semester offered	CP	HPW
Compulsory subjects				
31885	Advanced Mathematics	A	4	3
34852	Statistics 2	S	4	3
34960	Probability	A,S	4	3
34740	Introduction to Operations Research Models	A,S	4	3
34931	Linear Programming	A,S	4	3
34961	Stochastic Processes 1	A,S	4	3

Students who have passed 31615 Discrete Mathematics, 31626 Probability and Statistics and 31885 Advanced Mathematics in the School of Computing Sciences are deemed to have satisfied the knowledge requirement for any subjects which have prerequisites of 34701 Algebra 1, 34710 Calculus, and 34751 Statistics 1.

Note that 31885 Advanced Mathematics is a compulsory prerequisite for any subject to be undertaken from the School of Mathematical Sciences. Furthermore, 34740 Introduction to Operations Research Models must be taken **before** any other operations research subject.

With the exception of the subject pair Advanced Mathematics and Introduction to Operations Research Models, students are **not** permitted to take individual subjects from the School of Mathematical Sciences but must enrol for a sub-major.

Humanities

Credit points: 24 (minimum)

Contact person: Ms K Fry

Phone: 330 2291 Room: 408

The School of Humanities offers the following sub-majors to Computing Science students. These sub-majors are structured into two levels. Students must take the compulsory introductory three credit point unit, and at least 24 credit points drawn from Level 200 and Level 300. At least six credit points must be at Level 200 and at least six credit points must be at Level 300.

Students who commenced Humanities sub-majors before 1993 should consult the School of Humanities concerning equivalents.

- **Communication, History, Politics And Society**

Introductory Level		CP	HPW
51370	Human Communication	3	2
200 Level			
51369	Technical and Professional Communication	6	3
	or		
50712	Communication Skills in English	6	3
	or		
59326	Professional Communication	4	3
59325	Science, Technology and Human Values	8	3
	or		
59324	Issues in Science, Technology and Human Values	4	3
53203	Communication and Control	8	3
53204	Social and Political Theory	8	3
53205	Australian Politics	8	3
53208	Energy and Environment	8	3
53209	Culture, Race and Ethnicity	8	3
53211	Urban Culture	8	3
53212	Australian History	8	3
53219	Aboriginal Studies	8	3
300 Level			
51519	Industrial Relations	8	3
	or		
59325	Issues in Industrial Relations	4	3
52029	Organising EEO	8	3
	or		
59326	Issues in Organising EEO	4	3
59630	Social Issues in Health	8	3
	or		
51014	Health, Technology and Society	4	3
50716	Writing for Science and Technology	6	3
53300	International Aspects of Communication	8	3
53303	Orientalism: Constructs of the East	8	3
53306	History of Social and Political Thought	8	3
53307	Asian and Pacific Politics	8	3
53308	International Politics	8	3
53310	Religion, Magic, Science and the Supernatural	8	3
53314	Social Policy	8	3

- **Public Relations**

Introductory Level		CP	HPW
21125	Australian Business Environment (Faculty of Bus)	5	3
51370	Human Communication	3	2
200 Level			
53240	PR: Process and Practice (compulsory unit)	8	4
50351	PR: Research and Communication	6	4
50357	Community Relations	6	4
300 Level			
50352	PR: Issues and Management	6	4
53341	PR in Global Development	8	4
53342	PR Project	8	4

As part of the course requirements in Public Relations, students undertake an internship under the guidance of a public relations professional during the course of study for a sub-major in Public Relations. Details of this should be discussed with the Public Relations Coordinator in the School of Humanities.

Business

The following sub-majors are offered to Computing Science students by the Faculty of Business. Note that Computing Science students are **not** permitted to take the Business Information Systems sub-major.

Some of the subject numbers may have been changed. Students should check the Business Timetable for such changes at enrolment.

• Advertising Management

Credit points: 25

Coordinator: Mr J Wright

Phone: 330 3536 Room: C226

Students undertaking the Advertising sub-major will be aiming to develop their managerial skills for careers in marketing and advertising. There are specific applications to product management, advertising and advertising planning/strategy for agency executives.

The subjects included in this sub-major take students from an understanding of Buyer Behaviour through Advertising Management to research applications, in the form of Advertising Research Methods. This is followed by the Advertising Project, in which a student, as part of a small team, undertakes a complete brief from an advertising agency or client and uses all the tools learnt in this major, in real-life application.

It also proposes a model by which advertising can be more predictable and successful.

Structure

Compulsory subjects		CP	HPW
24105	Principles of Marketing	5	3
24202	Buyer Behaviour (24105)	5	3
24210	Advertising Management (24202)	5	3
26122	Business Statistics	5	3
24510	Advertising Research Methods (26122, 24210)	5	3

• Economics

Credit points: 25

Coordinator: Associate Professor H Pritchard

Phone: 330 5451 Room: 4.415

Structure

Compulsory subjects		CP	HPW
25110	Microeconomics	5	3
25209	Macroeconomics	5	3
plus any three of the following (subject to prerequisite rules)			
25304	Asian-Australian Economic Relations [1] (25110, 25209)	5	3
25322	Comparative Economic Systems [2] (25209)	5	3
25303	Industry Economics (25210)	5	3
25315	International Economics (25209)	5	3
25305	Labour Market Economics (25209)	5	3
25309	Macroeconomic Policy (25209)	5	3
25210	Microeconomic Policy (25110)	5	3
25307	Public Finance [2] (25209)	5	3
25306	Resource Economics [1] (25110, 25209)	5	3
25320	Underdeveloped Economies [1] (25209)	5	3

[1] Available at the City campus only.

[2] Available at the Kuring-gai campus only.

• Human Resources Management

Credit points: 25 (minimum)

Coordinator: Mr B Connor

Phone: 330 3645 Room: C438

Structure

Compulsory subjects		CP	HPW
21125	Australian Business Environment	5	3
21306	Employment Relations	5	3
plus any three of the following four subjects			
21430	Advanced Industrial Relations (21306)	5	3

21407	Strategic Human Resource Management (21306)	5	3
79270	Industrial and Labour Law (79101)	5	3
21408	Employment Relations Skills (21306)	5	3

- **International Business**

Credit points: 25

Coordinator: Mr C Hall

Phone: 330 5324 Room: K4-414

Structure

The sub-major consists of five units as follows:

Compulsory subjects		CP	HPW
25209	Macroeconomics	5	3
24105	Principles of Marketing	5	3
25315	International Economics (25209)	5	3
24220	International Marketing (24105)	5	3

plus choose one of the following (subject to prerequisite rules)

21591	International Management	5	3
	or		
25304	Asian Australian Economic Relations	5	3

- **International Marketing**

Credit points: 25

Coordinator: Mr R Fletcher

Phone: 330 3537 Room: C225

Structure

The International Marketing Country Study is an elective subject offered over two semesters involving considerable commitment on the student's part. There are therefore two options within the International Marketing sub-major.

Compulsory subjects		CP	HPW
Option 1 (for students **not** electing to do the International Marketing Country Study)			
24105	Principles of Marketing	5	3
24220	International Marketing	5	3
24517	Contemporary Issues in International Marketing (24220)	5	3
24607	International Marketing Management Project (24517, 24220)	5	3
21517	International Management	5	3

Option 2 (for students electing to do the International Marketing Country Study)

24105	Principles of Marketing	5	3
24220	International Marketing	5	3
24517	Contemporary Issues in International Marketing (24220)	5	3
24518	International Marketing Country Study [1] (24220)	10	3

[1] This subject is a full year subject, commencing in the Autumn (1st) semester and extending till the end of the Spring (2nd) semester in the same year.

- **Leisure Studies**

Credit points: 25

Coordinator: Mr B Hayllar

Phone: 330 5111 Room: K5.218

Structure

Compulsory subjects		CP	HPW
27126	Leisure in Australia	5	3
27216	Leisure Services Management	5	3

plus choose any three of the following (subject to prerequisite rules)

27323	Leisure and Public Policy	5	3
27628	Law for Leisure, Sport and Tourism	5	3
27523	Leisure and Tourism Planning	5	3
36613	Contemporary Management Practice	5	3
27610	Recreation Facility Design and Management	5	3
27132	Community Fitness and Lifestyle 1	5	3
27223	Leisure Program Planning	5	3

Other leisure studies subjects taught within the School of Leisure and Tourism Studies may be substituted for the above electives with the approval of the Head of School.

- **Management**

Credit points: 25

Coordinator: Mr N Barnwell

Phone: 330 3612 Room: C409

Structure

Compulsory subjects	CP	HPW
21125 Australian Business Environment	5	3
21130 Organisational Behaviour	5	3
plus choose any three of the following (subject to prerequisite rules)		
21131 Operations Management	5	3
21306 Employment Relations	5	3
21210 Business and Government (21125)	5	3
21221 Organisational Design and Change (21130)	5	3
21591 International Management	5	3
21130 Organisational Behaviour	5	3

Law

- **Business Law**

Credit points: 28

Coordinator: Associate Professor K Cutbush-Sabine

Phone: 330 3442 Room: B336

The purpose of this sub-major is to enable students to gain recognition for acquiring detailed knowledge in a group of specialist subjects with direct relevance to business. Such a concentrated course of learning develops a better understanding of intricate legal issues and facilitates planning of current and future commercial strategy.

Structure

Compulsory subjects	CP	HPW
79101 Law for Business	5	3
79267 Commercial Law	5	3
Plus choose any three of the following (subject to prerequisite rules)		
79265 Administrative Law 1	6	3
79266 Administrative Law 2 (79101)	6	3
79666 Advanced Income Tax Law	6	3
79366 Banking Law (79101)	6	3
79368 Commercial Contracts (79101, 79267)	6	3
79365 Company Law (79267)	6	3
79411 Advanced Companies and Securities Law (79101)	6	3
79612 Corporate Control and Power (79101)	6	3
79667 Indirect Taxation (79101)	6	3
79360 Insurance Contracts (79101, 79267)	6	3
79270 Industrial and Labour Law (79101)	6	3
79364 Advanced Industrial and Labour Law (79101)	6	3
79363 Life Insurance Law (79101)	6	3
79263 Marketing and Consumer Protection (79101)	6	3
79466 Trade Law (79101)	6	3
79369 Elements of Contract	6	3
79468 Equity and Trusts	6	3

- **Finance Law (Faculty of Law and Legal Practice and School of Finance and Economics)**

Credit points: 26

Coordinator: Mr J Taggart

Phone: 330 3451 Room: C314

The objectives of the Finance Law sub-major are:

1. To develop specialist knowledge of the legal framework regulating the finance industry.
2. To provide students with a practical knowledge of existing regulations and an understanding of the legal ramifications of financial transactions, to enable them to fulfil their legal responsibilities with the finance industry.
3. To appreciate the dynamic nature of the development of laws and regulations within the finance industry in a practical context and to enable informed discussion in respect of future reforms.

Structure

In addition to 79101 Law for Business (5cp) students are required to take the following four units:

	CP	HPW
79502 Law and Finance	5	3
25607 Securities Market Regulation (School of Finance and Economics, and Faculty of Law) (25314, 79101)	5	3
79366 Banking Law (79101)	6	3
79462 Revenue Law (79101)	5	3

Physics

Credit points: 24 (minimum)

Coordinator: Dr G Anstis

Phone: 330 2193 Room: 1/1118

Students who commenced Physics sub-majors before 1993 should contact Dr G Anstis in the Department of Physics, Faculty of Science, for details of transitional arrangements due to the introduction of credit points. Remember that four credit points will be awarded for every three hours of electives completed up to the end of 1992. The Department of Physics offers two sub–majors to Computing Science students. Interested students should first study this section and then if further advice is needed, consult Dr Anstis.

Registration

At the beginning of each semester in which a student takes a Physics subject, he/she should register with the Department of Physics by completing a form **on or before** re-enrolment day at the office of the Physics Sub-major Coordinator.

Students will also need to officially enrol in the subject(s); this is done on re-enrolment day through the School of Computing Sciences.

Students should remember when planning ahead that some subjects are available in one semester only.

- **Physics (General)**

This sub-major provides the grounding in general physics or the possibility of advanced study in a specialised area such as materials physics or solid state physics. The sub-major is of benefit to students contemplating a career in programming of scientific and engineering problems.

The minimum of 24 credit points may be made up as follows:

Subject number	Subject name	Semester offered	CP	HPW	Prerequisite
Compulsory subjects					
68711	Physics 1 S	A,S	8	6	
68721	Physics 2 S	A,S	8	6	Physics 1 or permission
plus choose at least eight credit points from the following					
68731	Physics 3 S	A	4	3	Physics 2 S or Engineering Physics (Civil) S
68732	Applied Optics S	A	4	3	Physics 2 S or Engineering Physics (Civil) S
68743	Thermodynamics and Energy S	S	4	3	Physics 2 S or Engineering Physics (Civil) S
68751	Nuclear Physics S	A	4	3	Quantum Physics 1 S
68741	Quantum Physics 1 S	S	4	3	Quantum Physics 1 S Mathematics

- **Electronics**

This sub-major enables students to complement knowledge of software with a knowledge of hardware. It is useful to students contemplating a career in the areas of microprocessors and computer interfacing.

The minimum of 24 credit points may be made up as follows:

Subject number	Subject name	Semester offered	CP	HPW	Prerequisite
Compulsory subjects					
68713	Physics for Electronics S	A	8	6	
plus choose at least eight credit points from the following					
68734	Electronics 1 S	A	8	6	Physics 2 S or Eng Physics (Civil) S
68744	Electronics 2 S	S	4	3	Electronics 1 S or
31888	Logic Design	A	4	3	31613, 31623
68754	Microprocessors in Instrumentation S	A	4	3	Electronics 2 S or Electronics 1 S and Logic Design 1
68764	Principles of Instrumentation	S	4	3	

Logic Design is taught by the School of Computing Sciences.

Electronics 2 S is the preferred subject because it emphasises hardware. Full-time students with an average mark below 55 can only do Electronics 2 S in their Industrial year. Since Logic Design has no Physics prerequisites it can be taken early in the course.

Advanced Logic Design cannot be credited towards the sub-major in Electronics. Only Microprocessors in Instrumentation S may be taken for credit.

Electrical Computer Systems

Credit points: 19

Contact person: Ms E With

Phone: 330 2432 Room: 1-2423

The School of Electrical Engineering offers an Electrical Computer Systems sub-major to Computing Science students.

Subject number	Subject name	Semester offered	CP	HPW	Prerequisite
Compulsory subjects					
31885	Advanced Mathematics	A	4	3	31615, 31626
45113	Digital Techniques	A,S	3	3	
45143	Computer Hardware	A,S	3		45113
45163	Real Time Software and Interfacing	A,S	3	3	45143
45372	Computer-Systems Analysis	S	3	3	45143, 31885
45364	Digital Systems	A,S	3	3	45143

Note that one of the subjects in this sub-major is 31885 Advanced Mathematics offered by the School of Computing Sciences.

The normal program for a full-time student would be:

Autumn	Spring
Year 2	
Advanced Mathematics	Computer Hardware
Digital Techniques	
Year 4	
Real Time Software and Interfacing	Digital Systems
	Computer-Systems Analysis

The normal program for a part-time student would be:

Year 3	
Advanced Mathematics	Digital Techniques
Year 4	
Computer Hardware	Computer Hardware (Alternative)
Year 5	
Real Time Software and Interfacing	Digital Systems
Year 6	
Computer-Systems Analysis	Digital Systems (Alternative)

Information Studies

The School of Information Studies at the Kuring-gai campus offers the following sub-majors to Computing students.

- **Information Studies**

Credit points: 24

Contact person: Ms J Houghton

Phone: 330 5462 Room: K2-330

Compulsory subjects

55040	Information Science 1: Foundations of Information Science	5 cp
55041	Information Science 2: User Behaviour	6 cp

plus one of the following groups of subjects

55042	Information Science 3: Organisation of Information	6 cp
55043	Information Science 4: Information Retrieval	6 cp
	or	
55024	Information Production	6 cp
55075	Information Resources and Collections	6 cp
	or	
55010	Psychology	4 cp
51103	Work, Organisation and Society	4 cp
55023	Communication and Information Skills	4 cp
	or	
56010	Video Production	6 cp
55090	Publishing	6 cp

- **Communication Studies**

Credit points: 24

Contact person: Ms C Bailey

Phone: 330 5221 Room: K2-467

Structure

Compulsory subjects

56001	Communication 1: Foundations of Communication	5 cp
56002	Communication 2: Group Communication	6 cp

plus one of the following groups of subjects

56003	Communication 3: Organisational Communication	6 cp
56004	Communication 4: Public Communication	6 cp
	or	
56008	Public Relations Practice	6 cp
56007	Public Relations Principles	6 cp
	or	
55010	Psychology	4 cp
51103	Work, Organisation and Society	4 cp

55023	Communication and Information Skills	4 cp
	or	
56010	Video Production	6 cp
55090	Publishing	6 cp

Bachelor of Information Technology (BInfTech)

Course code MCO3

This course is a cooperative education program in computer information systems and has been developed by the School of Computing Sciences in cooperation with a group of private and public sector employers. The course is of three years' duration and involves four semesters of full-time study at the University and two semesters of full-time study and practical experience in industry. The industry semesters are of 24 weeks' duration, and a 42-week academic year is the norm for the course.

Year	Semester 1	Semester 2
1	UTS	Industry
2	UTS	UTS
3	Industry	UTS

The program differs from existing cooperative education courses in that, during the industry-based semesters, students will follow a structured program designed jointly by the University and the employer group, including formal coursework taught in industry. This coursework is assessed to University and business standards and familiarises students with business needs and requirements. During the industry periods students will be exposed to real problems within an environment quite different from that of the University. The resources of industry will be available to support the education of students.

The central curriculum of the course is information systems; this is supported by studies in management, accounting, finance and marketing as well as the necessary background subjects in computing science and programming. The active participation of industry practitioners in course design and course delivery will further ensure that graduates of the course are well equipped with skills relevant to present and future industry needs.

The two industry semesters will be spent with two different companies. Students are not employees of the company, and will not be obliged to find employment with a given company on completion of their studies. Nevertheless students are encouraged to find employment within the group of sponsoring employers.

The number of students admitted each year will be limited by the number of sponsorship commitments secured from employers, to a maximum of 50 places.

Each student admitted to the course will receive a scholarship for the duration of the course, subject to satisfactory performance and to certain conditions detailed further in this handbook. Each of the industry partners undertakes to sponsor a stated number of students, and contributes the full amount of their scholarship to a fund administered by the University.

Each company also provides the industry semester facilities for the number of students being sponsored.

Selection to the course is based on HSC results and on performance at an interview. Interviews are conducted by panels comprising representatives of the University and the industry group. Applicants will be assessed for their suitability to the industrial as well as the academic components of the course.

RECOMMENDED PROGRAM

Year 1

Autumn semester–UTS

31611	Information Systems (4cp)
31613	Computer Systems Architecture 1 (4cp)
31614	Programming Principles (5cp)
31615	Discrete Mathematics (4cp)
31617	Accounting Fundamentals (4cp)
31621	Systems Analysis (4cp)

Spring semester–Industry

31722	Commercial Programming (5cp)
31770	Industry Project 1 (5cp)
31771	Business Requirements Analysis (5cp)
31779	Applications of Information Technology 1 (5cp)

Year 2

Autumn semester–UTS

25106	Economics (5cp)
24105	Principles of Marketing (5cp)
31631	Database (4cp)
31632	Communications and Networks (4cp)
31633	Operating Systems (4cp)

31738 Management Principles for IT Professionals (4cp)

Winter

31780 Industry Studies [1] (4cp)

Spring semester–UTS

31625 Software Engineering (4cp)
31626 Probability and Statistics (4cp)
31641 Systems Design (4cp)
31642 On-line Systems (4cp)
31647 Management Control Systems (4cp)
31788 Organisation Theory for IT Professionals (4cp)

Year 3

Autumn semester–Industry

31756 Project Management (5cp)
31781 Business Systems Design (5cp)
31789 Applications of Information Technology 2 (5cp)
31790 Industry Project 2 (5cp)

Spring semester–UTS

25301 Financial Management (5cp)
31762 Technology Planning (5cp)
31766 Performance Modelling and Management (4cp)
31902 Auditing the Computer (4cp)
31768 Business Planning for IT Professionals (4cp)
31669 Social Implications of Computers (3cp)

[1] This subject requires commitment of time over the winter period, in order to complete the 42-week requirement of the course.

Special conditions relating to students enrolled in the Bachelor of Information Technology

Leave of absence will not normally be granted to students, except under exceptional circumstances and subject to satisfactory arrangements being possible. Likewise, withdrawal from the course and subsequent re-admission is not normally granted. Students are reminded that withdrawal without penalty from any course at the University is only possible up to the deadlines imposed by the University. After such deadlines, students will be expected to complete all assessment tasks for subjects in which they are enrolled.

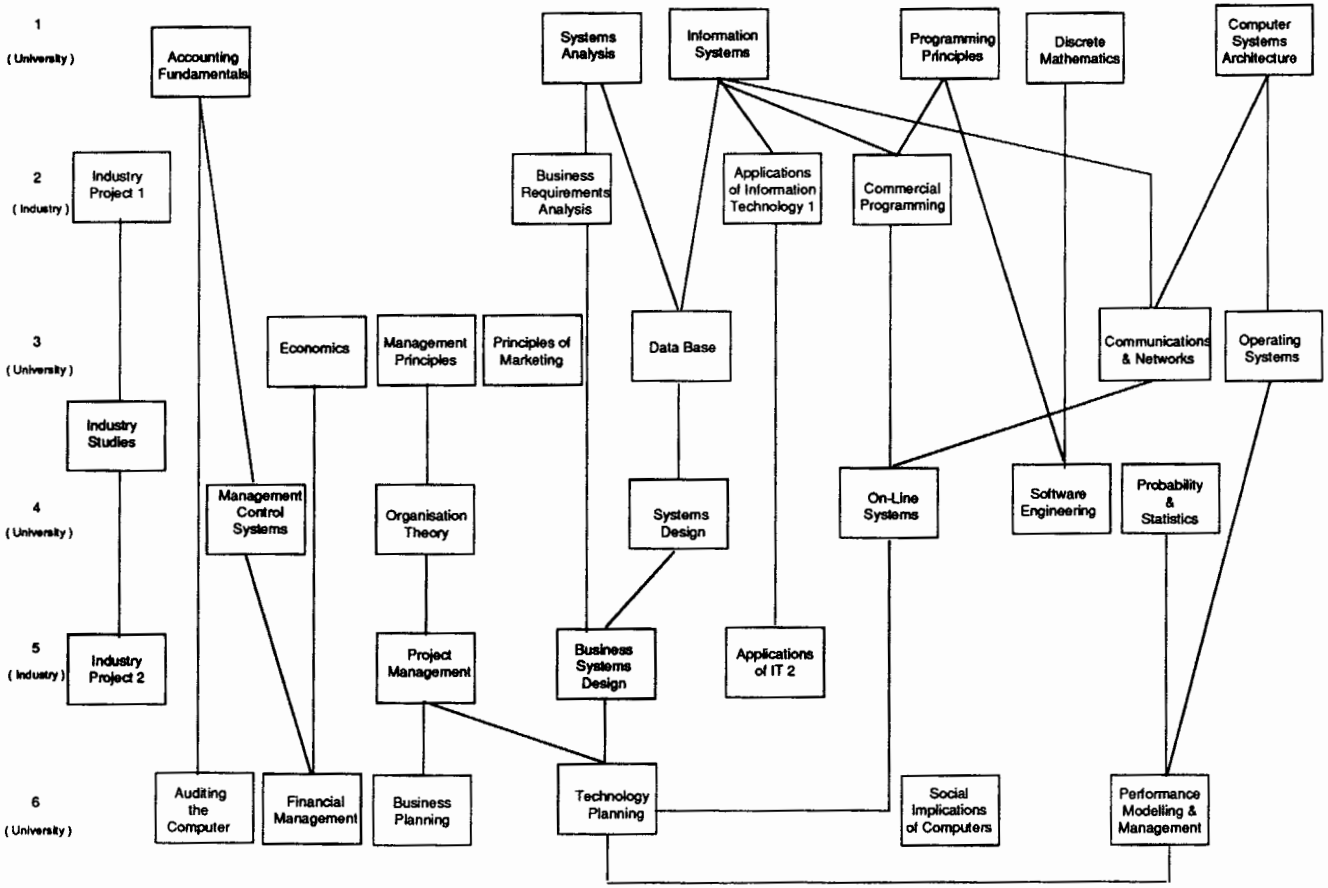
Variations to the approved program of study for the Bachelor of Information Technology are restricted. No industry-based subject may be deleted from the program, except under extraordinary circumstances and at the discretion of the Course Steering Committee and the School of Computing Sciences. No industry-based subject can be taken during a university-based semester. The taking of additional subjects during an industry-based semester is seen as unusual and may only be done at the discretion of the Course Steering Committee and the School.

The School will not recommend probation for unsatisfactory academic performance. Instead, the School will recommend to the Faculty Board that a student be excluded under any of the following circumstances:

- a student fails any subject for the second time;
- a student gains less than 50 per cent of the credit points for which he or she is enrolled in that assessment period;
- a student fails any subject that is part of the program of an industry-based semester (there is provision for a supplementary examination to be taken in these subjects following a failure on the first attempt) or a student performs unsatisfactorily during an industry-based semester; or
- a student who, immediately prior to the commencement of an industry-based semester, has still to complete more than one subject in the normal program of the course to that stage.

Appeals against exclusion will be dealt with by the University's Appeals Committee (of the Academic Board), which will take into account the recommendation of the Course Steering Committee.

Bachelor of Information Technology Curriculum



INDUSTRY SEMESTERS

The dates of the industry-based semesters for 1994 are as follows:

Autumn semester (3rd-year students)
Monday 17 January 1994 – Friday 1 July 1994

Spring semester (1st-year students)
Monday 4 July 1994 – Friday 16 December 1994

Students are expected to attend their assigned sponsoring company on a full-time basis throughout these periods. Students cannot expect any absences to be approved during the industry semesters.

PERSONAL DETAILS

Students must inform the University should their name or address details change. BInfTech students **must** also inform Des Saunders, Cooperative Education Officer, of any changes to personal details. Students who wish to change the method of payment of the scholarship should contact the Salaries Office, Smail Street on 330 2847.

SCHOLARSHIP

The scholarship will be paid at three different and increasing levels; all first year students will start at Level 1. At the end of each year all BInfTech students with satisfactory progress will move from their current level to the next level.

The levels for 1994 are as follows:

Level 1 $9,000 per annum

Level 2 $9,450 per annum

Level 3 $9,900 per annum

The scholarship paid to BInfTech students has been ruled as tax exempt.

POSTGRADUATE PROGRAMS

Application forms for all postgraduate courses may be obtained from the UTS Information Service. General enquiries should be directed to either the Postgraduate Studies and Scholarships Office (PSSO), telephone 330 1523, or the Faculty Graduate Assistant, telephone 330 1806. All prospective applicants should contact the Faculty Graduate Assistant **before** submitting an application. Applicants for research degrees should obtain approval either from the Director, Postgraduate Studies or from their chosen supervisor before submitting applications.

POSTGRADUATE RESEARCH DEGREES

Research areas

Areas of particular interest for work towards research degrees in the School of Computing Sciences include:

operating systems
computer performance evaluation
intelligent office automation systems
computer graphics
image processing
artificial intelligence
expert systems
knowledge bases,
local networks and network interface technology
neural networks
parallel processing and transputers
group support systems for workgroup computing
information modelling
auditing large databases
microprocessors and their applications
distributed databases
computer systems security
object-oriented techniques
usability and human-computer interaction

Computer research laboratories

Within the School, support for a wide range of Computing and Information Technology research is provided by a variety of research laboratories. Graduate research students, academics, visiting researchers and research assistants undertake collaborative research within the laboratories. The research quality and relevance of all laboratories is enhanced by well-established links, both with industry and overseas institutions.

The major laboratories are:

Parallel Processing Laboratory – examines and applies transputer technology to real world tasks, distributed operating systems and compilation. The laboratory is part of the

Australian Transputer Centre (supported by Inmos) that has a configuration of over 40 transputer systems. (Contact: Ury Szewcow)

Computer Graphics Laboratory – using seven Silicon Graphics workstations, this Laboratory develops realistic images and computer animation. Other areas include efficient contour algorithms, human movement image animation and textual modelling. (Contact: Dr Kevin Suffern)

Distributed Database Laboratory – implementation and data modelling of distributed databases client-server computing and cooperative workgroup systems. Development of methods for integrating database with expert systems, modelling of constraints and development of design tools. Integration of groupware with databases. (Contact: Dr George Feuerlicht)

Software Research Laboratory – includes three groups:

Programming Research Group – investigates programming languages and paradigms, concurrency, software engineering and formal methods, category theory;

Artificial Intelligence Group – interests include AI in design, Case Based Reasoning, cognitive modelling, Knowledge Engineering, PROLOG and LISP;

Adaptive Methods Group – applies neural networks, genetic programming and other machine learning methods to problems of varying complexity including image analysis, forecasting and natural language. (Contact: Dr Tom Osborn)

CRC Distributed Systems Technology Laboratory – the primary focus is management security and performance for controlled and efficient access to the resources of distributed systems such as database, collaboration software and distributed software tools. (Contact: Associate Professor Mike Fry)

Distributed Multimedia Laboratory – examines technology, protocols and implementation issues for very high band-width multimedia technology over computer networks. Work includes distance interaction of design editing and performance groups and network traffic performance, supporting diverse components. (Contact: Associate Professor Mike Fry)

Usability laboratory – investigates the methods and measurement techniques for developing effective and usable human-computer interaction methods, for different kinds of operating environments including design and system development. (Contact: Mr David Wilson or Mrs Judy Hammond)

Doctor of Philosophy (PhD)

Course code MC54

The Doctor of Philosophy is intended for students who wish to pursue research at a high level; such research is expected to demonstrate significant originality and to make a substantial contribution to computing knowledge. For specific areas of interest in research in the School of Computing Sciences see 'Research areas' above.

ATTENDANCE PATTERN

The Doctor of Philosophy degree is available on both a full-time and a part-time basis. Candidates who already possess a degree at the Master's level may be permitted to complete in two years if full-time, and three years, if part-time. The maximum duration of enrolment is four years for full-time students and six years for part-time students.

HOW TO APPLY

Applicants should hold a First Class, or Second Class (Division One), Bachelor's degree with a major computing component, or should hold a Master's degree in an appropriate area, or should have previously undertaken other postgraduate studies in computing. Prospective applicants are expected to have developed interests in a specific area of research, and should have one or more specific proposals for research work in that area. Before submitting a formal application for admission to this degree course, applicants should first seek the approval of the School for their proposed research work. To gain this approval, applicants should initially:

Either send a summary proposal of at least 1,000 words to the Director, Postgraduate Studies, School of Computing Sciences, containing references to seminal works in the area of proposed research. If the proposal is of interest to the School then the Director will refer the applicant to a suitable member of staff for further detailed discussion;

Or approach a suitable member of the School's academic staff directly and discuss the proposed research.

University Rule 3.5.2.2, as amended, provides that every Doctor of Philosophy student at UTS is required to have two supervisors for their research work, one of whom should be an academic staff member of the University and, normally, one of whom should hold a Doctoral degree.

When the applicant's proposed research has been approved by a member of the School's academic staff, and if two members of staff are prepared to supervise the research, then the applicant may formally apply for admission. Formal application for admission should consist of a completed Application for Admission – Doctor of Philosophy form and a completed Details of Proposed Study form which should be signed by both the applicant and one of the proposed supervisors.

COURSE FEES

There are no tuition fees for this course, and students are not required to pay the Higher Education Contribution Scheme fee.

PROGRESS REPORTS

All thesis students are required to submit, in consultation with their supervisors, a progress report at the end of each semester. The Faculty Graduate Assistant contacts each supervisor to initiate this process.

SUBMISSION OF THESIS

Each candidate for the degree of Doctor who is required to submit a thesis should give the Academic Registrar two months' written notice of intention to submit. Appropriate forms and the information brochure *Presentation and Submission of Theses for Higher Degrees* are available from the Postgraduate Studies and Scholarships Office. There is a different set of rules for Master's and Doctoral students.

RECENT THESIS

Buntine W L, A Theory of Learning Classification Rules, 1991

Master of Science (by thesis) (MSc)

Course code MC51

The Master of Science (by thesis) degree enables graduates to extend and deepen their knowledge of a specialised area in computing by undertaking research under the supervision of a member of the academic staff. For specific areas of interest in research work in the School of Computing Sciences see 'Research areas' above.

ATTENDANCE PATTERN

This degree is available on a full-time and part-time basis. The normal duration of enrolment for this degree is two years of full-time attendance or three years of part-time attendance. The maximum time to complete the course is three years and four and a half years respectively. The School of Computing Sciences has a strong preference for research work which proceeds at a full-time pace. This preference should not be seen as a deterrent to those students who wish to remain in employment. Students who are working in a full-time job, are encouraged to select a topic for their research which is closely aligned with their professional work. Once such a topic has been selected, the School usually requires that the student's employer provide a statement to the effect that at least half of the student's working week will be devoted to work which is directly relevant to the research. The student is then expected to contribute some of his or her own time to the project which brings the total number of hours devoted to research within that expected of full-time attendance.

HOW TO APPLY

Applicants should hold a first degree with a major computing component or should have previously undertaken other postgraduate studies in computing. Prospective applicants are expected to have developed interests in a specific area of research, and should have one or more specific proposals for research work in that area. Before submitting a formal application for admission to this degree course, applicants should first seek the approval of the School for their proposed research work. To gain this approval, applicants should initially:

Either send a summary proposal of at least 1,000 words to the Director, Postgraduate Studies, School of Computing Sciences, containing references to seminal works in the area of proposed research. If the proposal is of interest to the School then the Director will direct the applicant to a suitable member of staff for further detailed discussion;

Or approach a suitable member of the School's academic staff directly and discuss the proposed research.

When the applicant's proposed research has been approved by a member of the School's academic staff, and if that member of staff is prepared to supervise the research, then the applicant may formally apply for admission. Formal application for admission should consist of a completed Application For Admission – Graduate Courses form and a completed Details of Proposed Study form which should be signed by both the applicant and the proposed supervisor.

Note that all prospective applicants should obtain approval for their proposed research work either from the Director, Postgraduate Studies or from their chosen supervisor **before** submitting an application form for admission to this course.

COURSE FEES

There are no tuition fees for this course, and students are not required to pay the Higher Education Contribution Scheme fee.

PROGRESS REPORTS

All students are required to submit, in consultation with their supervisor, a progress report at the end of each semester. The Faculty Graduate Assistant contacts each supervisor to initiate this process.

SUBMISSION OF THESIS

Each candidate for the degree of Master who is required to submit a thesis should give the Academic Registrar two months' written notice of intention to submit. Appropriate forms and the information brochure *Presentation and Submission of Theses for Higher Degrees* are available from the Postgraduate Studies and Scholarships Office. There is a different set of rules for Master's and Doctoral students.

RECENT THESES

Grattan P J, Personal Computer Data Asset Protection; the End User Environment, 1988

Barnet M T, The Role of Data Modelling in Systems Methodology for C.S.R., 1989

Sifer M J, Structured Planning, 1990

Horn K A, Garvan-ESI: An Expert System for the Interpretation of Thyroid Laboratory Tests, 1991

Huang Y X, Knowledge-based Support for Office Procedures, 1991

Mrowka J W, A Computerised Fleet Management System for Large And Medium Fleets of Vehicles and Plant. (Automation of Overall Fleet Management), 1991

Blair A, Managing Business Rules and Integrity Constraints in Relational Database Applications, 1992

Lindley C A, The Knowledge Analyst's Assistant: A Computer-aided Knowledge Engineering Tool, 1992

Wilson D N, Project Management for a Prototyping Environment, 1993

Phillips M T, Dynamic Load Sharing: A Prototype, 1993

POSTGRADUATE COURSEWORK PROGRAMS

Master of Science in Computing (by coursework) (MSc)

Course code MC53

Until 1993 this course was called the Master of Science in Information Science. A revised course, entitled the Master of Science in Computing, will be introduced in 1994. The information that follows reflects the changes that have been made.

The Master of Science in Computing (by coursework) enables graduates to select a program of study which suits individual career goals. For example, a program may be chosen which develops specialised expertise in computer systems, which provides a general update of information science technology, or one which equips the student for a position in corporate management as an information scientist.

ATTENDANCE PATTERN

The course is offered on a part-time basis only, over six semesters (three years), as it is considered important that students remain in professional employment while undertaking their graduate studies in computing. Attendance is required at lectures for at least two evenings each week. Because the course is only available part-time all timetabled sessions are held in the evenings, usually between 6.00 pm and 9.00 pm.

HOW TO APPLY

The course is intended for computing professionals. Applicants should have **both**

- a Bachelor's degree from the University of Technology, Sydney or equivalent, preferably with a major computing component. Applicants are required to submit evidence to the effect that the extent of their formal knowledge of computing is equivalent to that of a graduate from the UTS Bachelor of Science in Computing Science; and

- an established professional career within the Information industry. As a guide, the extent of the applicant's professional experience should be equivalent to that of an Associate Member of the Australian Computer Society of at least two years' standing.

Each semester the School publishes the *MSc (by coursework) in Computing Course Guide.* This guide contains much administrative information as well as a detailed statement of the course regulations. Students and prospective applicants are advised to obtain a copy of this guide and to study it carefully. From August an 'Admission package' containing a copy of the guide, the application forms and other relevant information is available from either the UTS Information Service, the Faculty Graduate Assistant, or the University's Postgraduate Studies and Scholarships Office. Please note that completed application forms must be submitted to the University by the last week of October in the year prior to that in which admission is sought.

COURSE FEES

In 1994 tuition fees will be charged for students in the MSc (by coursework) in Computing. These fees have been set at $1,000 per semester for a normal attendance pattern. Students who pay tuition fees will not be liable for HECS (ie, the Higher Education Contribution Scheme).

PREREQUISITE KNOWLEDGE

All subjects in the MSc course are presented at the postgraduate level. Students are expected to be familiar with the undergraduate material which lies behind the postgraduate work.

For the subjects offered by the School of Computing Sciences, before the start of each semester a set of references to the presumed undergraduate material is given by each lecturer. It is important to note that these references are not 'pre-reading', but are a summary of the undergraduate knowledge required for each subject. Students are responsible for ensuring that they are completely familiar with the undergraduate knowledge implied by those references. If they are not, then they should defer their enrolment in that subject and should attend suitable remedial undergraduate lectures; the Director, Postgraduate Studies will advise students on suitable remedial lectures.

For a subject offered by schools other than the School of Computing Sciences, students are advised to contact that subject's coordinator, before the start of semester, to determine whether they possess the prerequisite knowledge for that subject. If students do not possess the prerequisite knowledge for subjects offered by other schools or faculties then they should seek advice from those schools or faculties on the feasibility of a remedial program; the Director, Postgraduate Studies will assist in obtaining this advice.

In addition, there are prerequisite requirements within the structure of the course itself (see subject descriptions).

COURSE STRUCTURE

Students are required to complete a total of 72 credit points consisting of 60 points from coursework and 12 points from the Project subject. The Project subject is normally taken in the fifth semester and must be completed by all students. In special circumstances, the Director, Postgraduate Studies may approve a program in which out of the total of 72 credit points 48 points come from coursework, and 24 points come from the 'Project' subject. Students should seek this approval in writing. Students who are allowed to undertake such a 24 credit point project must have the strong support of their Project Supervisor as a part of these 'special circumstances'.

Each student's program of study will be subject to approval by the School's Director, Postgraduate Studies. The subjects chosen by a student must form a coherent plan of study and must be consistent with the student's professional career goals. When approving a student's program of study, the Director, Postgraduate Studies will not permit a student to enrol in a subject in the MSc (Computing) if that student has already completed a corresponding subject in another course.

Principal subjects in the Master's are subjects offered by the School of Computing Sciences on a regular basis as subjects in the course. Elective subjects in the Master's are subjects offered by the School of Computing Sciences on a periodic basis as subjects in the course; the elective subjects may vary from year to year depending on the availability of specialist staff.

To gain their credit points from coursework (normally amounting to 60 credit points), students are required to gain at least 36 credit points by passing a selection of principal subjects; with the balance, which will thus be between 0 and 24 credit points, to be made up as follows:

- by passing postgraduate subjects which are made available to students in the MSc (Computing) course by the School of Mathematical Sciences or by other faculties, or

- by passing elective subjects up to a total of 12 credit points only (in special cases, when the student has specific requirements, the Director, Postgraduate Studies may extend this to a total of 18 credit points of elective subjects but no further).

SUBJECT OUTLINE TIMETABLE

The principal subjects in the proposed course are as follows and are grouped under the name of the School's Unit or Department which will present that subject:

		CP	Semester offered
Computer Science Department			
32901	Recent Advances in Computer Science	6	All Autumns
Computing Methods Unit			
32106	Object-oriented Software Development	6	A95
32108	Specialist Topics in Artificial Intelligence	6	S94
32107	Formal Reasoning for Software Development	6	S95
Computing Systems Unit			
32307	Operating Systems	6	S94
32306	Capacity Management	6	A95
32302	Computer Architecture	6	S95
Information Systems Department			
32902	Recent Advances in Information Systems	6	All Autumns
Information Systems Technology Unit			
32204	Advanced Data Management	6	A94
32205	Computer Communication Systems	6	S94
32206	Advanced Information Systems Modelling	6	S95
Information Systems Management Unit			
32207	Information Management	6	A95
32208	Information Processing Strategy	6	S95
32402	Information Technology Environment	6	S94
School of Computing Sciences			
32912	Project	12	All
32924	Project	24	All

Each principal subject is of one semester's duration. Principal subjects are offered once every two years with the exception of Recent Advances in Computer Science and Recent Advances in Information Systems which are offered each year. At present the intention is to offer the above principal subjects on a two-year cycle; however the Master's program is constantly under review, and it is expected that the list of principal subjects offered will be expanded, and that the contents and sequence of existing principal subjects may be modified.

The elective subjects in the proposed course will present specialised material and so will depend on the availability of specialist staff. At present it is proposed to offer the following elective subjects:

Elective subjects

32506	Knowledge Systems (6cp)
32507	Performance Evaluation (6cp)
32503	Distributed Databases and Client/Server Computing (6cp)
32504	Tool-based Systems Development (6cp)
32505	Advanced Object-oriented Analysis and Design (6cp)
32501	Computer Graphics (6cp)
32502	Advanced Computer Graphics Techniques (6cp)

Subjects from other schools or faculties

The following subjects from other schools or faculties are available to students in the MSc (Computing):

School of Mathematical Sciences

Advanced Financial Modelling sequence

34936	Decision Theory (4cp)
34938	Financial Modelling Techniques (4cp)
34038	Corporate and Financial Decisions and Investment Analysis (4cp)

Advanced Optimisation Techniques sequence

34932	Optimisation Techniques (4cp)
34934	Network Optimisation (4cp)
34031	Large-scale Mathematical Programming (4cp)
34033	Dynamic Optimisation (4cp)

34927 Deterministic Optimal Control (4cp)

Advanced Experimental Design sequence

34955 Regression Analysis (4cp)
34956 Design of Experiments (4cp)
34067 Multivariate Statistics (4cp)
34069 Linear Models and Experimental Design (4cp)

Advanced Industrial Statistics sequence

34955 Regression Analysis (4cp)
34957 Quality Control (4cp)
34065 Time Series Analysis (4cp)

Advanced Stochastic processes

34013 Modern Analysis (Honours) (4cp)
34014 Measure Theory (Honours) (4cp)
34961 Stochastic Processes 1 (4cp)
34062 Stochastic Processes 2 (4cp)

Other subjects

34985 Digital Image Processing (4cp)
34986 Cryptology (4cp)

Faculty of Business

25706 Economics for Management (6cp)
21710 Quantitative Methods (6cp)
22726 Accounting and Financial Administration (6cp)
21718 Organisation Analysis and Design (6cp)
25742 Financial Management (6cp)
24734 Managerial Marketing (6cp)
21719 Organisational Behaviour (6cp)
22727 Information for Management Decisions (6cp)
21720 Employment Relations (6cp)
25707 Government Business Relations (6cp)
25741 Capital Markets (6cp)
22751 Corporate Accounting Issues (6cp)
21702 Industrial Relations (6cp)
21724 Human Resource Management (6cp)
21722 Management 1 (6cp)
21723 Management 2 (6cp)
24737 Marketing Information Management (6cp)
21741 Operations Management (6cp)

Faculty of Law and Legal Practice

77756 Copyright Law (12cp)
77727 Design Law (12cp)
79749 Law for Managers (6cp)
79729 Legal Environment of Business (6cp)
72100 Legal Process (12cp)
79741 Marketing Legislation in Australia (6cp)

Choosing a program in 1994

Students may find the following presentation of planned subject offerings useful when choosing their program. It is usually easiest to choose the principal subjects first because most of these are only available every two years, and then to select the remaining subjects. Students should be sure to take the prerequisites into account, (see subject descriptions). Ideally, there should be two subjects chosen per semester for the first two years. During the final year, students normally take the Project subject and two more coursework subjects.

Semester	Computing Methods	Computing Systems	Information Systems Technology	Information Systems Management
A 94	Recent Advances in CS	Capacity Management	Advanced Data Management	Recent Advances in IS
S 94	Specialist Topics in AI	Operating Systems	Computer Commun. Systems	Information Technology Environment
A 95	Obj-Oriented Software Development	Recent Advances in CS	Recent Advances in IS	Information Management
S 95	Formal Reasoning for Software Development	Computer Architecture	Adv. Info. Systems Modelling	Information Processing Strategy
A 96	Recent Advances in CS	Capacity Management	Advanced Data Management	Recent Advances in IS
S 96	Specialist Topics in AI	Operating Systems	Computer Commun. Systems	Information Technology Environment

Note: The program shown for 1996 is provisional only.

PROJECT

The project entails a substantial investigation of a topic, in an area of current research interest in information technology and related to the student's professional career goals. All students are required to enrol in and pass the project subject. The project is normally undertaken in the final year of study after the completion of at least two years of coursework.

The **topic** for the project should be of direct interest to the student, and of value to the student's professional development.

Students may wish to select a topic which is closely related to their current employment or of value to their future career. The project should be a vehicle for importing the knowledge learned from the coursework to the student's professional life and the topic should be chosen with this professional goal in mind. Students are advised to seek the assistance of the lecturing staff in finalising the topic for their project.

Before beginning the project work a student should obtain the agreement of a member of the lecturing staff to act as project supervisor, and deliver a 500-word description of the project to the Director, Postgraduate Studies for approval.

Once approved, the project will proceed 'in the manner of a Master's thesis', and students are advised to discuss their work with their project supervisor regularly. The role of the project supervisor is to:

- advise on the general direction of the investigation;
- advise on a work schedule;
- advise on a framework for writing up the work, and
- criticise draft sections of work.

Enrolment and assessment of project

It is usual for the project work to extend over more than one semester. Students should enrol in the project for the semester in which they expect to submit their completed project. Note the requirement, stated below, that the project be submitted before the end of the tenth week of the semester in which the student wishes their project to be examined. The examination of the project must be completed before the School's Examination Review Committee meeting which takes place towards the end of each semester. If students are enrolled in the Project subject at the time of the School's Examination Review Committee meeting, and if the examination of their project has not been completed in time for that meeting, then their enrolment in project for that semester will be cancelled.

The project will result in the preparation of an extensive written report. Three copies of this report should be lodged with the Director, Postgraduate Studies before the end of the tenth week of the semester in which the student wishes to be examined. The School will retain three copies, one of which will be placed in the University Library. The final version of the report should be typed and bound in accordance with the University's specification for theses (available from the Postgraduate Studies and Scholarships Office, Academic Office). Students may have their written reports bound before submitting them for examination; alternatively, to avoid the possible expense of rebinding, three copies of a typed but unbound report may be submitted for examination. When submitted, the written report should be accompanied by a Certificate of Originality and a Retention of Report form; these forms are available from the Director, Postgraduate Studies.

There will also be an oral presentation of 40 minutes followed by 20 minutes' discussion with the examiners. A day will be set for the oral presentations each semester. The oral presentation day will usually be during the last two weeks of semester. The oral presentation should consist of a discussion of the more highly controversial or technical issues within the written report. When delivering the oral presentation, students should assume that their audience is familiar with the contents of their written report.

The project will be examined on the contents and standard of presentation of the written report and the oral presentation. The examiners of the project will be two members of the academic staff.

The result of the examination of the project shall be one of the following:

- outright pass;
- pass subject to minor corrections being made (without general re-typing) to the satisfaction of the project supervisor (or nominee) and without a formal re-examination;

- pass subject to major revisions being made (probably involving substantial re-typing). The student is responsible for making arrangements for these major revisions to be re-examined before the end of the twelfth week of the semester following the semester of the initial examination. The result of such a re-examination shall be 'outright pass' or 'outright failure'; or
- outright failure.

In addition, the examiners will allocate marks to the project.

SUBJECT FAILURE

Students are permitted at the most two failures during the MSc in Computing. Note the resolution of the Faculty Board FBMC/92/70 'that any Master's degree candidate enrolled in the MSc (Computing) who records any three failures will be excluded from the course'. In addition, students are bound by the Rules of the University, and are advised to refer to them.

MINIMUM AND MAXIMUM TIME

There are two important University Rules concerning minimum and maximum time which students should be aware of:

A Master's degree candidate shall not normally be eligible for the award of a Master's degree by coursework until he/she has completed at least six semesters of a part-time course. A student who is specially qualified in a relevant discipline may, with the approval of the Academic Board, be allowed to complete the course in less than the minimum time.

A student who fails to complete all of the work prescribed for the higher degree within nine semesters from the time of his/her registration as a part-time Master's degree candidate will only be permitted to continue with the approval of the Faculty Board.

Master of Business in Information Technology Management

Course code MC85

Graduate Diploma in Information Technology Management

Course code MC75

Graduate Certificate in Information Technology Management

Course code MC63

These are new courses which are expected to be offered for the first time in 1994 subject to Academic Board approval. The new courses form a joint program from the School of Computing Sciences and the Faculty of Business. All administration for these courses is the responsibility of the School of Computing Sciences within the Faculty of Mathematical and Computing Sciences. Enquiries on these courses should be directed to Susan Delaney, Program Manager, on 330 1925 or Jean Robb, Director of Graduate Education on 330 1836.

The courses aim to:

develop professional skills necessary for successfully undertaking the role of manager in terms of people, resources and processes in a variety of organisational contexts (which may include business, community, public, manufacturing, consultancy or professional contexts);

enable the acquisition of conceptual and analytical understanding of the corporate/organisational needs from the differing perspectives of individuals and groups within the organisation, necessary for successful management;

provide a well-balanced selection of subjects from both advanced information technology (IT) and management, in an integrated program which is relevant to the current and future demands of the IT industry;

develop an understanding of the IT business environment and to extend the knowledge and skills in specialist areas of management related to management of IT in business; and

enhance and develop a partnership between UTS and the IT industry.

ADMISSION REQUIREMENTS

Master's

1. A recognised Bachelor's degree (or equivalent) in an appropriate discipline such as Business or Computing, plus a minimum of two years' experience in the IT industry;
   or
2. The prior successful completion of the Graduate Diploma in Information Technology Management (therefore exempt from Semester 1, 2, 3 and 4 subjects);
   or
3. The successful completion of an approved bridging program for non-graduate entry; that is the Graduate Certificate with passes at a credit grade average.

Graduate Diploma

1. A recognised Bachelor's degree (or equivalent) in an appropriate discipline, plus a minimum of two years' experience in the IT industry,
   or
2. The prior successful completion of the Graduate Certificate in Information Technology Management (therefore exempt from Semester 1 and 2 subjects).

Graduate Certificate

1. A recognised Bachelor's degree (or equivalent) in an appropriate discipline, plus a minimum of two years' experience in the IT industry;
   or
2. Evidence of general and professional qualifications, such as other post-secondary school qualifications which can establish their aptitude, knowledge and practical experience, that will satisfy the Faculty Board in Mathematical and Computing Sciences that the applicant possesses the educational preparation and capacity to pursue postgraduate studies. Experience in the IT industry will be especially important in this regard, eg, five years' minimum vocational experience.

PRESUMED KNOWLEDGE AND PREREQUISITES

Subjects in the Graduate Certificate, Graduate Diploma and Master's courses are presented at postgraduate level. Students are expected to be familiar with the undergraduate material on which the postgraduate work is based. For the subjects offered by either the School of Computing Sciences or the School of Management, before the start of each semester a set of references to the presumed undergraduate material is given by each lecturer. It is important to note that these references are not 'pre-reading', but are a summary of the undergraduate knowledge required for each subject. Students are responsible for ensuring that they are completely familiar with the undergraduate knowledge implied by those references. If they are not, then they should seek advice from the Director of Graduate Education in the first instance and may then be advised to contact the subject coordinator, before the start of semester, to determine whether they possess the prerequisite knowledge for that subject.

For subjects offered by schools other than the School of Computing Sciences and the School of Management, students are advised to contact that subject's coordinator, before the start of semester, to determine whether they possess the prerequisite knowledge for that subject. If students do not possess the prerequisite knowledge for subjects offered by other schools or faculties then they should seek advice from that school or faculty on the feasibility of a remedial program; the Director of Graduate Education will assist in obtaining this advice.

In addition, there are prerequisite requirements within the structure of the course itself (see course structure).

FEES

Full tuition fees will be charged for students in the above courses. The fee is $1,500 per subject (module). The tuition fee for the research and development Project undertaken in the Master's course will be higher (subject to final determination).

COURSE STRUCTURE

All subjects will be assessed to the Master's standard, regardless of the course in which a student is enrolled. Hence a student who takes several individual subjects, may later gain credit towards a Graduate Certificate.

The courses have been designed to allow freedom of choice at the individual subject level. The subjects at the Graduate Certificate level aim to teach the student skills and competencies for IT management. At the Graduate Diploma level, the subjects aim to focus on organisational strategies and

planning. At the Master's level, the subjects are related to organisational development and research for the IT industry.

The full Master's degree course is normally completed in three years (six semesters) of part-time study. The Project is normally commenced in the fifth semester, together with one subject related to research methodology and Master's seminars on up-to-date issues in information technology.

Core subjects are to be offered by the Faculties of Mathematical and Computing Sciences, and Business on a regular basis. Additional subjects available on an **elective** basis will be offered depending on demand and the availability of specialist staff. There may be other postgraduate subjects available to students enrolled in the program, offered by other schools within the Faculties of Mathematical and Computing Sciences and Business, which may be selected by students with the approval of the Director of Graduate Education. The industrially linked Project must build on the core/elective subjects already taken by the student and should ideally be related to his/her place of work.

In all cases the subjects chosen must form a coherent plan of study and must be consistent with the student's professional career goals. Each student's program of study will be discussed with, and approved by, the Director of Graduate Education at the time of entry into a course. If a student has already completed an equivalent core subject in another course, he/she will be required to do an alternate subject from the electives available. Exemptions may only be considered if based on successfully completed subjects from these courses at Level 1 or above.

Level 1 – No formal qualification

A student may take any number of subjects relevant to his/her professional needs (subject prerequisites, if any, will need to be taken into account).

All subjects will be presented and assessed to the Master's level. Hence a student who takes several appropriate subjects may later gain credit towards a Graduate Certificate.

No formal qualification will be awarded by UTS.

Level 2 – Graduate Certificate in Information Technology Management

(24cp)

A student must take the following **three core** subjects:

21789 Contemporary Management Practices (6cp)
21788 Effective People Management (6cp)
32601 Advanced Project Management (6cp)

A student must take **one elective** subject selected from:

21809 Managerial Analysis and Evaluation of Information Systems (6cp)
32602 Impact of Information Technology (6cp)
32603 Software Quality Management (6cp)
32604 System Integration (6cp)

or an elective approved by the Director of Graduate Education.

Level 3 – Graduate Diploma in Information Technology Management

(48cp)

A student must complete the requirements for the Graduate Certificate in Information Technology Management (24cp);

plus

A student must take the following **three core** subjects:

21806 Managing Organisational Change (6cp)
21807 Total Quality and Productivity Management (6cp)
21708 Strategic Business Management (6cp)

A student must take **one elective** subject selected from:

24704 Managing Client Relations (6cp)
32701 Advances in Information Technology (6cp)
32702 Contemporary Telecommunications (6cp)
32703 Information Processing Strategy (6cp)

or an elective approved by the Director of Graduate Education.

Level 4 – Master of Business in Information Technology Management (72cp)

A student must complete the requirements for the Graduate Diploma in Information Technology Management (48cp);

plus

A student must take the following subjects:

21751 Management Research Methods (6cp)
32818 Project (18cp)

The major Project must involve applied organisational research and development in the IT industry. It must be industrially linked and conducted in conjunction with the student's industry sponsor.

As part of the Project, a student must also attend associated Master's seminars. Expert speakers may be available to run seminars on such topics as 'Major Economic Trends' or 'International Competitiveness in the IT industry'.

A student must make one oral presentation of his/her project work at a satisfactory standard during the final year of enrolment in the Master's course.

A **typical outline** program of study for the Master's level course will be as follows:

Year 1

Autumn semester
Subject 1 (Core 1/Level 2) (6cp)
Subject 2 (Core 2/Level 2) (6cp)

Spring semester
Subject 3 (Core 3/Level 2) (6cp)
Subject 4 (Elective/Level 2) (6cp)

Year 2

Autumn semester
Subject 5 (Core 1/Level 3) (6cp)
Subject 6 (Core 2/Level 3) (6cp)

Spring semester
Subject 7 (Core 3/Level 3) (6cp)
Subject 8 (Elective/Level 3) (6cp)

Year 3

Autumn semester
Subject 9 (Core 1/Level 4) (6cp)
Project (Y)

Spring semester
Project (18cp)

Y= year long subject

An example of a selected program of study for the Master of Information Technology Management

Year 1

21788 Effective People Management (6cp)
21789 Contemporary Management Practices (6cp)
32601 Advanced Project Management (6cp)
Elective (6cp)

Year 2

21807 Total Quality and Productivity Management (6cp)
21806 Managing Organisational Change (6cp)
21708 Strategic Business Management (6cp)
Elective (6cp)

Year 3

21751 Management Research Methods (6cp)
32818 Project (18cp)

In all cases the subjects chosen must form a coherent plan of study and must be consistent with the student's professional career goals. Each student's program of study will be discussed with, and approved by, the Director of Graduate Education at the time of entry into a course. If a student has already completed an equivalent core subject in another course, he/she will be required to do an alternative subject from the electives available.

PROJECT

The project entails a substantial investigation of a topic, in an area of current research interest in information technology and related to the student's professional career goals. The Project is normally taken in the last part of the Master's course and must be taken by all Master's students. All Master's students are required to enrol in and pass the project subject.

The topic for the project should be of direct interest to the student, and of value to the student's professional development.

A student may wish to select a topic which is closely related to his/her current employment. Alternatively, a student may

wish to choose a topic which should be of value to his/her future career. The project should be a vehicle for importing the knowledge learned from the coursework to the student's professional life. The topic should be chosen with this professional goal in mind. Students are advised to seek the assistance of the lecturing staff in finalising the topic for their project.

Graduate Diploma in Data Processing (GradDipDP)

Course code MC52

Course coordinator: Miss Jean Robb

This course aims to provide students with the basic knowledge and skills required for a professional career in programming and/or systems work. It is designed for people who have already taken a first degree in which computing has not been included or only covered lightly.

The course is not open to students who have already completed the Bachelor of Science in Computing Science, Diploma of Technology (Information Processing), or a similar course at an equivalent level.

Satisfactory completion of this course leads to the award of Graduate Diploma in Data Processing. Holders of the Graduate Diploma in Data Processing are exempt from the Associate examinations of the Australian Computer Society.

It is anticipated that students entering the course will have previously studied courses from a wide range of disciplines. Some will have graduated with little or no previous contact with computing and data processing, while others will be familiar with computing concepts in areas such as programming, and will be seeking to consolidate their present knowledge by obtaining a formal qualification.

ADMISSION REQUIREMENTS

The prerequisites for entry to the Graduate Diploma in Data Processing are a first degree, equivalent to an undergraduate three-year degree from the University of Technology, Sydney, plus a working knowledge of the programming languages COBOL, and either C or Pascal.

Applicants who are in doubt about the ranking of their academic qualifications should contact the Postgraduate Studies and Scholarships Office or the Admissions Branch at the University, or write to the National Office of Overseas Skills Recognition, PO Box 25, Belconnen, ACT, 2616.

Intending applicants who do not have the required knowledge of COBOL and Pascal or C, will need to acquire such knowledge before the close of applications. Courses on these languages are offered by the School of Computing Sciences; for details contact the Key Centre for Advanced Computing Sciences 330 1331. However, applicants are at liberty to present for consideration evidence of successful completion of any COBOL and Pascal or C courses, or of substantial work experience using these languages. The selection committee will assess whether what is presented satisfies the prerequisites for the course. Candidates presenting evidence of fulfilling the requirements will be offered an interview. The number of applicants for the course is always in excess of the number of places, and therefore no guarantee can be given that every candidate meeting the requirements will be successful in gaining admission.

For further information, candidates should telephone the Faculty's Graduate Assistant, Mr B Irvine on 330 1806, or the School Office on 330 1803, or write to:

The Director of Graduate Education
Graduate Diploma in Data Processing
School of Computing Sciences
University of Technology, Sydney
PO Box 123
BROADWAY NSW 2007

All applications should be well documented, including proof of graduate status, the applicant's academic record, and such other documentation as the applicant wishes to provide in support of his/her application.

COURSE FEES

Australian citizens and permanent residents will contribute to the cost of the course through HECS (ie, the Higher Education Contribution Scheme).

MODE AND LENGTH OF STUDY

The course is normally taken on a part-time attendance pattern over two years (two evenings and one afternoon each week). This will require students to attend the University for at least nine hours a week. Some students may take longer to complete

the course subject to approval. In exceptional circumstances, the course may be undertaken on a full-time attendance pattern over 12 or 18 months.

Students may be permitted to enter the course with advanced standing but, in order to qualify for an award, a student must complete at least 32 credit points of the prescribed 48 credit points for the course. Exemptions from some compulsory subjects will normally only be granted where a student has partially completed a similar Graduate Diploma elsewhere. A maximum of 16 credit points **only** may be exempted.

Where a student can demonstrate proficiency in a subject area, approval for substitution of Semester 1 and 2 subjects by other approved subjects from the undergraduate course may be granted.

PROGRESSION RULES

All students in the Graduate Diploma in Data Processing course should be aware of the following University Rules under which a student's registration will be discontinued:

MAXIMUM TIME

Failure to complete the course within four semesters from initial registration in the case of a full-time student, or within eight semesters from initial registration in the case of a part-time student. This is not inclusive of periods of approved leave of absence.

UNSATISFACTORY PROGRESS

Unsatisfactory progress, as defined by the Faculty Board in Mathematical and Computing Sciences, is failure in any subject three times. (FBMC/92/71)

COURSE REGULATIONS

To complete the Graduate Diploma students must gain 48 credit points. Since all subjects for this course are four credit point subjects, this means students must complete 12 subjects.

Of these students must take SIX core subjects:

31071 Introduction to Information Systems (4cp)
31073 Introduction to Computer Systems (4cp)
31621 Systems Analysis (4cp)
31022 Commercial Program Development (4cp)
31631 Database (4cp)
and one of
31617 Accounting Fundamentals (4cp)
or
31632 Communications and Networks (4cp)

In addition students must take SIX electives. These are usually chosen from the list given below or from elective subjects in the BSc in Computing Science. Students must have completed the appropriate prerequisites and their choice must be approved by the Director of Graduate Education.

Graduate Diploma electives – usually offered in Autumn

31632 Communications and Networks [1] (4cp)
31617 Accounting Fundamentals [1] (4cp)
31615 Discrete Mathematics (4cp)
31641 Systems Design (4cp)
31642 On-line Systems (4cp)
31658 Project Management (4cp)
31623 Computer Systems Architecture 2 (4cp)

[1] If not taken as a core subject.

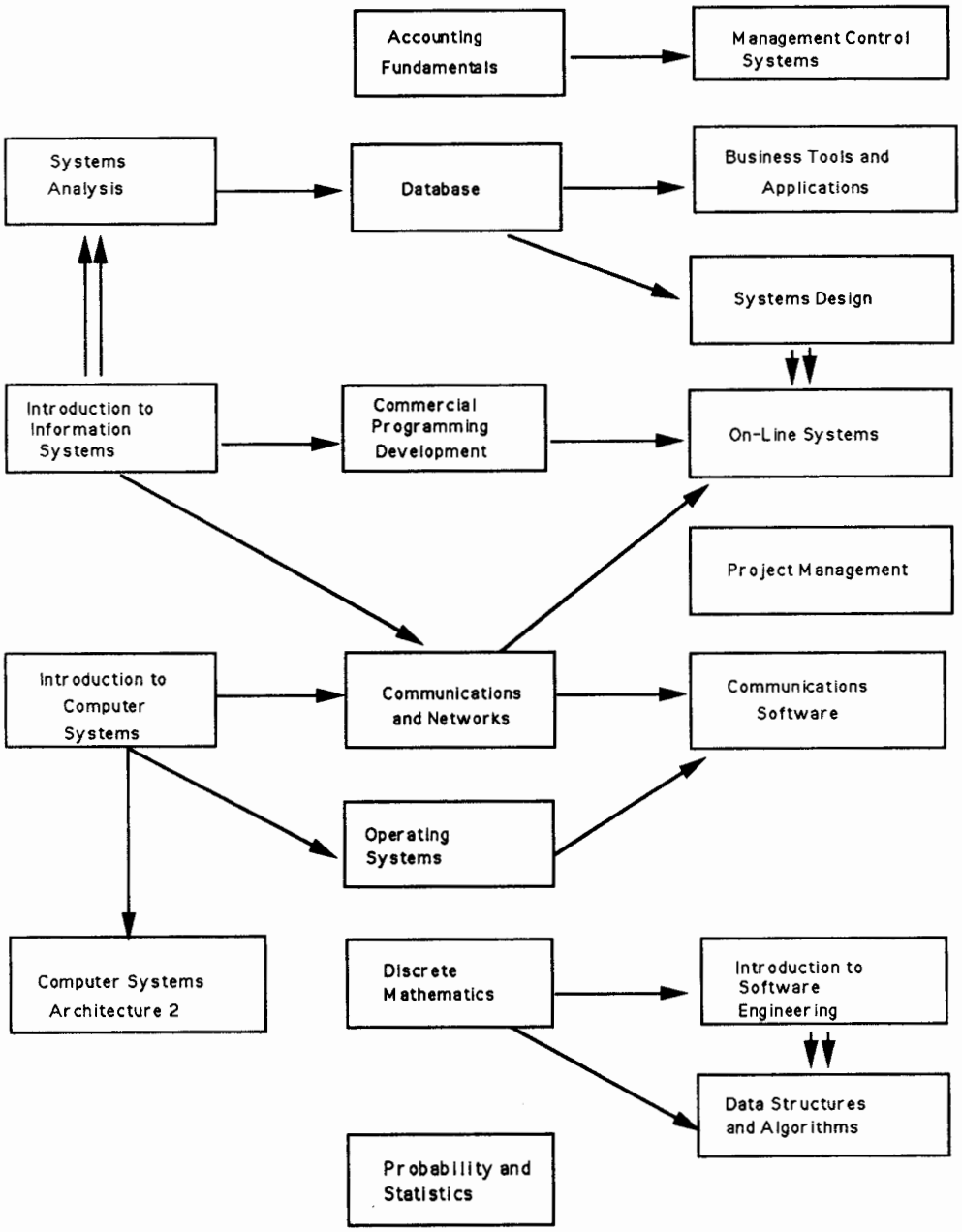
Other electives may be available during the day.

Graduate Diploma electives – usually offered in Spring

31624 Data Structures and Algorithms (4cp)
31025 Introduction to Software Engineering (4cp)
31626 Probability and Statistics (4cp)
31633 Operating Systems (4cp)
31641 Systems Design (4cp)
31642 On-Line Systems (4cp)
31647 Management Control Systems (4cp)
31648 Business Tools and Applications (4cp)
31653 Communications Software (4cp)

Other electives may be available during the day.

GRADUATE DIPLOMA IN DATA PROCESSING PRE-REQUISITE CHART



Indicates must be done before or concurrently
e.g. Introduction to Information systems must be done before or concurrently with systems analysis

RECOMMENDED PART-TIME PROGRAM

Autumn semester

31621 Systems Analysis (4cp)
31071 Introduction to Information Systems (4cp)
31073 Introduction to Computer Systems (4cp)

Spring semester

31022 Commercial Program Development (4cp)
31631 Database (4cp)
Elective

Autumn semester

31632 Communications and Networks (4cp)
and/or
31617 Accounting Fundamentals (4cp)
One or two electives

Spring semester

Three electives

Note that the hours per week listed in the subject descriptions are lecture and tutorial hours. Students should plan to spend at least the same amount of time again on private study.

Refer to the Graduate Diploma prerequisite chart on page 79.

GRADUATE CERTIFICATES

Graduate Certificate in Advanced Information Technology

Course code MC62
Coordinator: Dr B Howarth

COURSE DESCRIPTION

The course is intended for staff within companies who are specialising in a new direction. The course will allow students to build upon foundations in information systems and/or computer science. The prerequisite for the course will be the Graduate Certificate in Information Systems and/or the Graduate Certificate in Computer Science, or their equivalent. The course will enable students to develop advanced skills in more specialised areas of information technology, and will be the equivalent of one year's part-time study. The course will be offered on a full-fee-paying basis which, it is expected, will typically be met by companies for selected employees. However, the course will be a general qualification, which is not intended to be restricted to the employees of any particular company.

LENGTH

The course will typically be completed over a period of one year, part-time. Nonetheless, depending on demand, the course or individual subjects may be offered in flexible attendance modes.

ATTENDANCE PATTERN

The course may be offered as part of normal programs, provided class space is available. Depending on demand, students may undertake formal studies involving attendance at intensive blocks of lectures with possible additional weekend attendance.

COURSE STRUCTURE AND CURRICULUM

The course will consist of a coherent set of four subjects approved by the School of Computing Sciences. Existing subjects from the Graduate Diploma in Data Processing will be used. A typical selection, permitting a particular specialisation, would be as shown in the table on the next page.

(Note: D=Day, E=Evening)

Option 1

Subject number	Subject name	Semester offered	Prerequisite
You must select			
31073	Introduction to Computer Systems	A94: D S94: E	Nil
and three of the following			
31632	Communications and Networks	A94/A95: D&E	31073
31633	Operating Systems	A94: D S94/S95: E	31073 31073
31653	Communications Software	S94/S95: E A94: D	31632 & 31633 31632 & 31633
31666	Performance Evaluation	S94/S95: D A95: E	31633 31633
31904	Systems Programming	A94/A95: D	31633
31860	Object-oriented Programming and C++	S94/A95: D	31904

Option 1 requires as prerequisite knowledge, programming skills in an Algol-derived programming language such as is covered in Data Structures and Algorithms. That is, the programming and data structures knowledge in the Graduate Certificate in Computer Science is a prerequisite for this Graduate Certificate.

Option 1 may take up to four semesters on a part-time basis only.

Students with specific requirements may request that other subjects be substituted for those in the selection given above.

Option 2

Subject number	Subject name	Semester offered	Prerequisite
Select any four of the following			
31647	Management Control Systems	S94: D&E	31617
31658	Project Management	A94: D&E	31621 & 31641
31777	Human-Computer Interaction	A94: E S94: D	31641 31641
31902	Auditing the Computer	A94: E S94: D	31617 31617
31931	Software Quality Assurance	 S94: E	31621 31621
31768	Business Planning for IT Professionals	S94: D	G.Cert in IS
31778	Resources Management for IT Professionals	A94: D	G.Cert in IS

Option 2 requires as prerequisite knowledge, the Graduate Certificate in Information Systems. The prerequisites in Option 2 above imply selectivity in the choice of subjects in the Graduate Certificate in Information Systems.

Students with specific requirements may request that other subjects be substituted for those in the selection given above.

The total requirement for the Graduate Certificate will be 16 credit points.

ADMISSION REQUIREMENTS

Applicants will normally be expected to have completed the Graduate Certificate in Information Systems and/or the Graduate Certificate in Computer Science. Applicants with demonstrable, equivalent backgrounds will be considered on a case-by-case basis.

FEES

The proposed fee for this course for 1994 is $3,600 subject to University approval.

Graduate Certificate in Computer Science

Course code MC60

Coordinator: Dr B Howarth

COURSE DESCRIPTION

The course is intended for staff within companies who are specialising in a new direction. The course will provide students with a foundation in Computer Science. This foundation can later be consolidated via the Graduate Certificate in Advanced Information Technology, and/or complemented by the Graduate Certificate in Information Systems. The course will consist of a coherent set of four subjects from the Computer Science field, and will be the equivalent of one year part-time study. The course will be offered on a full-fee-paying basis which, it is expected, will typically be met by companies for selected employees. However, the course will be a general qualification, which is not intended to be restricted to the employees of any particular companies.

LENGTH

The course will typically be completed over a period of one year, part-time. Nonetheless, depending on demand, the course or individual subjects may be offered in flexible attendance modes.

ATTENDANCE PATTERN

The course may be offered as part of normal programs, provided class space is available. Depending on demand, students may undertake formal studies involving attendance at intensive blocks of lectures with possible additional weekend attendance. The precise attendance pattern will be developed as part of the business plan for any given course offering.

COURSE STRUCTURE AND CURRICULUM

(D=Day, E=Evening)

Subject number	Subject name	Semester offered	Prerequisite
You must select			
31624	Data Structures and Algorithms	S94: D&E	Nil
and a selection of any three of the following			
31615	Discrete Maths	A94: D S94: E	Nil
31140	Introduction to Computer Graphics	A94/A95: D	31624
31240	Topics in Computer Graphics	S94/S95: D	31140
31163	Knowledge-based Systems	A94/A95: E	31624
31896	LISP Programming	S94/S95: D	31624
31901	AI Theory	S94/S95: D	31624

It will take a minimum of three semesters to complete the Graduate Certificate, and is subject to the student being a competent programmer in some language, such as Pascal or C.

If it can be determined that a person has the prerequisite programming skills, then it may be possible for him or her to not take Data Structures and Algorithms, and instead choose say, two Graphics and two AI subjects.

Students with specific requirements may request that other subjects be substituted for those in the selection given above.

The total requirement for the Graduate Certificate will be 16 credit points.

ADMISSION REQUIREMENTS

Applicants with a recognised Bachelor's degree (or equivalent) will normally be deemed eligible for the course. Consideration will be given to applicants whose background does not fit the above requirement provided that a case can be made to establish that their aptitude, knowledge and practical experience is sufficient. Experience in the information technology industry will be especially important in this regard. Nonetheless, to achieve non-graduate entry, applicants may be asked to take an aptitude test or complete an approved bridging program.

FEES

The proposed fee for this course for 1994 is $3,600 subject to University approval.

Graduate Certificate in Human-Computer Interaction

Course code MC65

Coordinator: Mrs J Hammond

COURSE DESCRIPTION

This is a full-fee-paying course designed for professional upgrade. The course provides students with the required knowledge of human-computer interaction and the practical skills that are necessary to effectively achieve better usability in the software and systems design and development process. The course focuses on HCI principles and techniques for improving usability aspects of software and systems, and on operational issues associated with implementing HCI in organisations. The course is one year part-time which has a total of 18 credit points made up of three subjects, each worth six credit points. It will be studied for one evening per week in the first semester and two evenings per week in the second semester. In the second semester, the subject HCI Tools and Techniques will be studied for two evenings a week for six weeks, followed by the subject Implementation of HCI for two evenings for the following six weeks. This pattern is important and follows a natural sequence which culminates in the final subject of the Graduate Certificate. The subject Implementation of HCI integrates what has been studied in the subjects Fundamentals of HCI and HCI Tools and Techniques. It also requires students to complete a practical HCI project on a topic of interest to them.

COURSE STRUCTURE

The structure of the Graduate Certificate in Human-Computer Interaction is:

Autumn semester

31862 Fundamentals of Human-Computer Interaction (6cp)

Spring semester

31863 Human-Computer Interaction Tools and Techniques (6cp)

Spring semester

31864 Implementation of Human-Computer Interaction (6cp)

FEES

The fee for this course is $2,400 subject to University approval.

Graduate Certificate in Information Systems

Course code MC61

Coordinator: Mr C Richardson

COURSE DESCRIPTION

The course is intended for staff within companies who are specialising in a new direction. The course will provide students with a foundation in information systems. This foundation can be later consolidated via the Graduate Certificate in Advanced Information Technology. The course will consist of a coherent set of four subjects from the information systems field, and will be the equivalent of one year's part-time study. The course will be offered on a full-fee-paying basis which, it is expected, will typically be met by companies for selected employees. However, the course will be a general qualification, which is not intended to be restricted to the employees of any particular company.

LENGTH

The course will typically be completed over a period of one year, part-time. Nonetheless, depending on demand, the course or individual subjects may be offered in flexible attendance modes.

ATTENDANCE PATTERN

The course may be offered as part of normal programs, provided class space is available. Depending on demand, students may undertake formal studies involving attendance at intensive blocks of lectures with possible additional weekend attendance. The precise attendance pattern will be developed as part of the business plan for any given course offering.

COURSE STRUCTURE AND CURRICULUM

The total requirement for the Graduate Certificate in Information Systems will be 16 credit points. Students should select any four subjects, with the prerequisite requirements being met, from the following. Each subject attracts four credit points.

(D=Day, E=Evening)

Subject Number	Subject Name	Semester offered	Prerequisite
31071	Intro. to Information Systems	A94: E	Nil
	or		
31611	Information Systems	A94: D	Nil
31617	Accounting Fundamentals	A94: D&E	Nil
31621	Systems Analysis	A94: E S94: D	Nil Nil
31631	Database	A95: D S94/S95: E	31621 31621
31022	Comm. Program Development	S94/S95: E	31071 or 31611, COBOL
31641	Systems Design	A95: E S94/S95: D	31631 31631
31648	Business Tools and Applications	S94/S95: D&E	31631

Students should note the following:

A choice of either Information Systems or Introduction to Information Systems together with Systems Analysis are considered to be the basic subjects for a Graduate Certificate in Information Systems.

Database could be taken concurrently (corequisite) with Systems Design.

Business Tools and Applications could be taken concurrently (corequisite) with Database or Systems Design.

Depending on the choice of subjects, and the attendance pattern, it may take a minimum of three semesters to complete this Graduate Certificate.

Commercial Program Development can only be selected subject to the student being a competent programmer in COBOL.

Some previous experience in Information Systems may allow a selection of subjects without including Information Systems or Introduction to Information Systems.

Students with specific requirements may request that other subjects be substituted for those in the selection given above.

ADMISSION REQUIREMENTS

Applicants with a recognised Bachelor's degree (or equivalent) will normally be deemed eligible for the course. Consideration will be given to applicants whose background does not fit the above requirement provided that a case can be made to establish that their aptitude, knowledge and practical experience is sufficient. Experience in the information technology industry will be especially important in this regard. Nonetheless, to achieve non-graduate entry, applicants may be asked to take an aptitude test or complete an approved bridging program.

FEES

The proposed fee for this course for 1994 is $3,600 subject to University approval.

Graduate Certificate in Software Quality Assurance

Course code MC56

Coordinator: Mr B Wong

COURSE DESCRIPTION

This is a full-fee-paying course designed to provide a professional upgrade. It will provide students with the practical knowledge and skills that are necessary to effectively measure and control the quality of software products. The course focuses on the procedures and disciplines of a software quality system and the operational issues associated with implementing such a system in an organisation. Students who are members of the Australian Computer Society will be credited with PCP points on completion of the certificate.

LENGTH

The course will be one year part-time.

ATTENDANCE PATTERN

Students will undertake formal studies for two evenings per week in the first semester and one evening per week in the second.

PROJECTED ENROLMENT

Enrolment will be limited to 20 students for each offering.

RATIONALE AND AIMS

A primary objective of this course is to assist computing professionals to implement a software quality system that complies with Australian Standard AS3563.

On successful completion of this subject, students will be able to:-

1. understand the need for quality assurance of software products;
2. specify the role of the quality assurance function in software development and maintenance;
3. understand the nature of software quality and the problems of assessing the level and presence of software quality;
4. ensure adequate quality control of software development is achieved; and
5. produce and implement a quality assurance plan for software.

COURSE STRUCTURE AND CURRICULUM

The course will comprise formal studies for two evenings per week in the first semester and one evening per week in the second. The three subjects that comprise the formal studies are as follows :

31855	Software Quality Assurance Principles (4cp)
31856	Quality and Software Engineering (4cp)
31857	Software Quality Techniques (4cp)

Each subject carries four credit points, three semester hours. Thus the total course requirement is 12 credit points.

ADMISSION REQUIREMENTS

The course is intended for information technology professionals and applicants should have both:

1. a Bachelor's degree from UTS, or equivalent, preferably with a major computing component. Applicants whose degrees do not have a major computing component will be required to submit evidence to the effect that the extent of their formal knowledge of computing is equivalent to that of a graduate from the University's Bachelor of Science in Computing Science;

   and

2. an established professional career within the information technology industry. As a guide, the extent of the applicant's professional experience should be equivalent to that of an Associate Member of the Australian Computer Society of at least two years' standing.

Consideration will be given to applicants whose backgrounds do not fit these requirements, provided that a case can be made to establish that their computing knowledge and practical experience is equivalent to the above.

FEES

The fee for this course for 1994 is $2,100 subject to University approval.

Graduate Certificate in Applied Computing

Course code MC57
Coordinator: Ms E Lawrence

COURSE DESCRIPTION

The course will provide students with the practical skills and knowledge that are necessary to operate effectively at entry level in a computing environment.

On completion of the three subjects, graduates will have acquired sound knowledge of, and experience and skills in: Foundations of Computing and Programming; Systems Analysis and Design; and Database. Each of these subjects has a weighting of six credit points, four semester hours.

It is anticipated that graduates may wish to further their knowledge by attending follow-on Graduate Certificates offered by the School of Computing Sciences.

LENGTH

The course will be one year part-time, that is, four semester hours per week per six credit point subject, or the equivalent part-time attendance.

ATTENDANCE PATTERN

The course may be offered as part of the School's normal program at the Kuring-gai campus subject to availability of class places.

PROJECTED ENROLMENT

Enrolment will be limited to 20 students for each offering.

COURSE STRUCTURE AND CURRICULUM

The course may be offered as part of the School's normal program. The subjects to be taken are as follows:

31521 CIT 2 – Foundations of Computing and Programming (6cp)
31531 CIT 3 – Systems Analysis and Design (6cp)
31551 CIT 5 – Database (6cp)

ADMISSION REQUIREMENTS

The course is intended for non-computing professionals. Applicants should have, from a recognised University, a Bachelor's degree (or equivalent), with no major computing content. Consideration will be given to applicants whose background does not fit the above requirements, provided that a case can be made to establish that their knowledge and practical experience is equivalent to that which is implied by these requirements.

FEES

The fee for this course for 1994 is $1,800 subject to University approval.

Graduate Certificate in Programming Practice

Course code MC64
Coordinator: Ms E Lawrence

COURSE DESCRIPTION

The course will address modern business programming theory and practice and the commercial issues of data communications.

It has been designed as a follow-on from the Graduate Certificate in Applied Computing. Students will study Commercial Programming and Data Communications, both of which have a weighting of six credit points.

LENGTH

The course will be one year part-time, that is, six semester hours per week per six credit point subject, or the equivalent part-time attendance.

ATTENDANCE PATTERN

The course may be offered as part of the School's normal program at the Kuring-gai campus subject to availability of class places.

PROJECTED ENROLMENT

Enrolment will be limited to 20 students for each offering.

COURSE STRUCTURE AND CURRICULUM

The course may be offered as part of the School's normal program. The subjects to be taken are as follows:

31541 CIT 4 – Commercial Programming (6cp)
31561 CIT 6 – Data Communications (6cp)

ADMISSION REQUIREMENTS

The course is intended for non-computing professionals. Applicants should have, from a recognised university, a Bachelor's degree (or equivalent), with no major computing content. Consideration will be given to applicants whose background does not fit the above requirements, provided that a case can be made to establish that their knowledge and practical experience is equivalent to the above.

FEES

The fee for this course for 1994 is $1,200 subject to University approval.

NUMERICAL LISTING OF SUBJECTS (INCLUDING SEMESTER AND PREREQUISITE INFORMATION)

CORE SUBJECTS FOR BSc FROM 1989 ONWARDS

Explanatory notes
[1] Should be done before or concurrently.
[2] This subject must be done for 2 semesters.

Subject number	Subject name	Semester offered	1994 CP	HPW	Prerequisite
31611	Information Systems	A	4	4	Nil
31613	Computer Systems Architecture 1	A,S	4	3	Nil
31614	Programming Principles	A,S	5	7	Nil
31615	Discrete Mathematics	A	4	5	Nil
31617	Accounting Fundamentals	A	4	3	Nil
31621	Systems Analysis	A,S	4	3	31611
31622	Commercial Programming Development	A,S	4	5	31611 31614
31623	Computer Systems Architecture 2	A,S	4	5	31613,31614
31624	Data Structures and Algorithms	S	4	5	31614, 31615, 31625 [1]
31625	Software Engineering	S	4	3	31614, 31615
31626	Probability and Statistics	S	4	3	Nil
31631	Database	A,S	4	4	31621
31632	Communications and Networks	A	4	5	31611, 31613
31633	Operating Systems	A,S	4	5	31613
31636	Simulation and Modelling	A,S	4	4	31624, 31626
31641	Systems Design	A,S	4	4	31631
31642	On-line Systems	A,S	4	5	31622, 31632, 31641 [1]
31647	Management Control Systems	S	4	4	31617
31648	Business Tools and Applications	S	4	5	31631
31653	Communications Software	A,S	4	6	31632, 31633
31655	Theory of Computer Science	A	4	4.5	31624, 31625
31658	Project Management	A	4	4.5	31696–7 or 31698–9
31662	Information Systems Case Study	S	5	6	31641, 31642, 31658 [1], 31666 [1]
31666	Performance Evaluation	A,S	4	6	31636
31669	Social Implications of Computers	A,S	3	3	31696–7 or 31698–9
31696	Industrial Training F/T	A	0	6	31621, 31622, 31624, 31633, 51370
plus at least eight other core subjects from the BSc					
31697	Industrial Training F/T	A	0	6	31696
31698	Industrial Training P/T [2]	A,S	0	3	31621, 31622, 31624, 31633 51370,
plus at least eight other core subjects from the BSc					
31699	Industrial Training P/T [2]	A,S	0	3	31698
51370	Human Communication	A,S	3	2	Nil

UNDERGRADUATE ELECTIVES

Explanantory note
[1] Not offered in 1994.

Subject number	Subject name	Semester offered	CP	HPW	Prerequisite
31140	Introduction to Computer Graphics	A	4	3	31624
31163	Knowledge-based Systems	A	4	3	31624, 31625
31240	Topics in Computer Graphics	S	4	3	31140
31350	Project (2 sem)	A,S	8	6	31641
31351	Project (1 sem)	A,S	8	6	31641
31352	Project	A,S	4	3	31641
31654	Languages and Translators	S	4	3	31613, 31624
31738	Management Principles for IT Professionals	A	4	3	51370
31768	Business Planning for IT Professionals	S	4	3	51370
31777	Human-Computer Interaction	A,S	4	3	31641
31778	Resource Management for IT Professionals	A	4	3	51370
31788	Organisation Theory for IT Professionals	S	4	3	51370
31853	Office Automation	S	4	3	31621
31854	Distributed Databases	A	4	3	31631, 31632
31858	Object-oriented Analysis and Design	A	4	3	31625, 31631
31859	Computer Assisted System Development Environment	A	4	3	31631, 31641
31860	Object-oriented Programming and C++	S	4	3	31904
31875	Parallel Programming	A	4	3	31624, 31633
31876	Operating Systems Facilities	A	4	3	31624, 31633
31882	Advanced Theoretical Computer Science[1]		4	3	31655
31885	Advanced Mathematics	A	4	3	31615, 31626
31888	Logic Design[1]	A	4	3	31613
31889	Advanced Logic Design[1]	S	4	3	31888
31892	Logic Programming[1]	A	4	3	31624, 31625
31893	Comparative Programming Languages[1]	S	4	3	31624
31894	Project	A,S	4	3	31641
31895	Numerical Analysis [1]		4	3	31885
31896	LISP Programming	S	4	3	31624, 31625
31897	Computer Systems Architecture 3	A	4	3	31633
31898	Microprocessors and Applications[1]	S	4	3	31623, 31888
31899	Systems Architecture[1]		4	3	31897
31901	Artificial Intelligence Theory	S	4	3	31624, 31625
31902	Auditing the Computer	A,S	4	3	31617
31904	Systems Programming	A	4	3	31633
31916	Cognitive Modelling	A	4	2.5	Nil
31931	Software Quality Assurance	S	4	3	31621

BACHELOR OF INFORMATION TECHNOLOGY

Explanatory notes
[1] Should be done before or concurrently.
[2] Winter

Subject number	Subject name	Semester offered	CP	HPW	Prerequisite
25106	Economics	A	5	3	Nil
24105	Principles of Marketing	A	5	3	Nil
25301	Financial Management	S	5	3	23106
31611	Information Systems	A	4	4	Nil
31613	Computer Systems Architecture	A	4	3	Nil
31614	Programming Principles	A	5	7	Nil
31615	Discrete Mathematics	A	4	5	Nil
31617	Accounting Fundamentals	A	4	3	Nil
31621	Systems Analysis	A	4	3	31611 [1]
31626	Probability and Statistics	S	4	3	Nil
31631	Database	S	4	4	31611, 31621
31632	Communications and Networks	A	4	5	31611, 31613
31633	Operating Systems	A	4	5	31613
31641	Systems Design	S	4	4	31631
31642	On-line Systems	S	4	5	31722, 31632, 31641 [1]
31647	Management Control Systems	S	4	3	31617
31722	Commercial Programming	S	5	5	31611, 31614
31725	Software Engineering	S	4	6	31614, 31615
31738	Management Principles for IT Professionals	A	4	3	51370 or equivalent
31756	Project Management	A	5	3	31788
31762	Technology Planning	S	5	6	31642, 31781, 31766 [1]
31766	Performance Modelling and Management	S	4	6	31626, 31633
31768	Business Planning for IT Professionals	S	4	3	51370 or equivalent
31669	Social Implications of Computers	S	3	3	Nil
31770	Industry Project 1	S	5	14	Nil
31771	Business Requirements Analysis	S	5	3	31621
31779	Applications of Information Technology 1	S	5	3	31611
31780	Industry Studies[2]	W	4	6	31770
31781	Business Systems Design	A	5	3	31641, 31771
31788	Organisation Theory for IT Professionals	S	4	3	51370 or equivalent
31789	Applications of Information Technology 2	A	5	3	31779
31790	Industry Project 2	A	5	14	31770
31902	Auditing the Computer	S	4	3	31617

GRADUATE DIPLOMA IN DATA PROCESSING

Explanatory notes
[1] Should be done before or concurrently.

Subject number	Subject name	Semester offered	CP	HPW	Prerequisite
31022	Commercial Programming Development	S	4	3	31071, Pascal or C, COBOL
31025	Introduction to Software Engineering	S	4	3	31615
31071	Introduction to Information Systems	A	4	3	Nil
31073	Introduction to Computer Systems	A	4	3	Nil
31615	Discrete Mathematics	A,S	4	3	Pascal or C
31617	Accounting Fundamentals	A	4	3	Nil
31621	Systems Analysis	A,S	4	3	31071
31623	Computer Systems Architecture 2	A,S	4	3	31073
31624	Data Structures and Algorithms	S	4	3	Pascal or C, 31025 [1]
31626	Probability and Statistics	S	4	3	Nil
31631	Database	A,S	4	3	31621
31632	Communications and Networks	A	4	3	31071, 31073
31633	Operating Systems	A,S	4	3	31071, 31073
31641	Systems Design	A,S	4	3	31631
31642	On-line Systems	A,S	4	3	31022, 31632, 31641 [1]
31647	Management Control Systems	S	4	3	31617
31648	Business Tools and Applications	S	4	3	31631
31653	Communications Software	A,S	4	3	31632, 31633
31658	Project Management	A	4	3	Nil

MASTER OF SCIENCE IN COMPUTING

Subject number	Subject name	Semester offered	CP	HPW	Prerequisite
32106	Object-oriented Software Development	A95	6	3	
32107	Formal Reasoning for Software Development	S95	6	3	
32108	Specialist Topics in Artificial Intelligence	S94	6	3	
32204	Advanced Data Management	A94	6	3	
32205	Computer Communication Systems	S94	6	3	
32206	Advanced Information Systems Modelling	S95	6	3	
32207	Information Management	A95	6	3	
32208	Information Processing Strategy	S95	6	3	32207
32306	Capacity Management	A94	6	3	
32307	Operating Systems	S94	6	3	
32308	Computer Architecture	S95	6	3	
32402	Information Technology Environment	S94	6	3	
32501	Computer Graphics		6	3	
32502	Advanced Computer Graphics Techniques		6	3	
32503	Distributed Databases and Client/Server Computing		6	3	
32504	Tool-based Systems Development		6	3	
32505	Advanced Object-oriented Analysis and Design		6	3	

32506	Knowledge Systems		6	3
32507	Performance Evaluation	A94	6	3
32901	Recent Advances in Computer Science		6	3
32902	Recent Advances in Information Systems	A94	6	3
32912	Project		12	by arrangement
32924	Project		24	by arrangement

MASTER OF BUSINESS IN INFORMATION TECHNOLOGY MANAGEMENT

Subject number	Subject name	Semester offered	CP	HPW	Prerequisite
21708	Strategic Business Management		6	3	Graduate Certificate in Information Technology Management, 21806, 24704
21751	Management Research Methods		6	3	Graduate Certificate in Information Technology Management
21789	Contemporary Management Practices		6	3	
21788	Effective People Management	A	6	3	
21806	Managing Organisational Change		6	3	
21807	Total Quality and Productivity Management		6	3	
21809	Managerial Analysis and Evaluation of Information Systems		6	3	
24704	Managing Client Relations		6	3	
32601	Advanced Project Management	A	6	3	
32602	Impact of Information Technology	S	6	3	
32603	Software Quality Management	S	6	3	
32604	Systems Integration	S	6	3	
32701	Advances in Information Technology	S	6	3	
32702	Contemporary Telecommunications	S	6	3	
32703	Information Technology Strategy[1]	S	6	3	
32818	Project		18	Nil	Graduate Diploma in Information Technology Management

[1] Name and number are subject to approval by the Faculty Board

ALPHABETICAL LISTING OF SUBJECTS

UNDERGRADUATE COMPUTING SUBJECTS

Explanatory notes
[1] Serviced by other faculties
[2] BInfTech only
[3] Grad Dip DP only
[4] Elective subject for BSc
[5] Not offered 1994
[6] Graduate Certificate only
[7] Not to be taken with 21130 Organisational Behaviour
[8] Not to be taken with 21221 Organisation Design and Change
[9] BSc only.

Subject name	Subject number
Accounting Fundamentals	31617
Advanced Logic Design [4,5]	31889
Advanced Mathematics [6]	31885
Advanced Theoretical Computer Science [4,5]	31882
Applications of Information Technology 1 [2]	31779
Applications of Information Technology 2 [2]	31789
Artificial Intelligence Theory [4]	31901
Auditing the Computer [4]	31902
Business Planning for IT Professionals [4]	31768
Business Requirements Analysis [2]	31771
Business Systems Design [2]	31781
Business Tools and Applications	31648
Cognitive Modelling [4]	31916
Commercial Program Development [3]	31022
Commercial Programming [2]	31722
Commercial Programming Development	31622
Communications and Networks	31632
Communications Software	31653
Comparative Programming Languages [4,5]	31893
Computer Assisted System Development Environment [4]	31859
CIT 2 – Foundations of Computing and Programming [6]	31521
CIT 3 – Systems Analysis and Design [6]	31531
CIT 4 – Commercial Programming [6]	31541
CIT 5 – Database [6]	31551
CIT 6 – Data Communications [6]	31561
Computer Systems Architecture 1	31613
Computer Systems Architecture 2	31623
Computer Systems Architecture 3 [4]	31897
Data Structures and Algorithms	31624
Database	31631
Discrete Mathematics	31615
Distributed Databases [4]	31854
Economics [1]	25106
Fundamentals of Human-Computer Interaction [6]	31862
Human Communication [1]	51370
Human-Computer Interaction [4]	31777
Human-Computer Interaction Tools and Techniques [6]	31863
Implementation of Human-Computer Interaction [6]	31864
Industrial Training F/T [9]	31696
Industrial Training F/T [9]	31697
Industrial Training P/T [9]	31698
Industrial Training P/T [9]	31699
Industry Project 1 [2]	31770
Industry Project 2[2]	31790
Industry Studies [2]	31780
Information Systems	31611
Information Systems Case Study	31662
Introduction to Computer Graphics [4]	31140
Introduction to Computer Systems [3]	31073
Introduction to Information Systems [3]	31071
Introduction to Software Engineering [3]	31025
Knowledge-based Systems [4]	31163
Languages and Translators[4]	31654
LISP Programming [4]	31896
Logic Design [4,5]	31888
Logic Programming [4,5]	31892
Management Control Systems	31647
Management Principles for IT Professionals [7]	31738
Microprocessors and Applications [4,5]	31898
Numerical Analysis [4,5]	31895
Object-oriented Analysis and Design [4]	31858
Object-oriented Programming and C++ [4]	31860
Office Automation [4]	31853
On-line Systems	31642
Operating Systems	31633
Operating Systems Facilities	31876
Organisation Theory for IT Professionals [8]	31788
Parallel Programming [4]	31875
Performance Evaluation	31666
Performance Modelling and Management [2]	31766
Principles of Marketing[1,2]	24105
Probability and Statistics	31626

Programming Principles	31614
Project (1 sem) 8cp [4]	31351
Project (2 sem) 8cp [4]	31350
Project 4cp [4]	31352
Project 4cp [4]	31894
Project Management	31658
Project Management [2]	31756
Quality and Software Engineering [6]	31856
Resource Management for IT Professionals [4]	31778
Simulation and Modelling	31636
Social Implications of Computers	31669
Software Engineering	31625
Software Engineering	31725
Software Quality Assurance [4]	31931
Software Quality Assurance Principles [6]	31855
Software Quality Techniques [6]	31857
Systems Analysis	31621
Systems Architecture [4]	31899
Systems Design	31641
Systems Programming [4]	31904
Technology Planning [2]	31762
Theory of Computer Science	31655
Topics in Computer Graphics [4]	31240

POSTGRADUATE COMPUTING SUBJECTS

Advanced Computer Graphics Techniques	32502
Advanced Data Management	32204
Advanced Information Systems Modelling	32206
Advanced Object-oriented Analysis and Design	32505
Advanced Project Management	32601
Advances in Information Technology	32701
Capacity Management	32306
Computer Architecture	32308
Computer Communication Systems	32205
Computer Graphics	32501
Contemporary Management Practices	21789
Contemporary Telecommunications	32702
Distributed Databases and Client/Server Computing	32503
Effective People Management	21788
Financial Management	25301
Formal Reasoning for Software Development	32107
Impact of Information Technology	32602
Information Management	32207
Information Processing Strategy	32208
Information Technology Strategy	32703
Information Technology Environment	32402
Knowledge Systems	32506
Legal Environment of Business	79729
Management Research Methods	21751
Managerial Analysis and Evaluation of Information Systems	21809
Managing Client Relations	24704
Managing Organisational Change	21806
Object-orientated Software Development	32106
Organisation Analysis and Design	21718
Operating Systems	32307
Performance Evaluation	32507
Project	32912
Project	32924
Project	32818
Recent Advances in Computer Science	32901
Recent Advances in Information Systems	32902
Software Quality Management	32603
Specialist Topics in Artifical Intelligence	32108
Strategic Business Management	21708
Systems Integration	32604
Tool-based Systems Development	32504
Total Quality and Productivity Management	21807

SUBJECT DESCRIPTIONS

Guide to subject descriptions

The subject descriptions shown below indicate the subject number and name, the number of credit points for the subject (eg, 3cp), the duration of the subject, indicated as semester weeks, if applicable, and the number of formal contact hours each week (eg, 4hpw); for some subjects, there may also be practical components off-campus, and this is indicated in the text. Also shown are the prerequisites or corequisites if any, the method of assessment and name of the subject coordinator, if known, and a brief outline of the content.

Prerequisites are subjects which must be completed before taking the subject to which they refer. Corequisites may be completed before or be taken concurrently with the subject to which they refer.

31022 COMMERCIAL PROGRAM DEVELOPMENT

(4cp); 3 hpw
prerequisites 31071 Introduction to Information Systems, COBOL
coordinator Mr R Raban

Structured design techniques and their application to COBOL programming in an off line commercial environment. Advanced program design techniques are presented to give the student a knowledge of how to address a wide range of programming tasks.

31025 INTRODUCTION TO SOFTWARE ENGINEERING

(4cp); 3 hpw
prerequisite 31615 Discrete Mathematics
coordinator Dr J Potter

An introduction to the formal aspects of modern software engineering. Topics: an overview of the software engineering environment, the practice of formal mathematical specification, program development via refinement of specifications, programs correctness, machine executable specifications, an overview of software testing and reliability.

31071 INTRODUCTION TO INFORMATION SYSTEMS

(4cp); 3 hpw
coordinator Mrs J Hammond

A foundation for understanding information systems and their applications to common computer-based practices and procedures used in organisations today. Elementary system models, typical business systems development life cycles and applications, and a range of techniques and resources used to develop and design information systems are examined.

31073 INTRODUCTION TO COMPUTER SYSTEMS

(4cp); 3 hpw
coordinator Mr J Tu

Provides students with a model of computer hardware they will be able to use as a basis for understanding the actual computer platform for the software they will study and develop in the remainder of the course.

31140 INTRODUCTION TO COMPUTER GRAPHICS

(4cp); 3 hpw
prerequisite 31624 Data Structures and Algorithms
coordinator Dr K Suffern

Provides a thorough introduction to the computer representation, manipulation and display of pictorial information. Topics covered include passive and interactive graphics hardware devices and programming; mathematical tools for two and three dimensional graphics; two and three dimensional graphics, algorithms; graphics standards; human-computer interaction, graphical design; application areas of computer graphics.

31163 KNOWLEDGE-BASED SYSTEMS

(4cp); 3 hpw
prerequisites 31624 Data Structures and Algorithms, 31625 Software Engineering
coordinator Dr S Prabhakar

An introduction to recent developments in artificial intelligence, based on the representation and manipulation of knowledge. The student will obtain an understanding of the principles of expert systems together with some experience constructing small knowledge-based systems with the aid of current development tools. Topics: representation of knowledge; plausible reasoning; knowledge acquisition; development methodologies; evaluation of current tools.

31240 TOPICS IN COMPUTER GRAPHICS

(4cp); 3 hpw
prerequisite 31140 Introduction to Computer Graphics
coordinator Dr K Suffern

For students who have passed 31140, this subject provides a study of several additional computer graphics topics, with an emphasis on image synthesis techniques. Topics covered include fractals, illumination models, ray tracing, textures, antialiasing, halftoning and ordered dither, hidden line and surface removal algorithms, computer animation and radiosity.

31350 PROJECT (2 SEM)

(8cp); 6 hpw
prerequisite 31641 Systems Design
coordinator Mr P Bebbington

31351 PROJECT (1 SEM)

(8cp); 6 hpw
prerequisite 31641 Systems Design
coordinator Mr P Bebbington

31352 PROJECT

(4cp); 3 hpw
prerequisite 31641 Systems Design
coordinator Mr P Bebbington

A project is intended to give a student experience in working independently, and responsibility for scientific research or the development of a small system from initial analysis to user documentation. Projects may be drawn from any area of computer science or information systems. Each project is supervised by a member of academic staff.

31521 CIT 2 – FOUNDATIONS OF COMPUTING AND PROGRAMMING

(6cp); 4 hpw
coordinator Mr L Smith

Provides an understanding of the basic concepts of hardware design, data storage and transmission, and introduces third generation language programming in file processing and report production applications.

31531 CIT 3 – SYSTEMS ANALYSIS AND DESIGN

(6cp); 4 hpw
coordinator Mr L Smith

Concerned with the systems development life cycle, and the tools and techniques used in the analysis of systems requirements and the determination of alternate implementation strategies.

31541 CIT 4 – COMMERCIAL PROGRAMMING

(6cp); 6 hpw
prerequisite Graduate Certificate in Applied Computing
coordinator Mr L Smith

COBOL language syntax and structures. Report layout principles. Indexed file concepts, design and implementation of a simple on-line enquiry/update package.

31551 CIT 5 – DATABASE

(6cp); 4 hpw
prerequisite 31531 CIT 3 – Systems Analysis and Design
coordinator Mrs E Lawrence

Introduces database models and the principles of database design and management. Practical experience is given in designing and implementing a database using commercial packages such as Oracle.

31561 CIT 6 – DATA COMMUNICATIONS

(6cp); 4 hpw
prerequisite Graduate Certificate in Applied Computing
coordinator Ms D Jinks

Information coding and signal transmission codes. Voice and digital communications. Communications software. Data communications services. Network configurations. Local area networks. Network design and planning. Network management.

31611 INFORMATION SYSTEMS

(4cp); 4 hpw
coordinator Mr J Underwood

An introduction to the idea of an information system and its importance in modern organisations. An information system is defined as a system which processes data to produce information for people. We introduce techniques for analysing user requirements and for structuring data so that they

may be used more effectively and efficiently. Systems development life cycles and prototyping are discussed and the later stages of system design are outlined. Examples from typical information systems are used to illustrate the concepts.

31613 COMPUTER SYSTEMS ARCHITECTURE 1

(4cp); 3 hpw
coordinator Mr J Tu

Provides students with a model of computer hardware they will be able to use as a basis for understanding the actual computer platform for the software they will study and develop in the remainder of the course.

31614 PROGRAMMING PRINCIPLES

(5cp); 7 hpw
coordinator Dr K Suffern

An introduction to problem analysis and solution on the computer. Students gain experience at using the UNIX operating system and developing programs with the two major software development methodologies. The principles of object-oriented design and programming are introduced using the language EIFFEL; the principles of top-down structured design and programming are introduced using the language Pascal. Methods of pseudo-coding, coding, debugging, testing, and documentation are discussed.

31615 DISCRETE MATHEMATICS

(4cp); 5 hpw
coordinator Dr T Osborn

Develops the mathematics of discrete objects and models. Logic: propositions, truth tables, predicate logic, proof techniques. Set theory: sets, relations, relational algebra, functions, iteration, recursive definitions and inductive proof, partial orders and equivalence relations. Discrete structures: natural numbers, lists, trees. Functional programming (Miranda) is used to illustrate the mathematical concepts introduced.

31617 ACCOUNTING FUNDAMENTALS

(4cp); 3 hpw
coordinator Mr B Wong

A general introduction to financial accounting and business law. Accounting related applications are the backbone of many commercial computing systems, and an understanding of business law facilitates the study of business methods. Students will also develop an awareness of computers in the accounting discipline – looking at how computers are used, how systems have been designed, and examples of accounting systems.

31621 SYSTEMS ANALYSIS

(4cp); 3 hpw
prerequisite 31611 Information Systems
coordinator Mr J El-Den

Introduces systems concepts and a range of techniques used in systems analysis. Covers the techniques used to analyse all discrete systems data functions and flows inclusive of data flow diagrams, relational analysis and normalisation and E-R modelling. Describes systems life cycles and the role of these techniques within life cycles in evaluating requirements and proposals and setting objectives for new systems.

31622 COMMERCIAL PROGRAMMING DEVELOPMENT

(4cp); 5 hpw
prerequisites 31611 Information Systems, 31614 Programming Principles
coordinator Miss J Robb

Structured design techniques and their application to COBOL programming in an off-line commercial environment.

31623 COMPUTER SYSTEMS ARCHITECTURE 2

(4cp); 5 hpw
prerequisites 31613 Computer Systems Architecture I, 31614 Programming Principles
coordinator Mr C W Johnson

A continuation of Computer Systems Architecture 1. The concepts introduced there are elaborated upon, and study of CPU internals is facilitated by use of assembler language on a real machine. Additional requirements of architectures for performance enhancement and support of high-level languages and operating systems are discussed.

31624 DATA STRUCTURES AND ALGORITHMS

(4cp); 5 hpw
prerequisites 31614 Programming Principles, 31615 Discrete Mathematics
corequisite 31625 Software Engineering
coordinator Dr R Rist

Structured approach to software development: modular design, step-wise refinement, top down design, documentation and

layout, complexity analysis, program correctness and program testing strategies. The data structures covered include sets, files and dynamic data structures: stacks, queues, lists and binary trees. Each data structure is presented as an abstract data type, and then discussed at the implementation and application levels. Hashing and common searching and sorting algorithms are also discussed.

31625 SOFTWARE ENGINEERING

(4cp); 3 hpw
prerequisites 31614 Programming Principles, 31615 Discrete Mathematics
coordinator Dr J Potter

Introduces the formal aspects of modern software engineering. Topics: an overview of the software engineering environment, the practice of formal mathematical specification, program development via refinement of specifications, program correctness, machine executable specifications, an overview of software testing and reliability.

31626 PROBABILITY AND STATISTICS

(4cp); 3 hpw
coordinator Dr T Osborn

Descriptive statistics. Probability theory, random variables, conditional probabilities, independence and Bayes' theorem, and modelling of uncertainty, measures of central tendency and dispersion, moments. Processes and distributions: binomial, Poisson, normal and sampling. Theorems: Chebychev, central limit. Applied statistics: estimation, confidence intervals, hypothesis testing and types of errors; problem solving by theory, statistical tables and machine packages.

31631 DATABASE

(4cp); 4 hpw
prerequisite 31621 Systems Analysis
coordinator Dr G Feuerlicht

Database design and implementation methodologies. Both entity-relationship and relational models are described and used to facilitate database design. The SQL language is described in detail illustrating database query and update techniques. Traditional database approaches including codasyl and hierarchical databases are described.

31632 COMMUNICATIONS AND NETWORKS

(4cp); 5 hpw
prerequisites 31611 Information Systems, 31613 Computer Systems Architecture I
coordinator Ms D Jinks

Introduces communication concepts and terminology, and describes the problems involved in the physical and data link layers of communication and their solutions. The subject discusses network architectures, topologies and carrier services.

31633 OPERATING SYSTEMS

(4cp); 5 hpw
prerequisite 31613 Computer Systems Architecture I
coordinator Mr U Szewcow

An introduction to the concepts and facilities available in computer operating systems. The subject includes scheduling, multiprogramming, protection and resource control.

31636 SIMULATION AND MODELLING

(4cp); 4 hpw
prerequisites 31624 Data Structures and Algorithms, 31626 Probability and Statistics
coordinator Dr T Osborn

Principles and practice of modelling: analysis, data gathering, solution, validation, implementation. Modelling in and of computer systems, queueing theory, continuous simulation, languages, corporate modelling, and inventory.

31641 SYSTEMS DESIGN

(4cp); 4 hpw
prerequisite 31631 Database
coordinator Mr R Raban

Focuses on the user and business aspects of systems design. User interface issues cover dialogue, screen, report and forms design as well as designing and writing user documentation. Integration with business environment includes business procedures, security, control and implementation. A variety of design and implementation strategies are introduced, such as prototyping, CASE tools and 4GLs.

31642 ON-LINE SYSTEMS

(4cp); 4 hpw
prerequisites 31622 Commercial Programming Development, 31632 Communications and Networks;
corequisite 31641 Systems Design
coordinator Mr C Richardson

Aspects of systems development that are specific to on-line application systems. Real time and distributed systems are also covered with respect to their impact on the development of application systems. Practical work involves developing a series of programs in an on-line transaction processing environment. A research report is also included in the assessment for the subject.

31647 MANAGEMENT CONTROL SYSTEMS

(4cp); 4 hpw
prerequisite 31617 Accounting Fundamentals
coordinator Mr P Bebbington

The principles and techniques of cost accounting, budgeting and financial planning and their use in computer-based accounting and business decision-making systems.

31648 BUSINESS TOOLS AND APPLICATIONS

(4cp); 5 hpw
prerequisite 31631 Database
coordinator Mr B Wong

Gives students familiarity with microcomputers in the office and business environment and as stand alone machines or workstations. The use of database and file management programs and the physical operation of microcomputers are discussed. Students will become familiar with specific packages such as business databases, spreadsheets and program development aids.

31653 COMMUNICATIONS SOFTWARE

(4cp); 6 hpw
prerequisites 31632 Communications and Networks, 31633 Operating Systems
coordinator Mr S Jha

Discusses the higher layer problems of communications systems using as a reference model the ISO definitions of OSI (Open Systems Interconnection) seven-layer protocols. Major emphasis is placed on presentation and application layer issues.

31654 LANGUAGES AND TRANSLATORS

(4cp); 3 hpw
prerequisites 31613 Computer Systems Architecture I, 31624 Data Structures and Algorithms
coordinator Mr J Colville

Translation and execution of expressions and statements. Syntactic analysis and parsing. Attribute grammars. Compile-time type checking. Syntax and table-driven compilers. Compiler-compilers. Code generation, error diagnostics and error correction of code. Code optimisation. Memory allocation during compilation and execution.

31655 THEORY OF COMPUTER SCIENCE

(4cp); 4.5 hpw
prerequisites 31624 Data Structures and Algorithms, 31625 Software Engineering
coordinator Dr B Jay

Topics from the theory of machines, the theory of languages – syntax and semantics, the theory of processes, the theory of data, the complexity of problems. Applications of the theory particularly in the area of language translation and compiler writing.

31658 PROJECT MANAGEMENT

(4cp); 4.5 hpw
prerequisite 31696–7 or 31698–9 Industrial Training
coordinator Mr D Wilson

Provides students with the practical knowledge and skills that are necessary to effectively manage project teams and software development projects. The major topics are: planning a software project, software time and cost estimation, controlling a software project, development aids and alternatives, leadership and people management. In summary, this subject will provide an essential understanding of project management issues and identify the knowledge required of a project manager in the IT industry.

31662 INFORMATION SYSTEMS CASE STUDY

(5cp); 6 hpw
prerequisites 31641 Systems Design, 31642 On-line Systems; corequisites 31658 Project Management, 31666 Performance Evaluation
coordinator Mr J Underwood

This case study deals with the issues involved in strategic level analysis and design in a corporate wide information systems environment. It reinforces material previously studied while giving groups of students scope to use their own judgment in applying their knowledge. It stresses the development and assessment of alternative approaches to a system strategy. Senior management communication skills are also developed.

31666 PERFORMANCE EVALUATION

(4cp); 6 hpw
prerequisite for BSc 31636 Simulation and Modelling; for GradCert 31633 Operating Systems
coordinator Dr B Howarth

Reviews considerations involved in configuring, selecting or upgrading a computer system in the most cost-effective way. Operating systems and other software factors affecting computer performance are also studied. Measurement and modelling techniques are emphasised.

31669 SOCIAL IMPLICATIONS OF COMPUTERS

(3cp); 3 hpw
prerequisite 31696–7 or 31698–9 Industrial Training
coordinator Dr R Rist

Aims at identifying areas of society where the use of computer technology is of concern, and to apply an understanding of the social issues to the actual work situation. Topics include: history of computing (social and economic factors), effects on workforce, professionalism and ethics, social responsibility of computer practitioners, privacy, the DP workforce. These areas are discussed in the context of contemporary issues.

31696 INDUSTRIAL TRAINING F/T

(0cp); 6 hpw
prerequisites 31621 Systems Analysis, 31622 Commercial Programming Development, 31624 Data Structures and Algorithms, 31633 Operating Systems, 51370 Human Communication plus at least eight other core subjects from the BSc program
coordinator Associate Professor M Fry

31697 INDUSTRIAL TRAINING F/T

(0cp), 6hpw
prerequisites 31696 Industrial Training (F/T first semester)
coordinator Associate Professor M Fry

The first and second semesters of Industrial Training are a compulsory requirement for the course. All full-time students must enrol in these subjects and obtain a minimum of nine months' of full-time employment. Students must normally have completed the equivalent of at least four full-time semesters before obtaining employment.

31698 INDUSTRIAL TRAINING P/T

(0cp); 3 hpw
prerequisites 31621 Systems Analysis, 31622 Commercial Programming Development, 31624 Data Structures and Algorithms, 31633 Operating Systems, 51370 Human Communication plus at least eight other core subjects from the BSc program
coordinator Associate Professor M Fry

31699 INDUSTRIAL TRAINING P/T

(0cp); 3 hpw
prerequisite 31698 Industrial Training (P/T first semester)
coordinator Associate Professor M Fry

The first and second years Industrial Training are a compulsory requirement for the course, normally taken for a total of four semesters in Stages 5 and 6. All part-time students must enrol in these subjects and obtain a minimum of 18 months of full-time employment.

31722 COMMERCIAL PROGRAMMING

(5cp); 5 hpw
prerequisites 31611 Information Systems, 31614 Programming Principles
coordinator Mr C Richardson

Commercial structured design techniques and commercial programming in either a batch or on-line environment. Students will

be taught the design technique and language of the particular industry organisation using approved assignment work.

31725 SOFTWARE ENGINEERING

(4cp); 6 hpw
prerequisites 31614 Programming Principles, 31615 Discrete Mathematics
coordinator Dr J Potter

Introduces the formal aspects of modern software engineering. Topics: an overview of the software engineering environment, the practice of formal mathematical specification, program development via refinement of specifications, program correctness, machine executable specifications, an overview of software testing and reliability.

31738 MANAGEMENT PRINCIPLES FOR IT PROFESSIONALS

(4cp); 3 hpw
prerequisite 51370 Human Communication or equivalent
coordinator Mr J Clark

The environment of business organisations and the challenges facing large and small business. Management theory, evolution and schools of thought. Management principles, style, decision making, mechanistic and organic systems. Personnel management, planning, job analysis and design, selection and training, career planning, appraisal and counselling, compensation and incentives. Operations management.

31756 PROJECT MANAGEMENT

(5cp); 3 hpw
prerequisite 31788 Organisation Theory for IT Professionals
coordinator Mr D Wilson

Provides students with the practical knowledge and skills that are necessary to effectively manage project teams and software development projects. The major topics are: planning a software project, software time and cost estimation, controlling a software project, development aids and alternatives, leadership and people management. This subject will provide an essential understanding of project management issues and identify the knowledge required of a project manager in the IT industry.

31762 TECHNOLOGY PLANNING

(5cp); 6 hpw
prerequisites 31642 On-line Systems, 31781 Business Systems Design; corequisite 31766 Performance Modelling and Management
coordinator Mr J Underwood

This case study deals with the issues involved in strategic level analysis and design in a corporate wide information systems environment. It reinforces material previously studied while giving groups of students scope to use their own judgment in applying their knowledge. It stresses the development and assessment of alternative approaches to a system strategy. Communication skills with senior management are developed.

31766 PERFORMANCE MODELLING AND MANAGEMENT

(4cp); 6 hpw
prerequisites 31626 Probability and Statistics, 31633 Operating Systems
coordinator Dr B Howarth

Understanding the basic techniques of system performance modelling and the application of systems modelling techniques to the assessment of present and future required system capacity; basic principles of capacity management and its importance to IS management and senior management. Simple queueing theory and operational analysis modelling techniques; systems performance analysis – measurement and models; modelling and analysis of on-line systems; workload characterisation; workload forecasting; relations between capacity planning, IS management, corporate planning and corporate management.

31768 BUSINESS PLANNING FOR IT PROFESSIONALS

(4cp); 3 hpw
prerequisite 51370 Human Communication or equivalent
coordinator Mr J Underwood

Provides students with an awareness of the problems in developing corporate strategies, in general, and information technology strategies, in particular; also, develops skills in the selection and use of appropriate techniques. Major topics are: business planning/strategic planning, analysing business priorities and objectives, long-term planning, models, tools and techniques; information technology planning, major

tools and techniques and the changing role of the information systems manager; corporate needs for information technology.

31770 INDUSTRY PROJECT 1

(5cp); 14 hpw
coordinator Mr B Wong

Provides students with an understanding of the function of the Information Systems Department in an organisation and also of at least one user business function serviced by IS. Understanding is via a number of strategies such as interviewing, observation and work experience. Students will be taught human communication skills in conjunction with the project work, with special emphasis on oral and written communication. Training will also be provided in a variety of development tools used in the information systems development process in order to build up a defined skills profile in conjunction with the subject Industry Project 2.

31771 BUSINESS REQUIREMENTS ANALYSIS

(5cp); 3 hpw
prerequisite 31621 Systems Analysis
coordinator Mr J Clark

Applications of systems analysis (data flow diagrams, relational modelling, etc) in a business setting; the roles of the business analyst and the systems analyst; systems research and requirements analysis (interviewing, document analysis, etc) for data processing, management information systems, etc; top-down enterprise-wide perspective; evolution of the business environment; business, product and other life cycles. Industry case studies.

31777 HUMAN-COMPUTER INTERACTION

(4cp); 3 hpw
prerequisite 31641 Systems Design
coordinator Mrs J Hammond

Focuses on human factors and management aspects of user-centred systems development and design. It provides students with HCI principles, concepts, tools and techniques needed to build user-centred systems, particularly in terms of the design of interfaces that satisfy user needs and create usable products that support user tasks and goals. Major topics include: role and scope of HCI, methodologies such as requirements analysis, task analysis and usability testing, usability evaluation, user-centred design support and user interface management systems.

31778 RESOURCE MANAGEMENT FOR IT PROFESSIONALS

(4cp); 3 hpw
prerequisite 51370 Human Communication
coordinator Mr P Bebbington

Aims to instil the knowledge and skills required for effective management of hardware and software resources within an information system organisation. The major topics: resource acquisition, developing software, workplace environment, hardware and software security, operations management, EDP accounting.

31779 APPLICATIONS OF INFORMATION TECHNOLOGY 1

(5cp); 3 hpw
prerequisite 31611 Information Systems
coordinator Mr C S Johnson

Formal and practical exposure to, and understanding of, a variety of specific applications of information technology, such as management information systems, database, decision support systems, process control, graphics, etc. Subject material will complement that of 31789 Applications of Information Technology 2 to ensure a common level of experience for all students.

31780 INDUSTRY STUDIES

(5cp); 4 hpw
prerequisite 31770 Industry Project 1
coordinator Mr B Wong

Students undertake surveys of industry sponsors of the BInfTech program investigating contemporary topics in the field of information systems. Students may also be required to undertake other formal activities to complement the industry objectives of the BInfTech program.

31781 BUSINESS SYSTEMS DESIGN

(5cp); 3 hpw
prerequisites 31641 Systems Design, 31771 Business Requirements Analysis
coordinator Mr J Underwood

Understanding systems design in a business setting; performance and quality criteria; alternative implementation strategies; approaches to systems construction and estimation (including package evaluation and prototyping); implementation issues; productivity issues; methods engineering;

information technology in business; industry and product differences. Case studies.

31788 ORGANISATION THEORY FOR IT PROFESSIONALS

(4cp); 3 hpw
prerequisite 51370 Human Communication or equivalent
coordinator Mr J Underwood

This subject examines the structural and sociological aspects of organisations. Topics include: the nature of organisation theory; organisation effectiveness; structure and technology; structure and environment; typical organisation structures; organisations as social systems; work groups and job design; organisational learning; cultures and organisations; information technology in organisations.

31789 APPLICATIONS OF INFORMATION TECHNOLOGY 2

(5cp); 3 hpw
prerequisite 31779 Applications of Information Technology 1
coordinator Mr C S Johnson

Formal and practical exposure to and understanding of a variety of specific applications of information technology, such as management information systems, database, decision support systems, process control graphics, etc. Subject material will complement that of 31779 Applications of Information Technology 1 to ensure a common level of experience for all students.

31790 INDUSTRY PROJECT 2

(5cp); 14 hpw
prerequisite 31770 Industry Project 1
coordinator Mr B Wong

Students gain practical 'hands on' experience of the role of members of an information systems development team in relation to business organisational goals and objectives; students are incorporated as members of a project team in a sponsoring company. Training will also be provided in a variety of development tools in order to build up a defined skills profile in conjunction with the subject 31770 Industry Project 1.

31853 OFFICE AUTOMATION

(4cp); 3 hpw
prerequisite 31621 Systems Analysis
coordinator Mr C S Johnson

Covers the advanced concepts of office automation and the impact on the organisational structure. Analysis of the social issues of the implementation of office automation systems into the corporate structure and the current information systems. The management of office automation systems is discussed. Current research issues in office automation are presented by the researchers. Practical exposure is given in the requirements stage of office automation.

31854 DISTRIBUTED DATABASES

(4cp); 3 hpw
prerequisites 31631 Database, 31632 Communications and Networks
coordinator Dr G Feuerlicht

Addresses both the theoretical and practical issues associated with design and implementation of distributed database and client/server systems. Relational database concepts will form the basis for the theoretical material presented in this course. The object-oriented approach to distributed computing is also briefly covered. The material presented in lectures will be supported by practical assignment work using a commercially available distributed database management system.

31855 SOFTWARE QUALITY ASSURANCE PRINCIPLES

(4cp); 3 hpw
coordinator Mr D Wilson

Provides students with the practical knowledge and skills in the definition of quality for software products, quality characteristics and their relationships, setting measurable and testable quality attributes, the importance of being able to measure quality, different approaches to quality metrics, methods of defining suitable metrics, examples of typical metrics and the relationship between the QA Function, Software Developers and Management. The major topics are : Total Quality Management, principles of software quality, software metrics and estimation. This is one of three subjects that comprise a full-fee-paying course which is designed for professional upgrade and which leads to the award of a Graduate Certificate.

31856 QUALITY AND SOFTWARE ENGINEERING

(4cp); 3 hpw
prerequisite 31855 Software Quality Assurance Principles
coordinator Mr B Wong

The subject looks at the role of engineering methods and tools in the software development process, advantages and disadvantages of different approaches, contribution of engineering disciplines to the achievement of quality. This is one of three subjects that comprise a full-fee-paying course which is designed for professional upgrade leading to the award of a Graduate Certificate.

31857 SOFTWARE QUALITY TECHNIQUES

(4cp); 3 hpw
prerequisite 31855 Software Quality Assurance Principles
coordinator Mr D Wilson

Provides students with the practical knowledge and skills in Verification, Validation and Test (VV&T) methods and techniques, VV&T tools, relation of VV&T to all phases of the software development life cycle, the processes of VV&T appropriate to each of the life-cycle phases, characteristics and documentation of SQA plans, quality standards, configuration management, quality audit and the effectiveness and cost of SQA. The major topics are: verification, validation and test, configuration management, software quality plans and standards, implementing SQA. This is one of three subjects that comprise a full-fee-paying course which is designed for professional upgrade leading to the award of a Graduate Certificate.

31858 OBJECT-ORIENTED ANALYSIS AND DESIGN

(4cp); 3 hpw
prerequisites 31625 Software Engineering, 31631 Database
coordinator Mr R Raban

Introduces object-oriented methods to analyse the problem domain and to create an implementation independent formal representation of the system requirements. The object-oriented analysis (OOA) utilises the concept of an 'object' to represent the problem and to identify meaningful abstractions within the problem domain. Elements of OOA process, OOA representation and OOA complexity management are introduced, compared with related concepts of structured analysis methodologies, the differences between the two approaches and advantages and disadvantages of each of them are discussed. The use of domain specific libraries of reusable objects is also covered. Different object-oriented modelling techniques including abstract data types are compared and their applicability in different problem domains is assessed. The transition from the implementation independent results of the OOA to the object-oriented design for different implementation platforms is also covered.

31859 COMPUTER ASSISTED SYSTEM DEVELOPMENT ENVIRONMENT

(4cp); 3 hpw
prerequisites 31631 Database, 31641 Systems Design
coordinator Dr G Feuerlicht

The subject will enable the student to understand the role and interaction of various system development tools through the system development life cycle, and gain in-depth understanding of methodologies which are used in conjunction with modern system development tools. Other topics include repositories and the role of international repository standards. Students will gain practical experience with computer assisted tools during the development of a realistic commercial application system.

31860 OBJECT-ORIENTED PROGRAMMING AND C++

(4cp); 3 hpw
prerequisite 31904 Systems Programming
coordinator Dr K Suffern

Review of object-oriented design principles and practices. Objects, classes, run time instantiation, inheritance, information hiding polymorphism and libraries and their implementation in C++. Comparison with the approach in EIFFEL. Contrast with the procedural style of C.

31862 FUNDAMENTALS OF HUMAN-COMPUTER INTERACTION

(6cp); 3 hpw
coordinator Mrs J Hammond

Introduces students to the fundamental knowledge required to understand the nature and scope of HCI, the contribution to HCI of discipline areas involving human factors, language and communication, and ergonomics, and the role of HCI in the

software and systems design and development process. Approaches to incorporate HCI into the software and systems development process will be examined with an emphasis on how HCI can ensure more usable software and systems for mainframes, personal computers and networks.

31863 HUMAN-COMPUTER INTERACTION TOOLS AND TECHNIQUES

(6cp); 3 hpw
prerequisite 31862 Fundamentals of Human-Computer Interaction
coordinator Mrs J Hammond

Introduces students to the knowledge and skills required to use a variety of HCI tools and techniques in all phases of the software and systems development process using mainframes, personal computers an/or networks, and to use methods and metrics for evaluating the usability of software and systems. The role of usability guidelines and standards in the systems design process is examined.

31864 IMPLEMENTATION OF HUMAN-COMPUTER INTERACTION

(6cp); 3 hpw
prerequisite 31862 Fundamentals of Human-Computer Interaction; corequisite 31863 Human-Computer Interaction Tools and Techniques
coordinator Mrs J Hammond

Provides students with the knowledge and practical skills to implement HCI approaches in the software and systems design and development process and integrating them into organisational and business contexts. Students undertake a substantial project to gain practical experience of how HCI can be implemented, and how usability can be measured through testing and evaluation. The implementation of usability guidelines and standards in conjunction with industry-wide quality assurance standards and future trends in HCI is examined.

31875 PARALLEL PROGRAMMING

(4cp); 3 hpw
prerequisites 31624 Data Structures and Algorithms, 31633 Operating Systems
coordinator Dr B Howarth

An introduction to parallel programming covering the following topics: a parallel programming language and program development system; modularising a problem into a set of cooperating sequential processes running in parallel; the prevention of deadlock; orderly termination of a set of parallel processes; use of multiple intercommunication processors; comparison of performance under different physical configurations.

31876 OPERATING SYSTEMS FACILITIES

(4cp); 3 hpw
prerequisites 31624 Data Structures and Algorithms, 31633 Operating Systems
coordinator Dr B Howarth

The development of applications to make use of the facilities offered by an operating system offering support for a graphical user interface, such as Microsoft Windows or Macintosh will be covered. Included is the methodology involved in building applications that are driven by user actions such as the mouse as well as input from a keyboard. Issues related to inter-application communication will also be explored.

31882 ADVANCED THEORETICAL COMPUTER SCIENCE

(4cp); 3 hpw
prerequisite 31655 Theory of Computer Science
coordinator to be advised

Reviews advanced work in the theory of machines, theory of languages, theory of programs and theory of data.

Not offered in 1994.

31885 ADVANCED MATHEMATICS

(4cp); 3 hpw
prerequisites 31615 Discrete Mathematics, 31626 Probability and Statistics
coordinator Dr T Osborn

A compulsory prerequisite for a mathematics sub-major or any subjects in the School of Mathematical Sciences.

Linear Mathematics: matrices, determinants, eigenvalues and eigenvectors,

inversion, pivoting and conditioning, complex numbers and functions. Calculus: calculus methods and theory, ordinary and partial differential equations. Analysis: real numbers, real functions, continuity, formal calculus.

31888 LOGIC DESIGN

(4cp); 3 hpw
prerequisite 31613 Computer Systems Architecture I
coordinator Mr J Tu

Provides an introduction to the concepts of logic design, gates, combinational and sequential circuits. The subject is supported by some practical work.

31889 ADVANCED LOGIC DESIGN

(4cp); 3 hpw
prerequisite 31888 Logic Design
coordinator Mr J Tu

A continuation of Logic Design to include the concepts of machine structure as a controlled combination of registers and gates.

31892 LOGIC PROGRAMMING

(4cp); 3 hpw
prerequisite 31624 Data Structures and Algorithms, 31625 Software Engineering
coordinator Dr S Prabhakar

Intended to give the student an understanding of the principles and techniques underlying logic programming. A student should become proficient in PROLOG and its applications to AI problems.

31893 COMPARATIVE PROGRAMMING LANGUAGES

(4cp); 3 hpw
prerequisite 31624 Data Structures and Algorithms
coordinator Dr J Potter

Programming language constructs, their syntax and semantics. A comparative study of different language styles through particular languages, for example PROLOG, LISP, C, MODULA-2, SMALLTALK, OCCAM.

31894 PROJECT

(4cp); 3 hpw
prerequisite 31641 Systems Design
coordinator Mr P Bebbington

A project is intended to give a student experience in working independently and responsibility for scientific research or the development of a small system from initial analysis to user documentation. Projects may be drawn from any area of computer science or information systems. Each project is supervised by a member of academic staff.

31895 NUMERICAL ANALYSIS

(4cp); 3 hpw
prerequisite 31885 Advanced Mathematics
coordinator to be advised

Errors, numerical linear algebra, interpolation and approximation, solution of nonlinear equations in one and many unknowns, numerical differentiation and integration, numerical solution of ordinary and partial differential equations. Computer implementation of numerical algorithms and use of packages.

Not offered in 1994.

31896 LISP PROGRAMMING

(4cp); 3 hpw
prerequisites 31624 Data Structures and Algorithms, 31625 Software Engineering
coordinator Dr R Rist

This subject introduces the student to various aspects of common LISP, their application to AI problems and methodologies, and important programming concepts in LISP. Different aspects of LISP include various data types of LISP, recursion, iteration, functions and macros. AI applications include expert systems, model based reasoning and diagnosis. Programming concepts include variable binding, lexical and dynamic scoping, data and procedure abstractions, and building large programs.

31897 COMPUTER SYSTEMS ARCHITECTURE 3

(4cp); 3 hpw
prerequisite 31633 Operating Systems
coordinator Associate Professor T Hintz

A systematic treatment of more advanced topics in machine organisation and systems architecture. Particular emphasis is placed on parallelism in general and its exploitation in a number of special purpose machines. Some practical work with a distributed parallel system will be included.

31898 MICROPROCESSORS AND APPLICATIONS

(4cp); 3 hpw
prerequisites 31623 Computer Systems Architecture 2, 31888 Logic Design
coordinator Mr J Tu

An examination of the current range of microprocessors and their applications in embedded systems. Emphasis is on interfacing peripheral devices to microcomputers. The subject is supported by some practical work.

31899 SYSTEMS ARCHITECTURE

(4cp); 3 hpw
prerequisite 31897 Computer Systems Architecture 3
coordinator Associate Professor T Hintz

In-depth study at the architectural level of one or more state-of-the-art or experimental computer systems. Some practical work on a state-of-the-art parallel computer will be included.

Not offered in 1994.

31901 ARTIFICIAL INTELLIGENCE THEORY

(4cp); 3 hpw
prerequisites 31624 Data Structures and Algorithms, 31625 Software Engineering
coordinator Dr R Rist

This subject covers Artificial Intelligence to give a professional basis in the basic methods and algorithms of the subject. It includes knowledge representation, machine reasoning, planning, problem solving and research, constraint based systems, learning robotics and computer vision.

31902 AUDITING THE COMPUTER

(4cp); 3 hpw
prerequisite 31617 Accounting Fundamentals
coordinator Mr J Clark

Audit concepts and techniques in the EDP audit field. Control measures that must be embedded in computer accounting and information systems. Different systems of control, administrative, operational and security. Audit techniques and the DP audit function. Risk analysis, quality assurance.

The emphasis is oriented to control measures possible and desirable in various computer systems, eg, billing, creditors, payroll, etc and non-monetary information systems.

31904 SYSTEMS PROGRAMMING

(4cp); 3 hpw
prerequisite 31633 Operating Systems
coordinator Mr U Szewcow

The role of the systems programmer. Comparison of programming languages for systems programming. UNIX operating system. C programming language. Comparison of using tools vs writing a new program.

31916 COGNITIVE MODELLING

(4cp); 2.5 hpw
coordinator Dr T Osborn

Designed to proved an overview of recent developments in the exciting field of cognitive science. Bringing together work from several disciplines including psychology, neurophysiology, philosophy and AI, this subject will investigate the biological mechanisms underlying human intelligence in order to provide a theoretical model for emulating such behaviour artificially. Topics include philosophy of mind, memory systems, selective attention, learning, and emerging AI technologies such as neural networks.

31931 SOFTWARE QUALITY ASSURANCE

(4cp); 3 hpw
prerequisite 31621 Systems Analysis
coordinator Mr C S Johnson

Aims to provide students with the practical knowledge and skills that are necessary to effectively measure and control the quality of software products. Major topics are quality assurance principles, quality metrics, verification, validation and test, implementing quality assurance, software engineering methods and tools.

32106 OBJECT-ORIENTED SOFTWARE DEVELOPMENT

(6 cp); 3 hpw
coordinator Dr J Potter

Basic principles of object-oriented software development. Classes as modules and classes as types. OO analysis and design. Software design as object modelling through abstract data type definition. Design by contract and subcontracting. The different forms of inheritance. OO programming. Static vs dynamic typing; static vs dynamic binding. Comparison of OO programming languages. Software development environments. Support for OO methods and techniques. OO models of the software development process. Project

management for OO. Designing for reusability. Abstraction and generalisation. Models of application domains as the basis for OO frameworks for fast application development.

32107 FORMAL REASONING FOR SOFTWARE DEVELOPMENT

(6 cp); 3 hpw
coordinator Dr B Jay

Promote a methodology where correctness is established before efficiency is considered. Specification languages allow the precise description of systems, while abstracting away from implementation concerns. Formal refinement allows programs to be developed from specifications, while preserving correctness. Semantics of languages provide a basis for reasoning about their correct implementation. Reasoning about concurrency is difficult; formal models of concurrency will be introduced.

32108 SPECIALIST TOPICS IN ARTIFICIAL INTELLIGENCE

(6 cp); 3 hpw
coordinator Dr S Prabhakar

This subject covers some important areas of Artificial Intelligence and their applications. These areas include, broadly, Knowledge Representation, Problem Solving, Planning, Knowledge-based Systems, Dealing with Uncertainty, Explanation Facilities, Machine Learning, and Applications of AI. The subject quickly introduces to students the basic AI techniques and then deals with individual topics in depth. The subject may specialise in one or more subareas of AI.

32204 ADVANCED DATA MANAGEMENT

(6 cp); 3 hpw
coordinator Dr G Feuerlicht

The subjects covers a range of advanced topics in database including relational and object-oriented database systems and distributed databases. The subject area is treated mainly from a technology viewpoint, but also includes discussions of management issues.

32206 ADVANCED INFORMATION SYSTEMS MODELLING

(6 cp); 3 hpw
coordinator Mr R Raban

Information systems requirements can be modelled in many different ways. The modelling method used should be suitable to the class of the system. The modelling methods differ in terms of their expressive power and ability to describe requirements in specific application domains. This subjects presents and compares the information systems modelling methods used in structured and object-oriented methodologies. Formal and de facto industry standards for modelling information systems are also covered.

32207 INFORMATION MANAGEMENT

(5cp); 4 hpw
coordinator Mr P Bebbington

This subject covers three broad topics: management of the information resources of an organisation, management of the development and maintenance of systems using those resources, and management of IT personnel and users of the information resources. Management of information resources requires the calculation of the costs, and benefits of such resources both in accounting, and qualitative terms, and the controlling and recovering of costs so that services can be used in an efficient and effective manner. It also includes the security, privacy, and legal matters which are part of data management. Management of system development and maintenance includes project management and control, systems development methodologies and tools, and IT organisation structures. The emphasis in IT personnel and client relationship management is on the effective use of IT staff in an increasingly user-oriented world.

32208 INFORMATION PROCESSING STRATEGY

(6 cp); 3 hpw
prerequisite 32203 Information Management
coordinator Mr D Wilson

Designed to develop knowledge and skills to carry out strategic planning for corporate information systems and services. An introduction to strategic management models and their application to MIS planning is followed by an examination of the applications spectrum and technology spectrum, of the organisational environment, and of appropriate management tools for strategic planning, implementation and control of information systems. The applications model and infrastructure model of MIS planning are contrasted.

32205 COMPUTER COMMUNICATION SYSTEMS

(6 cp); 3 hpw
coordinator Ms D Jinks

Historical evolution. Architectural models. Standards. Requirements analysis and specification. Principles of design. Sizing estimates and calculations. Regulatory environment. Inter-organisational computer communications. Computer communications existing and emerging technologies. Integrated broadband networks. Computer communications management.

32306 CAPACITY MANAGEMENT

(6 cp); 3 hpw
coordinator Dr B Howarth

Introduces students to the concepts of capacity management, and relates this management tool to the broader management areas of corporate planning and systems development.

32307 OPERATING SYSTEMS

(6 cp); 3 hpw
coordinator Dr B Howarth

Topics in modern operating systems: Concurrency in multiprocessor operating systems. Programming support environments. User-friendly system interfaces. Object-based systems. Fault tolerant systems. Secure systems.

32308 COMPUTER ARCHITECTURE

(6 cp); 3 hpw
coordinator Associate Professor T Hintz

Current directions in machine architectures, and the relationship between machine architecture, task structure and system performance.

32402 INFORMATION TECHNOLOGY ENVIRONMENT

(6 cp); 3 hpw
coordinator Mr J Underwood

This subject would deal with trends and issues in the management of IT. Typical issues would be: IT within the company – user and expert cultures; competition vs collaboration in the IT industry; relations between suppliers and customers; hardware manufacturers and software houses; downsizing and outsourcing; encouraging innovation; IT as a global industry; social impacts of IT; employment effects; IT as a leading part of the economy.

32501 COMPUTER GRAPHICS

(6cp); 3 hpw
coordinator Dr K Suffern

Demonstrates why computer graphics is important, and through the lectures and practical work, gives students a working knowledge of elementary two and three dimensional graphics programming.

32502 ADVANCED COMPUTER GRAPHICS TECHNIQUES

(6cp); 3 hpw
prerequisite 32501 Computer Graphics
coordinator Dr K Suffern

Gives students a working knowledge of ray tracing, which is one of the two major image synthesis techniques. It also gives students practical experience with computer animation and video recording techniques.

32503 DISTRIBUTED DATABASES AND CLIENT/SERVER COMPUTING

(6cp); 3 hpw
coordinator Dr G Feuerlicht

The subject covers a range of topics in distributed database and client/server computing. The main topics include discussion of distributed database design, distributed transactions and queries, and data replication strategies. The subject area is treated mainly from a technical view-point, but also includes discussions of management issues relevant to distributed database and client server computing and commercially available technology.

32504 TOOL-BASED SYSTEMS DEVELOPMENT

(6cp); 3 hpw
coordinator Dr G Feuerlicht

The current industry trend is away from the traditional programming-oriented approach towards a tool-based approach to system analysis and development. Central to this approach is the use of repositories to define and maintain information about application systems and the use of tools to develop applications. This elective subject focuses on system development methodologies and techniques and the use of commercially available tools for systems development.

32505 ADVANCED OBJECT-ORIENTED ANALYSIS AND DESIGN

(6cp); 3 hpw
coordinator Mr R Raban

This subject introduces object-oriented methods to analyse the problem domain and to create an implementation independent formal representation of the system requirements. The object-oriented analysis (OOA) utilises the concept of 'an object' to represent the problem and to identify meaningful abstractions within the problem domain. As elements of OOA process, OOA representation and OOA complexity management are introduced and they are compared with related concepts of structured analysis methodologies and differences between the two approaches. Advantages and disadvantages of each of them are discussed. The use of domain specific libraries of reusable objects is also covered. Different object-oriented modelling techniques including abstract data types are compared and their applicability in different problem domains is assessed. The transition from the implementation independent results of the OOA to the object-oriented design for different implementation platforms are also covered.

32506 KNOWLEDGE SYSTEMS

(6cp); 3 hpw
coordinator Dr S Prabhakar

Symbol level description of KBS. Knowledge level description of KBS. Problem solving analysis of KBS. Acquisition and characterisation of knowledge. Role of KBS in work environments. Enhancing the capabilities of KBS.

32507 PERFORMANCE EVALUATION

(6cp); 3 hpw
coordinator Dr B Howarth

Introduces students to performance modelling techniques for computers and networks. It is intended for students who have not covered similar material in their undergraduate studies.

32601 ADVANCED PROJECT MANAGEMENT

(6cp); 3 hpw
coordinator Mr D Wilson

Provides an essential understanding of advanced project management issues and identify the knowledge required of a project manager in the information technology industry.

32602 IMPACT OF INFORMATION TECHNOLOGY

(6cp); 3 hpw

Reviews the effect of the introduction of computer technology into work places, improved efficiency of work organisations, increased occupational health hazards for computer terminal operators, and increased potential for computer crimes. Physical, psychological and environmental factors that contribute significantly to the conditions such as RSI are explained in depth. The effects of information technology on employment patterns are examined. We define and categorise computer crime and discuss difficulties associated with its prevention, detection, and with subsequent legal actions. Measures to ensure the protection of privacy are explained in this unit.

32603 SOFTWARE QUALITY MANAGEMENT

(6cp); 3 hpw
coordinator to be advised

Provides the students with the practical knowledge and skills necessary to manage the quality of software products.

32604 SYSTEMS INTEGRATION

(6cp); 3 hpw
prerequisite 32601 Advanced Project Management
coordinator to be advised

System Integration can be defined as the business of adding value to a specific project, by assuming responsibility for combining information products and services into a specified business solution. The System Integrator takes the responsibility and risk for the project. From the set of user requirements right through to the final output solution, delivered on time, within budget and achieving the expected performance criteria.

32701 ADVANCES IN INFORMATION TECHNOLOGY

(6cp); 3 hpw
coordinator to be advised

Looks at the technology trends affecting information processing and delivery, to provide the student with the vision to ensure that not only is their company well served in the present by its technology environment, but that it is also able to take up the opportunities of the future.

32702 CONTEMPORARY TELECOMMUNICATIONS

(6cp); 3 hpw
coordinator to be advised

Introduction to data communications and networks. Network architectures and standards. New communications technologies. Internetworking. Domestic and international communications environment. Application-oriented services. Network resource architectures. Client/server systems. Introduction to distributed processing. Distributed databases. Criteria for selection of communications systems. GOSIP. Migration to integrated systems.

32703 INFORMATION TECHNOLOGY STRATEGY[1]

(6cp); 3 hpw
coordinator to be advised

Designed to provide students with an awareness of the problems in developing corporate strategies for information processing and to develop skills in the selection and use of appropriate techniques.

32818 PROJECT

(18cp); hpw to be advised
prerequisite Graduate Diploma in Information Technology Management; corequisite 21751 Management Research Methods
coordinator to be advised

All students in the MBus in IT Management are required to enrol in and pass the project subject. The project is normally undertaken in the final year of study. The project entails a substantial investigation, under the supervision of a member of the academic staff, and is examined on the quality of both a written report and an oral presentation of the project work. The oral presentation must be made in the final year of enrolment in the Master's course and must be presented at a satisfactory standard. Expert speakers may be available to present Master's seminars as required throughout the final year of the course. Students are required to attend the Master's seminars.

[1] Subject name and number yet to be approved by the Faculty Board

32901 RECENT ADVANCES IN COMPUTER SCIENCE

(6 cp); 3 hpw
coordinator Dr S Prabhakar

Review of key developments in computer science. Selection of topics from: software engineering, artificial intelligence, knowledge processing, computer graphics, theory of computer science, decision support system, capacity planning, communications, distributed systems, computer architecture.

32902 RECENT ADVANCES IN INFORMATION SYSTEMS

(6 cp); 3 hpw
coordinator Mr J Underwood

Reviews some key developments in the information systems discipline. Some likely topics are: new techniques in data base design; automated development methodologies; alternative system modelling techniques; system usability; quality in information systems; organisation wide network design; participative system design; managing the IT function in the next decade; security in information systems; evaluating the economics of information systems; career paths in IT.

32912 PROJECT

(12cp); hpw to be advised
coordinator to be advised

32924 PROJECT

(24cp)
coordinator Professor J Debenham

Nature of research: academic and professional. Research methodologies. Cost of research. Evaluation of research. Significance of research. Timeliness of research. Execution of a research project.

Subjects offered by other faculties

Students should consult the relevant Faculty and its handbook for any late changes to subject information.

21708 STRATEGIC BUSINESS MANAGEMENT

(6cp); 3 hpw
Prerequisites Graduate Certificate in Information Technology Management, 21806 Managing Organisational Change, 24704 Managing Client Relations
coordinator to be advised

The nature of strategic issues; arenas of strategy; the information technology industry: context and issues; concepts of strategy; environmental analysis; capability analysis; development of strategic alternatives; evaluation and choice of strategic alternatives; stability, change and transformation; the process of strategy implementation; strategic control and monitoring.

21751 MANAGEMENT RESEARCH METHODS

(6cp); 3 hpw
prerequisite Graduate Certificate in Information Technology Management
coordinator to be advised

Will familiarise IT managers with a range of approaches used in management research, with an emphasis on approaches commonly used in practical settings. Advantages and limitations of different research approaches will be examined, as well as their applicability in different IT contexts. Experience will be provided in the design of research studies and in the analysis and interpretation of data and report presentation. Participants will acquire skills which will be useful in the conduct of research agendas in their own IT organisations, and in the critical evaluation of other's research work.

21788 EFFECTIVE PEOPLE MANAGEMENT

(6cp); 3 hpw
coordinator Mr R Connor

Deals with a range of critical interpersonal management skills, competencies and understandings necessary for effective people management. It seeks to develop enhanced competence in managing others and recognising the importance of continuing personal learning and development in management, and seeks to develop an increased sensitivity and understanding of self and others in organisational contexts.

21789 CONTEMPORARY MANAGEMENT PRACTICES

(6cp); 3 hpw
coordinator to be advised

Addresses a range of management practices appropriate to contemporary organisations. The unit provides students with an understanding of key aspects of current management practices including managerial relationships; intercultural management; leadership, status and power; negotiation; interviewing; team building; managerial audits; and managerial ethics.

Students explore a range of strategies for handling management issues, eg, competencies relevant to people, organisational structures and issues and working in international environments.

21806 MANAGING ORGANISATIONAL CHANGE

(6cp); 3 hpw
coordinator to be advised

Provides participants with a knowledge of the principles of organisational design and an appreciation of the dynamics underlying organisational change. The role of IT managers in creating adaptive, flexible structures and in maintaining the momentum of the change process will be discussed. Students will be introduced to a variety of techniques for diagnosing the strengths and weaknesses of organisations, and to a range of organisational development interventions suitable for their industry. They will develop useful change agent skills by participating in a group action learning project.

21807 TOTAL QUALITY AND PRODUCTIVITY MANAGEMENT

(6cp); 3 hpw
prerequisite Graduate Certificate in Information Technology Management
coordinator to be advised

Productivity and quality are both key factors in successful performance in the IT industry. This subject aims to develop a clear understanding of the practical and managerial aspects of quality management and productivity management, including the fundamentals of TQM and its relationship to productivity. Students completing this subject will have a sound philosophical

and practical basis for evaluating productivity and quality improvement programs and Total Quality implementation programs.

21809 MANAGERIAL ANALYSIS AND EVALUATION OF INFORMATION SYSTEMS

(6cp); 3 hpw
coordinator to be advised

Presents a range of fundamental accounting, risk analysis and performance criteria for information systems. This subject is intended to provide basic skills in evaluating computer-based information systems. For students who are involved in management, it is important that they are aware of what information systems can provide and how to rate them and how to specify their requirements for their organisation's advantage.

24704 MANAGING CLIENT RELATIONS

(6cp); 3 hpw
coordinator to be advised

Reviews the nature of the business development process through focusing upon the specific needs of clients. It explores the complex issues of determining and focusing on client needs as a key activity for IT managers who wish to maximise their impact. Specific IT based case material will be used throughout the course to ensure that participants recognise the essential relationship between product and client satisfaction.

25106 ECONOMICS

(5cp); 3 hpw
coordinator Mr E Kasamenie

Provides a short, intensive introduction to the two major components of economic theory – microeconomics (which deals with the behaviour of individuals, firms and industries) and macroeconomics (which deals with the behaviour of the national and international economies). Through this introduction, students will begin to acquire a foundation of economic understanding useful in management decision-making. Microeconomics is a major source of techniques used by managerial economists; and both micro and macroeconomics provide insights into the external environment within which firms operate and managers must function.

24105 PRINCIPLES OF MARKETING

(5cp); 3 hpw
coordinator Ms R McGuiggan

To develop an awareness and understanding of marketing concepts and how these concepts apply to profit and not for profit organisations. To provide the foundations from which a more advanced study of marketing may be pursued. To show the relevance of the need for a marketing orientation in a dynamic and changing business environment. To allow students to test and apply marketing concepts in a dynamic simulated business environment. The simulation also highlights the need for group decision making and effective management. To develop and enhance competence in the analysis of 'real world' marketing problems.

25301 FINANCIAL MANAGEMENT

(5cp); 3 hpw
prerequisite 23106 Economics
coordinator Mr K Chan

Financial Management is a specialised field of study which provides the analytical framework for corporate financial decisions. Its objective is to introduce students to financial theory and to the tools of financial decision making in the context of the Australian institutional environment. Financial Management is concerned primarily with investment project evaluation and determining the financing mix necessary to achieve the firm's financial objectives.

51370 HUMAN COMMUNICATION

(3cp); 2 hpw
coordinator Ms K Fry

Outlines the principles and practice of written and oral reporting and communication within the context of the workplace. It is designed to help students in researching, organising, writing and presenting material appropriate to technical and commercial contexts. Topics covered include adaptation of content and style to suit the medium of communication, eg, letters, memoranda, reports, articles and graphs, tables and diagrams; short talks on technical subjects: visual aids.

Students will investigate various theories of communication and apply these principles to their practical work. Research, organisation, composition and presentation will be developed in the areas of written, spoken and non-verbal communication.

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