
INFORMATICS SUBJECT DESCRIPTIONS

CSCI907 Corba and Enterprise Java 6cp

Spring Wollongong On Campus

Contact Hours: 2 hr Lecture per week

Exclusions: CSCI407

Assessment: A series of assignments totalling 100% with no one assignment exceeding 50% in value.

Subject Description: This subject introduces students to the "enterprise level" computing environments - Corba, and Enterprise Java Beans. It will also provide a more limited overview of general "web services" and related technologies. The emphasis is practical with students developing Corba applications with Java clients and C++ servers, and later creating and deploying complete EJB systems.

CSCI908 Distributed Java 6cp

Not on offer in 2004

Assessment: A series of assignments totalling 100% with no one assignment exceeding 50% in value.

Subject Description: This subject provides students with a strong grounding in distributed object systems, using the inter-related Java based RMI, Jini, Javaspaces, and JXTA technologies as illustrations. The content will include an exploration of how to "objectify" a client-server distributed system, a reasonably detailed study of Java Remote Method Invocation, exploration of the Jini technology with emphasis on applications such as Javaspaces distributed computing, and an introduction to the latest Java based peer-to-peer systems.

CSCI925 Topics in Software Engineering 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr Lecture per week

Exclusions: CSCI425

Assessment: Project Planning & Requirement Specifications 20% Project Architecture & Design 10% Project Testing 20% Version Control 10% Final Exam 40%

Subject Description: This subject examines the current state of software engineering both as an academic discipline and as a profession. The subject focuses on issues of requirements engineering, system procurement, and professional practice, and through case studies, the subject considers reasons for the failure and success of various software engineering projects.

CSCI941 Advanced Topics in Computer Science A 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr Lecture per week

Subject Description: Topics will be selected from those areas of computing science in which visiting staff members of the School are engaged in active research.

CSCI942 Advanced Topics in Computer Science B 6cp

Not on offer in 2004

Subject Description: Topics will be selected from those areas of computing science in which visiting staff members of the School are engaged in active research.

CSCI943 Advanced Topics in Computer Science C 6cp

Not on offer in 2004

Subject Description: Topics will be selected from those areas of computing science in which visiting staff members of the School are engaged in active research.

CSCI944 Perception and Planning 6cp

Spring Wollongong On Campus

Contact Hours: 2 hr Lecture per week

Assessment: Assignments 100%

Subject Description: This subject explores ways in which a robot can combine data from variety of sensors to create or update a model of its environment, and then use this model to infer the consequences of proposed actions. The subject will cover the use of internal sensors, such as those measuring odometry and location, and external sensors including those for touch, vision, and range finding.

CSCI945 Parallel Computing 6cp

Not on offer in 2004

Subject Description: This subject presents different approaches to the construction of parallel algorithms and computer architectures. Both theoretical and practical aspects are covered, emphasis is placed on identifying the suitability of the approaches for specific applications.

CSCI946 Multimedia Studies 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr Lecture per week

Assessment: Assignments 40% Exam 60%

Subject Description: This subject studies the creation and programming of digital media for multimedia applications. Multimedia systems combine images, graphics, sound and text to interactively communicate information. Each of these media has its own standards, algorithms and file formats. The foundations strand examines the principles of how media is created. The programming strand explores the programming of multimedia applications, using a multimedia applications such as QuickTime for Java. The practical strand explores the acquisition, encoding and editing of digital video and audio with professional tools, such as Final Cut Pro.

CSCI957 Advanced Topics in Database Management 6cp

Spring Wollongong On Campus

Contact Hours: 3 hrs Lecture, 1 hr Seminar per week

Assessment: Implementation project (20%) mini research project (30%) final examination (50%)

Subject Description: This subject covers two advanced topics from modern database management systems: object-oriented databases and transaction management in database systems. The topics include the details such as design and implementation of object-oriented database systems, hybrid transaction management, optimistic transaction management,

Subject Descriptions

nested transactions, management of long transactions, and management of transaction in distributed systems.

CSCI963 Advanced Computer Graphics **6cp** *Not on offer in 2004*

Assessment: Assignment 60% Examination 40% (form of assessment to be confirmed with class)

Subject Description: In this subject students will learn how to use graphics techniques such as ray tracing and radiosity to produce highly realistic images with features such as shadows, reflection, refraction, texturing, penumbras and motion blur. The rendering algorithms and their underlying mathematics are covered with a practical component being the implementation of a ray tracer. Applications including scientific visualisation are also covered.

CSCI964 Neural Computing **6cp** **Autumn** Wollongong On Campus

Contact Hours: 2 hrs lecture per week

Pre-requisites: nil

Assessment: Exam 60% Assignment 40%

Subject Description: This subject introduces students to the basics of "soft" computing. Primary focus will be on artificial neural networks, with some attention also given to genetic algorithms, (evolutionary computing), fuzzy logic and neurofuzzy expert systems. These approaches will be compared and contrasted with heuristic, rules-based artificial intelligence methods, such as decision trees and case-based reasoning. Several application areas will be discussed, primarily pattern recognition and/or classification.

CSCI965 Design and Analysis of Algorithms **6cp** *Not on offer in 2004*

Assessment: 50% assessment 50% exam

Subject Description: The objective of this subject is to develop the knowledge, skills and techniques for designing and analysing algorithms. Topics to be studied include: review of standard algorithm designs including divide and conquer, the greedy method, etc; complexity analysis and comparison of algorithms, number theoretical algorithms

CSCI966 Coding for Secure Communication **6cp** *Not on offer in 2004*

Assessment: Assignment 50% Exam 50%

Subject Description: This subject provides a fundamental understanding of information protection and efficient coding strategies that can be used to ensure correctness, security and authenticity of data. It uses entropy as the universal measure of information to analyse and explore fundamental bounds on the performance of secure and reliable storage and communication systems, and examine a range of coding schemes that form the main building blocks of such systems. It will include the following topics. i) redundancy in data and compression algorithms ii) efficient error control strategies for secure and reliable communication and storage systems; iii) coding methods for secrecy and authenticity.

CSCI967 Complexity Theory **6cp** *Not on offer in 2004*

Assessment: Assignment 50% Exam 50%

Subject Description: The subject introduces basic concepts of complexity theory. Topics include NP-completeness and NP-hardness, Cook's theorem and its implications concepts of indistinguishability and pseudorandomness, interactive proof systems and zero-knowledge protocols.

CSCI968 Network Security **6cp** **Spring** Wollongong On Campus

Contact Hours: 2 hrs Lecture per week

Pre-requisites: nil

Assessment: Assignment 50% Exam 50%

Subject Description: This subject provides a survey of network security technologies and explores them in practice. This includes but not limited to, network-based threats, security failure in cryptographic and network protocols, authentication servers, certificates and public-key infrastructure, security provisions in communication protocols and standards, electronic mail security, firewalls and intrusion detection systems.

CSCI971 Computer Security **6cp** **Spring** Wollongong On Campus

Contact Hours: 2hrs Lecture per week

Assessment: 50% assessment 50% exam

Subject Description: This subject provides a review of computer security. Topics include: digital signatures, elliptic curve cryptography, El Gamal public key methods, the Advanced Encryption Standard (AES), Security Standards, Security Evaluation Standards, Linear Cryptanalysis, Differential Cryptanalysis.

CSCI974 Systems Analysis **6cp** *Not on offer in 2004*

Subject Description: This subject concentrates on the analysis and design stages of the software implementation process. It provides students with an understanding of the engineering issues related to the initial implementation of a specified system and to the problems of long term maintenance and evolution. Dataflow, entity-relationship, object models and other design approaches are reviewed. Case studies include projects in the real time area.

CSCI981 Preliminary Topics in Computer Science B **6cp**

Not on offer in 2004

Subject Description: A selection of topics will be available from time to time to serve as preliminary material in the Master of Computer Science.

CSCI982 Preliminary Topics In Computer Science C **6cp**

Not on offer in 2004

Subject Description: A selection of topics will be available from time to time to serve as preliminary material in the Master of Computer Science.

CSCI983 Preliminary Topics in Computer Science D 6cp*Not on offer in 2004*

Subject Description: A selection of topics will be available from time to time to serve as preliminary material in the Master of Computer Science.

CSCI991 Project 12cp

Annual Wollongong On Campus

Spring 04/Aut 05 Wollongong On Campus

Contact Hours: 2 hrs per week

Subject Description: This subject involves undertaking a project. Where possible the projects are related to the research interests of the School and/or staff and are chosen to develop the student's research skills.

ECTE901 Fast Signal Processing Algorithms 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr Lecture/2hr Practical per week - Wks 1-7

Exclusions: ELEC901/ECTE401

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to extend the digital signal processing knowledge gained in undergraduate courses. It forms a useful basis for subsequent DSP applications subjects. Topics covered will include: Discrete Transforms, including: FFT, DFT, DCT, etc.; Wavelet transforms; Filter Design and Structures and Multirate Signal Processing (Interpolation, Decimation ,etc.); and current research developments.

ECTE902 Stochastic Signal Processing 6cp*Not on offer in 2004*

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to extend the digital signal processing knowledge gained in undergraduate courses. It forms a useful basis for subsequent DSP applications subjects. The contents will consist of: stochastic signals; least squares analysis, including optimal linear filters; spectral analysis, including linear predictive analysis; and basic scalar quantisation schemes (e.g., PCM, DPCM, ADPCM).

ECTE903 Image and Video Processing 6cp

Spring Wollongong On Campus

Contact Hours: 2hr Lecture/ 2hr Practical per week - Wks 8-13

Exclusions: ECTE403

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to extend digital signal processing knowledge gained in undergraduate courses. The contents will consist of: applying digital signal processing in image and video processing applications, including current research developments.

ECTE904 Adaptive Signal Processing 6cp

Autumn Wollongong On Campus

Contact Hours: 2hr Lecture / 1hr Tutorial per week - Wks 8-13

Exclusions: ELEC907/ECTE404

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to extend digital signal processing knowledge gained in undergraduate courses. The contents will consist of: applying digital signal processing in adaptive signal processing (echo cancellation, channel equalisation, etc.) applications, including current research developments.

ECTE905 Speech and Audio Processing 6cp

Spring Wollongong On Campus

Contact Hours: 2hr Lecture /2hr Practical per week - Wks 1-7

Exclusions: ELEC908/ECTE405

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to extend the digital signal processing knowledge gained in undergraduate courses. The contents will consist of: applying digital signal processing in speech and audio processing applications, including current research developments.

ECTE911 AC-Sourced Power Electronics 6cp*Not on offer in 2004*

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: Topics covered in this subject include: ac-sourced power electronics devices and their main applications, ac to dc power conversion and its industrial applications, ac voltage controllers, high power conversion in electric power utilities, harmonics and current research developments.

ECTE912 DC-Sourced Power Electronics 6cp

Autumn Wollongong On Campus

Contact Hours: 2hr Lecture /1hr Tutorial per week - Wks 1-7

Exclusions: ELEC911/ECTE412

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: This subject will study power conversion circuits with dc-supplies and using modern power switching devices. Topics covered include: power switching devices and their application (diode, MOSFET, IGBT, gto), dc-dc conversion (choppers), including switch-mode power supplies, dc-ac conversion using inverters, including methods of pulse width modulation and current research developments.

ECTE913 Micro-Electronics 6cp*Not on offer in 2004*

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to extend the electronics knowledge gained in undergraduate courses. Topics covered will include: theory of operation of BJT and FET devices; the use of FET devices in analogue and digital circuits; CMOS logic family; oscillators; high frequency amplifiers; VLSI design techniques; gate arrays; programmable logic devices; memory cells and current research developments. The practical component will consist of using Electronics Simulation Packages to (a) model circuits and examine their behaviour; (b) perform a logical design, (c) program the design into a programmable device and test its performance.

ECTE921 Power Quality 6cp

Spring Wollongong On Campus

Contact Hours: 2hr Lecture/ 1hr Tutorial per week - Wks 8-13

Exclusions: ELEC970/ECTE421

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: This subject will study the different types of systems which can propagate in the electric power supply, their origins and their effects on sensitive equipment such as computers, telecommunications systems, PLCs and variable speed drives. The disturbances include harmonics, voltage sags, capacity switching transients, voltage unbalance, etc. Topics discussed will include: the ability of equipment to emit disturbances, its susceptibility, industry standards; design techniques to ensure standards are met; and current research developments.

ECTE922 Power Quality Monitoring 6cp*Not on offer in 2004*

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: This subject will treat measurement techniques and waveform interpretation relevant to the operation of sensitive equipment with a non-ideal power supply. The different types of waveform disturbances and their characterisation will be discussed, such as harmonics, inter-harmonics, flicker and voltage sag. Relevant standards for signal analysis will be examined and their approach justified. There will also be a treatment of transducers and current research developments will be included.

ECTE923 Power Systems 6cp

Autumn Wollongong On Campus

Contact Hours: 2hr Lecture/ 1hr Tutorial per week - Weeks 1-7

Exclusions: ELEC920/ECTE423

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: Topics covered in this subject include: an introduction to power systems comprising thermal and hydro power stations, transmission lines and distribution systems, renewable energy, other energy sources such as solar energy, windmills, sea waves and geothermal, computer applications in power systems planning, design, control and operation, review of basic analysis tools, reactive power management, load flow and fault analysis and flexible ac transmission technology, environmental considerations and current research developments.

ECTE924 Power System Abnormalities 6cp*Not on offer in 2004*

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: Topics covered include: reliability concerns, insulation requirements and protection methods of energy systems. The design aspect of energy systems for reliable and economical energy supply, internal and external overvoltage protection of energy systems and terminal equipment, stability limits of energy systems; the application of electromagnetic transient programmes (EMTP) for insulation co-ordination and current research developments will be discussed.

ECTE925 Industrial Drives and Actuators 6cp

Autumn Wollongong On Campus

Contact Hours: 2hr Lecture/ 1hr Tutorial per week - Wks 8-13

Exclusions: ELEC928/ECTE425

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: Topics covered in this subject include: selection of dc, ac motors (induction and/or permanent magnet) and actuators for industrial applications and the design of closed loop speed control systems for dc and ac motors, including current research developments. In ac motor control, field orientation will be given particular emphasis.

ECTE926 Power Equipment Design 6cp

Spring Wollongong On Campus

Contact Hours: 2hr Lecture/ 1hr Tutorial per week - Weeks 1-7

Exclusions: ECTE426

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: Topics covered in this subject include: design aspects of transformers, ac motors and generators and industrial actuators for motion control. The design and analysis of magnetic circuits to meet requirements such as: torque/weight ratio, losses, heating and cooling will be addressed. Essentials of electromagnetic analysis using simulation software (e.g., finite element methods) and current research developments will be covered.

ECTE931 Real-Time Computing 6cp

Autumn Wollongong On Campus

Contact Hours: 2hr Lecture/ 2hr Practical per week - Wks 8-13**Exclusions:** ECTE431**Assessment:** See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.**Subject Description:** The aim of this subject is to extend the digital hardware knowledge gained in undergraduate courses. Topics covered will include: real-time operating systems; interrupts; interfacing to real world signals; use of A/D and D/A converters; multi-tasking, multi-threading; clocks and timers; direct digital control; and current research developments. The practical component will consist of writing real-time programs on DSP and micro-controller computer systems.**ECTE932 Computer Systems 6cp**

Autumn Wollongong On Campus

Contact Hours: 24hrs Lecture/Tutorial/Practical - Weeks 1-7**Exclusions:** ELEC932/ECTE432**Assessment:** See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.**Subject Description:** The aim of this subject is to extend the digital hardware knowledge gained in undergraduate courses. Topics covered will include: CPU organisation; complex instruction sets; reduced instruction sets; I/O structures; interrupts; direct memory access; intelligent peripherals; interfacing to real world signals; use of A/D and D/A converters; multi-processors; parallel DSP architectures and current research developments. The practical component will consist of writing programs on micro-controller computer systems.**ECTE941 Intelligent Control 6cp**

Spring Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial per week - Wks 8-13**Exclusions:** ELEC943/ECTE441**Assessment:** See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.**Subject Description:** The subject provides the knowledge and skills required to model, analyse and design a system using intelligent methods. The contents will consist of: introduction to fuzzy systems, introduction to artificial neural network, crisp fuzzy control systems, adaptive fuzzy control systems, neuro-fuzzy control systems and current research developments.**ECTE942 Computer Controlled Systems 6cp***Not on offer in 2004***Assessment:** See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.**Subject Description:** This subject provides the knowledge and skills required to model, analyse and design computer controlled systems in the z-domain. The contents will consist of: Discrete time state space modelling of system, stability analysis in state space, controllability and observability, pole

placement design and state feedback, state observer design and current research developments.

ECTE943 Digital Control 6cp*Not on offer in 2004***Assessment:** See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.**Subject Description:** This subject provides the knowledge and skills required to model, analyse and design computer controlled systems in the z-domain. The contents will consist of: Impulse sampling, stability analysis in the Z-domain, root locus analysis and design in the Z-domain, W-transformation, frequency response analysis and design in the Z-domain and current research developments.**ECTE944 Identification and Optimal Control 6cp***Not on offer in 2004***Assessment:** See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.**Subject Description:** The subject provides the knowledge and skills required to identify the model of a system and optimise its performance. The contents will consist of: system identification using the least square method and quadratic performance index; quadratic optimal control; Kalman filters; and applications of genetic algorithms in system identification and optimal control, including current research developments.**ECTE945 Advanced Intelligent Control 6cp***Not on offer in 2004***Assessment:** See Subject Information Sheet those presented here are only a guide. Final examination - 60% Individual and/or group assignments (involving theoretical and practical/laboratory projects) - 30% Oral presentation - 10%**Subject Description:** The aim of this subject is to provide students with the knowledge and skills required to model, analyse and design a system using intelligent methods. The contents will consist of: introduction to fuzzy systems, introduction to artificial neural network, crisp fuzzy control systems, adaptive fuzzy control systems, and neuro-fuzzy control systems. Students will be required to undertake an advanced project involving current research developments.**ECTE946 Advanced Computer Controlled Systems 6cp***Not on offer in 2004***Assessment:** See Subject Information Sheet those presented here are only a guide. Final examination - 60% Individual and/or group assignments (involving theoretical and practical/laboratory projects) - 30% Oral presentation - 10%**Subject Description:** The aim of this subject is to provide students with the knowledge and skills required to model, analyse and design computer controlled systems in the z-domain. The contents will consist of: Discrete time state space modelling of system, stability analysis in state space, controllability and observability, pole placement design and state feedback, state observer design. Students will be required to undertake an advanced project involving current research developments.

ECTE953 Report 12cp

Autumn/Spring Wollongong On Campus

Contact Hours: 13h rs Tutorial**Pre-requisites:** ECTE955**Co-requisites:** 36 credit points at 900-level**Exclusions:** ELEC953**Assessment:** A final report marked (Supervisor - 60%, and Examiner - 40% report). The Supervisor's mark includes both the project and report component.**Subject Description:** Projects may involve a hardware project; a software project; or an extensive literature survey; or a combination of any of these. Where possible the projects are related to the research programs of the School and are chosen to develop the student's initiative. Each student is required to deliver an oral seminar and to prepare a final thesis on the result of the work undertaken.**ECTE955 Advanced Laboratory 6cp**

Autumn/Spring Wollongong On Campus

Contact Hours: 39h rs Practical**Exclusions:** ELEC955**Assessment:** See Subject Information Sheet those presented here are only a guide. Reports 40%; Examination 60%.**Subject Description:** The aim of this subject is to provide students with an opportunity to apply and verify theory in areas associated with the postgraduate programs through laboratory experiments and computer studies. Students will be expected to design, and perform experiments; analyse results; and write reports on projects selected to illustrate practical issues selected from the two postgraduate programs.**ECTE956 Internet Technology Laboratory 6cp**

Autumn/Spring Wollongong On Campus

Contact Hours: 2 hour tutorial per week**Co-requisites:** ECTE991**Restrictions:** For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.**Assessment:** See Subject Information Sheet those presented here are only a guide - 30% - two reports; 20% - progress; 50% laboratory test.**Subject Description:** This subject consists of a series of experiments, during which the students (working individually or in small groups) become familiar with recent technological developments related to the Internet and its applications. Because the experiments are current hot topics in Internet technology, they will be updated regularly to include recent developments. These will include wireless networking, multimedia applications, remote control and operation, etc.**ECTE957 Advanced Internet Project 12cp**

Autumn/Spring Wollongong On Campus

Contact Hours: 2 hour tutorial per week**Pre-requisites:** A WAM of 72.5% for the full-time first session load (i.e., four six credit point subjects, including ECTE956 Internet Project and ECTE991 Internet Fundamentals).**Co-requisites:** ECTE991**Restrictions:** For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.**Assessment:** See Subject Information Sheet those presented here are only a guide. Technical report Oral presentation and project demonstration**Subject Description:** This subject involves students working on a major 12 credit point project. The project can be either undertaken by an individual or a group of students. It may be a project that involves hardware and or software development associated with Internet technology. It may also take the form of an extensive literature survey or market evaluation of various internet related technologies and associated aspect including specific applications. Each student is required to deliver an oral presentation and demonstration of the results obtained. A final thesis report will provided by the student detailing the work undertaken and results achieved.**ECTE958 Advanced Mechatronics Laboratory 6cp***Not on offer in 2004***Assessment:** See Subject Information Sheet those presented here are only a guide. Final examination - 60% Individual and/or group assignments (involving theoretical and practical/laboratory projects) - 40%**Subject Description:** The aim of this subject is to provide students with an opportunity to apply and verify theory through mechatronics laboratory experiments and computer studies. Students will be expected to design, and perform experiments; analyse results; and write reports on projects related to mechatronics activities within the research programs.**ECTE961 Telecommunications Queueing Theory 6cp**

Autumn Wollongong On Campus

Contact Hours: 24hrs Lecture/Tutorial/Practical - Weeks 1-7**Exclusions:** ELEC960/ECTE461**Assessment:** See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.**Subject Description:** The aim of this subject is to provide students with telecommunication engineering skills including analysis of delay and loss queueing systems, undertake Markov modelling and analysis, and calculate blocking probabilities of telephone switching equipment. Topics covered will include: queueing theory, Markov chain analysis, throughput and congestion analysis, Erlang and Engset distributions, blocking probability, overflow traffic and current research developments.**ECTE962 Telecommunications System Modelling 6cp**

Autumn Wollongong On Campus

Contact Hours: 24hr Lecture/Tutorial/Practical - Weeks 8-13**Exclusions:** ELEC960/ECTE462**Assessment:** See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.**Subject Description:** The aim of this subject is to provide students with telecommunication engineering skills including

skills to analyse and dimension telephone exchanges, trunk lines, Internet switches and circuit and packet switched networks. Topics covered will include: telephone and data networks and systems, mixed voice and data queueing systems, optimal capacity allocation, direct and alternate routing and current research developments.

ECTE963 Transmission Systems 6cp

Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: Topics covered include: Maxwell's equations, wave propagation in transmission lines, the Smith chart, wave guides, optical fibres and current research developments. The aim of this subject is to provide methods of characterising distributed passive transmission media such as transmission lines, wave guides, and fibre optics.

ECTE964 Antennas and Propagation 6cp

Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: Topics covered include: wave propagation in the air, signal radiation, antennas and current research developments. The aim of this subject is to provide methods of characterising antenna systems for use in communications.

ECTE965 Wireless Communications 6cp

Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to introduce wireless communication systems, including cellular telephony, personal communications, and wireless local area networks. The contents will consist of: mobile radio channel characterisation, channel access techniques used in wireless systems, error control coding and current research developments. The taught concepts will be illustrated by examples of existing wireless communication systems and those being developed.

ECTE966 Spread Spectrum Communications 6cp

Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to teach students the theory and highlight the major problems involved in application of spread-spectrum communications. The contents will consist of: basic spread-spectrum techniques, principles of code division multiple access (CDMA), design of spreading sequences, detection techniques for CDMA and current research developments. The taught concepts will be illustrated by examples of existing spread-spectrum communication systems.

ECTE967 Mobile Networks 6cp

Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to provide students with the knowledge to evaluate current and emerging mobile networks. Topics covered will include: analogue and digital mobile networks, roaming in mobile networks, GSM standards and principles, GSM network structure, call hand-over analysis, mobility in the Internet, emerging third generation mobile networks and current research developments.

ECTE968 Error Control Coding 6cp

Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The subject includes general concepts of information transmission and covers error-correction techniques applied to data transmission over error-prone (noisy) channels. Topics covered are forward error correction schemes like linear codes, cyclic codes, block codes (e.g. BCH and Reed-Solomon codes), and convolutional codes, as well as error control for channels with feedback, e.g. automatic repeat request (ARQ) coding and current research developments.

ECTE970 Advanced Topics in Engineering 6cp

Not on offer in 2004

Assessment: See Subject Information Sheet.

Subject Description: The aim of ECTE970 is to enable students to further their knowledge and abilities in topics selected from the advanced technical subject areas in the relevant postgraduate program areas. Topics will be selected from the fields of computer and telecommunications engineering or automation and power engineering and will include current research developments.

ECTE971 Robotics Manipulators 6cp

Spring Wollongong On Campus

Contact Hours: 24hrs Lecture/Tutorial/Practical - Weeks 1-7

Exclusions: ELEC973/ECTE471

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The subject provides the knowledge and skills required to model, analyse, design and employ a robotics manipulator. The contents will consist of: Industrial robots as a component of automation, mathematical modelling of a robotics arm, direct and inverse kinematics model, direct and inverse dynamics model, trajectory planning, robot control and current research developments.

ECTE972 Robotics Sensory Control 6cp

Spring Wollongong On Campus

Contact Hours: 24hr Lecture/Tutorial/Practical - Weeks 8-13

Exclusions: ELEC973/ECTE472

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: This subject provides the knowledge and skills required to design appropriate sensors for the intelligent operation of robotics systems. Topics covered include: intelligent operation of robots, industrial vision, hand-eye control of a robot, tactile sensors, force sensors, ultrasound and other sensors, and current research developments.

ECTE973 Advanced Robotics Manipulators 6cp
Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination - 60% Individual and/or group assignments (involving theoretical and practical/laboratory projects) - 30% Oral presentation - 10%

Subject Description: The aim of this subject is to provide students with the knowledge and skills required to model, analyse, design and employ a robotics manipulator. The contents will consist of: Industrial robots as a component of automation, mathematical modelling of a robotics arm, direct and inverse kinematics model, direct and inverse dynamics model, trajectory planning, robot control. Students will be required to undertake an advanced project involving current research developments.

ECTE974 Advanced Robotics Sensory Control 6cp
Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination - 60% Individual and/or group assignments (involving theoretical and practical/laboratory projects) - 30% Oral presentation - 10%

Subject Description: The aim of this subject is to provide students with the knowledge and skills required to design appropriate sensors for the intelligent operation of a robotics systems. Topics covered include: intelligent operation of robots, industrial vision, hand-eye control of a robot, tactile sensors, force sensors, ultrasound sensors, and other sensors. Students will be required to undertake an advanced project involving current research developments.

ECTE981 Internet Protocols 6cp
Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: This subject will provide students with an understanding of protocols used in computer networks. Examples will be drawn from existing networks including the Internet. Students will learn what computer network protocols are and how they work today, and how they are likely to evolve in the future. Topics to be studied will include: LAN medium access control protocols, congestion/flow/error control, routing, addressing, internetworking and current research developments. There will be both written and programming assignments, including a project involving the design and implementation of an exemplar protocol.

ECTE982 Internet Engineering 6cp
Spring Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial per week - Wks 8-13

Exclusions: ECTE482

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: This subject will provide students with an understanding of the design and operation of computer networks, with emphasis on the Internet. Students will learn what networks are and how they work today, and how they are likely to evolve in the future. Topics to be studied will include: design and operation of the Internet (including IPv4, OSPF, BGP, Mobile IP, CIDR, mobile IP, IPv6, TCP, and UDP), the role of ATM in the Internet (including the use of MPOA and MPLS), and mechanisms for engineering networks to provide QoS (such as RSVP, RTP, ATM service classes, and IETF DiffServ). There will be both written and programming assignments.

ECTE983 Computer Networking 6cp
Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to provide students with an understanding of the techniques that are used to provide communication between computer systems. Topics covered will include: modems, addressing, routing, interworking, congestion control in computer networks and current research developments.

ECTE984 Network Design and Analysis 6cp
Not on offer in 2004

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to provide students with the engineering skills to analyse multi-service packet switched networks and systems. Topics covered will include: simulation and numerical techniques in queueing, software tools for analysis of queueing systems and networks, queueing performance analysis of Internet, ATM and mobile multi-service networks, and current research developments.

ECTE985 Internet Communications 6cp
Spring Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial per week - Weeks 1-7

Exclusions: ELEC969/ECTE485

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aim of this subject is to provide students with an understanding of the techniques that are used to provide communication between computer systems. Topics covered will include: layered protocol architectures, circuit and packet switching, asynchronous and synchronous transmission, coding, error detection and correction, flow control and current research developments.

ECTE986 Telecommunications Network Management 6cp

Spring Wollongong On Campus
Contact Hours: 1.5hr Lecture/1hr Tutorial/1hr Practical per week - Weeks 1-7

Exclusions: ELEC965/ECTE486

Assessment: See Subject Information Sheet those presented here are only a guide. Written examinations 70%; Assignments 30%.

Subject Description: The aims of this subject are to provide students with an understanding of the technical issues of telecommunications management, to provide practical hands-on experience of network configuration and management systems and to make students aware of economic, management and political issues in telecommunications management. Topics covered will include: private and public communications systems; LANs and SNMP; integration of voice, data and video in networks; general management issues; international standards; and current research developments.

ECTE991 Internet Fundamentals 6cp

Autumn/Spring Wollongong On Campus

Contact Hours: 3 hours Lecture/Tutorial/Practical per week

Restrictions: For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination Individual and group assignments (involving theoretical and practical/laboratory projects) Oral presentation

Subject Description: The aim of this subject is to provide an overview of the Internet at a system level. In other words, the subject will provide an operational description of the Internet and its main components. The following topics will be covered: Internet evolution and current status, generic network infrastructure and configuration, layered communication architectures and protocols, access technologies, Internet security and management, case studies of Internet applications.

ECTE992 Internet Networking Protocols 6cp

Autumn/Spring Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial per week

Co-requisites: ECTE991

Restrictions: For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination Individual and group assignments (involving theoretical and practical/laboratory projects) Oral presentation

Subject Description: This subject will provide students with an understanding of protocols used in computer networks with a particular focus on Internet networks. Topics to be studied will include: LAN medium access control protocols, congestion/flow/error control, routing, addressing, internetworking; design and operation of the Internet (including IPv4 & 6, OSPF, BGP, Mobile IP, CIDR, TCP and UDP, MPOA, and MPLS) quality of service provisioning (such as RSVP, RTP, IETF DiffServ) and current research developments.

ECTE993 Wireline and Optical Communications 6cp

Spring Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial per week

Co-requisites: ECTE991

Restrictions: For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination Individual and group assignments (involving theoretical and practical/laboratory projects) Oral presentation

Subject Description: This subject will provide a detailed overview of wireline internet access networks and fibre optic techniques. The following topics will be covered: wireline access technologies, high speed modems, xDSL technology for broadband internet access using existing copper loop, cable modem technology, optical fibre technology (including fibre to the home and curb options), optical fibre link design considerations, WDM, optical standards and optical switching techniques.

ECTE994 Wireless and Mobile Communication Systems 6cp

Autumn Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial per week

Co-requisites: ECTE991

Restrictions: For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination Individual and group assignments (involving theoretical and practical/laboratory projects) Oral presentation

Subject Description: The aim of this subject is to provide a detailed overview of wireless and mobile communication systems. The following topics will be covered: mobile radio channel characterisation, channel access techniques, basic spread-spectrum techniques, principles of code division multiple access (CDMA), digital mobile networks (including, GSM and third generation mobile networks). As a special case study, this subject will cover in detail the IEEE 802.11 wireless data network standard and its effective use in a campus environment for Internet access.

ECTE995 Content Servers and Caching Technologies 6cp

Spring Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial per week

Co-requisites: ECTE991

Restrictions: For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination Individual and group assignments (involving theoretical and practical/laboratory projects) Oral presentation

Subject Description: The aim of this subject is to provide a detailed overview of content servers and cache technology. The following topics will be covered: content server technology (including the different classes RADE systems) and their

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comparative performance in terms of functionality, cost and reliability; analyse selection criteria for content servers given a functional specification; caching technology, analyse best practice cache dimensioning and selection guidelines.

ECTE996 Multimedia Communications 6cp

Autumn/Spring Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial/1hr Practical per week

Co-requisites: ECTE991

Restrictions: For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination Individual and group assignments (involving theoretical and practical/laboratory projects) Oral presentation

Subject Description: The aim of this subject is to provide a detailed overview of multimedia communication systems. The following topics will be covered: image and video coding, motion picture expert group (MPEG) and JPEG standards and their functionality, speech and audio coding, speech and audio coding standards for internet applications (Internet telephony), universal multimedia access (UMA) and MPEG 7.

ECTE997 Web Technology and Applications 6cp

Autumn Wollongong On Campus

Contact Hours: 2hr Lecture/1hr Tutorial/Practical per week

Co-requisites: ECTE991

Restrictions: For students not enrolled in the MIT, approval from the MIT Course Co-ordinator is required for enrolment in this subject.

Assessment: See Subject Information Sheet those presented here are only a guide. Final examination Individual and group assignments (involving theoretical and practical/laboratory projects) Oral presentation

Subject Description: The aim of this subject is to provide a detailed overview of web technologies and applications. The following topics will be covered: real-time streaming technologies, embedded Internet devices, web-based intelligent agent technology, web-application case studies (such as distance and flexible delivery of multimedia education, meta catalogue services etc).

GHMD983 Statistics in Health Research 6cp

Autumn Wollongong On Campus

Autumn Wollongong Distance

Contact Hours: 3 hrs per week

Subject Description: Introduces basic statistical concepts and methods. Topics covered: collecting data, designing statistical studies, principles of data presentation; exploratory data analysis, probability and statistical models emphasising binomial and normal distributions; categorical data, contingency tables and the Chi-squared distribution; sampling, sample means and the central limit theorem; inference - point estimation, confidence intervals, testing hypotheses; inference about single parameters; comparing means and proportions, analysis of variance, demography.

IACT901 IT Strategic Planning 6cp

Spring Wollongong On Campus

Intake D Sydney On Campus

Contact Hours: Wollongong 1hr Lecutre, 2 hr Tutorial; Intake D Saturdays 9.30am-4.30pm

Exclusions: BUSS907

Subject Description: The subject is essentially about the application of technology for competitive advantage. Throughout the subject, the spotlight will be trained on techniques and frameworks for "thinking strategically about a company's technological orientation". A wide spectrum of business and technology issues will be covered that address the problems and issues surrounding the analysis and development of an IT strategic plan.

IACT902 Applied Project Management 6cp

Autumn Wollongong On Campus

Contact Hours: Autumn 1 hr Lecture, 2 hr Tutorial per week

Pre-requisites:

Assessment:

Subject Description: This subject deals with the efficient management of a medium size project to ensure that a project meets deadlines and is within its budget. It covers the process of planning, directing and controlling the development of an IT project. Topics covered will include project management tools, software and techniques; expectations management matrices; and use of people management (the subtle art of delegation and accountability). Students will test the principles on the plan, design and implementation of a medium size project.

IACT904 International Telecommunications Policy Issues 6cp

Not on offer in 2004

Subject Description: IACT 904 provides students with an understanding of the policy issues relating to the emergence of political, economic and technological change in international telecommunications. The interdisciplinary foundations of telecommunications policy are examined. Issues in the development of telecommunications policy in Australia and overseas are reviewed as well as the regulatory frameworks adopted by different countries (eg. Australia and the United States) and regions (eg. European Union and South East Asia).

IACT905 Information Technology and Innovation 6cp

Autumn Wollongong On Campus

Intake B Sydney On Campus

Contact Hours: Wollongong 1 hr Lecture, 2 hrs Tutorial; Intake B Saturdays 9.30am-4.30pm

Subject Description: IACT 905 provides students with an understanding of the various political, economic, social and technical factors surrounding information technology and the innovation process. This subject addresses key themes such as: the importance of innovation to the economy and the firm; the links between information, information technology and innovation; and, the development of effective national policies to promote industrial innovation.

IACT906 Business On-Line 6cp

Spring Wollongong On Campus

Contact Hours: 1 hr Lecture, 2hrs Tutorial per week**Assessment:** Group Assignment 25% Tutorial Tests x 5 15% Case Studies x 5 20% Exam 40%

Subject Description: This subject aims to provide students with an understanding of e-business in the context of to-days global business environment. Today most businesses compete in a global environment; a sound business strategy for on-line business is essential to facilitate this. This subject covers key areas of e-business, including: Strategy formulation and implementation; e-branding; service leadership; economics and industry impacts of e-business and Internet effectiveness.

IACT916 Organisational Issues in Information Technology 6cp*Not on offer in 2004*

Subject Description: Effect on organisational information flows of growth in size and complexity: the management and technological response; information technology as a catalyst in codifying work procedures and creating new organisational structures; hierarchical versus horizontal approaches to information management; implications of broad-band networks for traffic integration.

IACT917 Information Management 6cp

Autumn Wollongong On Campus

Contact Hours: 1hr Lecture, 2hrs Tutorial per week**Pre-requisites:** nil

Assessment: Project Proposal - 5%; Seminar Presentation - 10%; Seminar Report - 10%; Participation - 10%; Major Report/Project - 25%; Exam - 40%.

Subject Description: This subject focuses on the importance of information as a resource, on which the knowledge base of successful organisations is dependent. While the main focus of the subject is information management within the organisation, a broader context is important. National and international issues relating to information access will be addressed. These include: standards relating to electronic storage and retrieval of electronic documents (digital archiving); legal protection for information as an economic good (for example as patents, copyright and other forms of intellectual property); and social and ethical issues (eg privacy and security) relating to information management.

IACT918 Corporate Network Management 6cp

Autumn Wollongong On Campus

Intake A Sydney On Campus

Contact Hours: 1hr Lecture, 2hrs Tutorial per week; Intake A Saturdays 9.30am-4.30pm

Subject Description: The subject investigates the documentation and management of telecommunications networks. Topics to be covered include 1. Documenting the Network: requirements capture and specification, functional specification, design specification, documenting the network configuration 2. Managing the Network: influences on the network, management architectures and standards, performance management, fault management, disaster management, managing changes in a network, cost minimisation management 3. Corporate and Regulatory

Requirements: management teams, operations and support, standards and protocols.

IACT919 Online Information Services 6cp

Spring Wollongong On Campus

Contact Hours: 1hr Lecture, 2hrs Tutorial per week

Subject Description: This subject examines the emergence of electronic information supermarkets and the changes within the online information industry as mass media conglomerates have entered the field. Other aspects covered include: the role of government in online services development; the future of public information sources such as libraries; and the potential of the Internet and the world wide web in online information delivery. Some practical experience in the use of electronic information services is provided.

IACT922 Case Studies in Information Technology Applications 6cp

Spring Wollongong On Campus

Contact Hours: 1hr Lecture, 2hrs Tutorial per week

Subject Description: IACT922 examines leading edge technological developments and the issues arising from the innovative uses of such technology. This subject covers innovative and new applications of information technology to create services and systems, eg electronic banking, video conferencing, multimedia, EDI and CD-ROM. In order to provide a thorough background and understanding of an application, normally only one case will be studied in the subject in any one semester. Cases that may be covered include, multimedia, EDI and EFTPOS.

IACT924 Corporate Network Design & Implementation 6cp

Spring Wollongong On Campus

Contact Hours: 1hr Lecture, 2hr Tutorial per week

Subject Description: The subject investigates the design and implementation of a telecommunications network plan. Topics to be covered include (1) The Need for Planning and the Planning Process: planning teams, strategic planning, the network plan, security planning and implementation planning. (2) The Design Process: design teams, translating the plan into design criteria, requirements capture and specification, design requirements and criteria, choosing topographies and architectures, evaluating plans (3) The Implementation Process: implementation teams, validating implementation plans, managing people and technology, managing the implementation process. .

IACT926 Information Society, Knowledge Work and Information Technology 6cp*Not on offer in 2004*

Assessment: Examination 30% Seminar presentation 10% Seminar paper 10% Essay 25% Project 25%

Subject Description: The subject examines the concept of 'information society' and its measurement. It also examines the changing structure of the workforce with an investigation of the place and role of knowledge workers in the labour force being a core element. An examination of the trends affecting knowledge workers in Australia, and internationally, with

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respect to increasing credentialism, life-long learning and issues relating to their education and training will be undertaken. The introduction and application of IT affects each of these areas is therefore another critical component of study.

IACT927 Research Report Part 1 **6cp** *Not on offer in 2004*

Subject Description: This subject involves undertaking a project. Where possible the projects are related to the research interests of the School and/or staff and are chosen to develop the student's research skills. Each student is required to deliver an oral seminar and to prepare a final thesis on the result of the work undertaken.

IACT928 Research Report Part 2 **6cp** *Not on offer in 2004*

Pre-requisites: IACT927

Subject Description: This subject involves undertaking a project. Where possible the projects are related to the research interests of the School and/or staff and are chosen to develop the student's research skills. Each student is required to deliver an oral seminar and to prepare a final thesis on the result of the work undertaken.

IACT930 Special Topics in Information and Communication Technology **6cp**

Autumn Wollongong On Campus

Contact Hours: 1 hr Lecture, 2 hr Tutorial per week

Subject Description: This subject aims to provide the student with an understanding of topics at the forefront of the discipline. Topics will be selected from areas of interest of staff members or visiting staff members to the Department. These will include topics in the application of information and communication technology.

IACT931 Special Topics in Information and Communication Technology A **6cp**

Spring Wollongong On Campus

Contact Hours: 2 hr Lecture, 1 hr Tutorial per week

Exclusions: IACT403, CSC1324

Subject Description: Topics will be selected from areas of interest of staff members or visiting staff members to the School. These will include topics in the application of information and communication technology. IT is a rapidly changing area. This subject will allow investigation into topics at the forefront of the discipline.

IACT932 Special Topics in Information and Communication Technology B **6cp**

Not on offer in 2004

Subject Description: Topics will be selected from areas of interest of staff members or visiting staff members to the Department. These will include topics in the application of information and communication technology. IT is a rapidly changing area. This subject will allow investigation into topics at the forefront of the discipline.

IACT940 Research Methodology **6cp**

Autumn Wollongong On Campus

Contact Hours: 2 hrs lecture per week

Subject Description: This subject introduces the MInfoTech students to research methodology. Topics include the purpose of research, formulating a research question, conducting a literature review and writing a research proposal. Students will gain an understanding of the different research methodologies, including quantitative and qualitative analysis. Students will learn how to design an appropriate research plan. Requirements for scholarly writing will also be discussed and the process of undertaking a research project will be analysed.

IACT950 Research Report **12cp**

Spring Wollongong On Campus

Contact Hours: 1 hr per week

Pre-requisites: IACT940

Assessment: Research report of 12,000 words (90%) and seminar presentation (10%)

Subject Description: This subject involves undertaking a project. Where possible the projects are related to the research interests of the School and/or staff and are chosen to develop the student's research skills. Each student is required to deliver an oral seminar and to prepare a final thesis on the result of the work undertaken.

INFO911 Data Mining and Knowledge Discovery **6cp**

Spring Wollongong On Campus

Contact Hours: 2 hrs per week

Pre-requisites: 36 cp

Subject Description: Introduction to Data Mining and Knowledge Discovery, Data Bases and Warehouses, Data Structures, Exploratory Data Analysis Techniques, Association Rules, Artificial Neural Networks, Tree Based Methods, Clustering and Classification Methods, Regression Methods, Overfitting and Inferential Issues, Use of Data Mining packages

INFO912 Mathematics for Cryptography **6cp**

Autumn Wollongong On Campus

Contact Hours: 6 hr per week

Assessment: Final exam 85%, Assignments 15%

Subject Description: Logic: informal propositional logic, circuit theory. Natural Deduction style proofs in propositional & predicate logic. Interpretations & Models. Nonclassical logics. Number Theory: elementary number theory, modular exponentiation, discrete logarithms, Galois arithmetic & polynomials, error correcting codes & cryptography. Elliptic curves, groups for cryptography. Combinatorics: combinatorial probability, Knapsack problem, network and graph theory, combinatorial designs, game theory & linear programming applied to cryptography.

INFO913 Information Theory 6cp**Spring** Wollongong On Campus**Pre-requisites:** MATH121 or MATH122 or (MATH187 and MATH188), or (MATH141 and MATH142).**Assessment:** Assignments 16%, test 20%, final examination 64%**Subject Description:** The following is a selection of topics which may vary. The idea of probability, entropy, inequalities involving entropy, data compression, Huffman and Fano codes, information sources, McMillan's theorem, communication and capacity, block codes, Shannon's theorems, applications to other areas which may include communication, linguistics, genetics and financial investment.**ITCS905 Systems 6cp****Spring** Wollongong On Campus**Contact Hours:** 2hrs Lecture, 2hrs comp lab per week**Exclusions:** MCS9102**Assessment:** Assignments (40%) Examinations (60%)
Presentation of Project - 10%**Subject Description:** This subject establishes the position of Computer Science and Information Technology in a non-programming context. Areas introduced include Human-Computer Interface, Information Modelling, Intelligent Systems, Networks, Operating Systems, Software Design and Development and Professional ethics, rights and responsibilities.**ITCS907 Java Programming & the Internet 6cp****Autumn/Spring** Wollongong On Campus**Contact Hours:** 3hrs Lecture, 2hrs Comp Lab per week**Pre-requisites:** ITCS902**Exclusions:** MCS9213**Assessment:** Assignments - 50% Final examination - 50%**Subject Description:** This subject provides: 1. an introduction to the Java language and some of its standard class libraries 2. experience with object oriented design and implementation techniques 3. an understanding of the Internet and its importance to modern software systems. Topics will include: Java language, subset of Java class libraries (windowing, graphics, networking, threads), object oriented design and implementation, Internet issues, basics of TCP/IP protocols, Web technologies, HTML and Javascript, CGI programming, introduction to security issues.**ITCS908 Citizens' Rights in the Information Society 6cp****Autumn** Wollongong On Campus**Contact Hours:** 1hr Lecture, 2 hrs Tutorial per week**Exclusions:** MCS9201**Assessment:** 1. 2x Mini report 30% 2. 2x On-line Discussion groups 20% 3. Group report 30% 4. Final report 20%**Subject Description:** This subject will examine the information technology industry which encompasses: telecommunications; computing; broadcasting and publishing. It will analyse the encroachment of industry activities that use electronic media on: citizens' rights in matters of data surveillance; freedom of access to information and ownership of intellectual property.

The extent to which technical solutions to these problems can and cannot be provided will be discussed and alternative non-technical (eg administrative or regulatory) solutions will also be treated. An investigation of the current legal safeguards, their legislative histories and the need for new legislation will be covered.

ITCS921 Database Design and Implementation 6cp**Autumn** Wollongong On Campus**Contact Hours:** 3hr Lectures per week**Exclusions:** MCS9315**Assessment:** 1. Assignments - 3*10% 2. Class tests - 4*5% 3. Final examination - 50%**Subject Description:** This subject investigates the process of relational database design starting from conceptual database design, through logical database design up to and including physical database design, database tuning and administration. The topics will include conceptual database design based on Object Modelling Technique, methodologies for conceptual design, view integration, logical database design, database normalization and de-normalization, physical database design, generation of database applications, database tuning, design of distributed database systems.**ITCS922 Computer Security 6cp****Autumn** Wollongong On Campus**Contact Hours:** 3hrs Lecture, 1hr Practical per week**Exclusions:** MCS9361**Assessment:** The exam contributes 70% to the final mark. The laboratory work contributes 30% to the final mark**Subject Description:** This subject develops the knowledge and skills necessary to identify the security problems that may occur in a distributed computer environment, and then to devise means for countering the threats. Covers: Identification: passwords, challenge-response protocols Private Key Cryptography: classical ciphers, Feistel cryptosystems Public Key Cryptography: RSA, Merkle-Hellman, El-Gamal, Elliptic-Curve cryptosystems Hashing: Birthday paradox, serial and parallel hashing, MD family, keyed hashing Digital Signatures: generic, RSA, El-Gamal, blind, undeniable, fail-stop Key Establishment Protocols: classical key transport, DH agreement, Kerberos, SPX, STS protocol, BAN logic Access Control: MAC, DAC, RBAC, implementations of access control, security kernel, Multics, UNIX, capabilities, access control lists, Network Security: IPsec, viruses, web security, copyright protection .**ITCS923 The Wired World 6cp****Spring** Wollongong On Campus**Contact Hours:** 1hr Lecture, 2hr Tutorial per week**Exclusions:** ITCS910, MCS9303**Assessment:** Exam - 40% Assignment - 60%**Subject Description:** This subject investigates the issues list in the objectives below within the context of world wide networking. Emphasis will be placed on group work with students required to participate in problem solving communications tasks. Web based activities will be an essential element in the conduct of this subject. Other activities may include: the setting up and conduct of a video-

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conference with students at another University, the running of a bulletin board or Internet mailing list or the maintenance of a World Wide Web site. Contributions to this subject have been made by several members of staff within the School.

ITCS929 Concepts and Issues In Healthcare Computing 6cp

Spring Wollongong On Campus

Contact Hours: 1 hr Lecture, 2 hr Tutorial per week

Assessment: Assignment 100%

Subject Description: This subject examines the essential concepts of health computing, limitations of technology, issues of privacy and security, economics of healthcare computing, managing healthcare computing projects, evaluation methods in medical informatics, knowledge engineering in health informatics, risk assessment in health informatics and the important issues involved in computer applications in healthcare.

ITCS930 Introduction to Health Informatics 6cp

Autumn Wollongong On Campus

Contact Hours: 1 hr Lecture, 2 hour Tutorial per week

Exclusions: ITCS430

Assessment: Assignment 100%

Subject Description: The subject covers clinical decision making and decision support systems and how health informatics and health information systems can assist. Topics include decision-making and decision-support systems in healthcare; the reasons for the necessity of systematically processing data, information and knowledge in medicine and healthcare; benefits and constraints of using information and communication technology; principles of practice evaluation and evidence-based care; evaluation methods; processing and evaluating information including analysis of business processes, bio-statistics and epidemiology; the application of statistics; computer concepts; characteristics of health information systems; healthcare systems; patient management; primary care systems and knowledge management.

ITCS931 Advance Web Application Development 6cp

Spring Wollongong On Campus

Contact Hours: 2hrs Lecture, 1hrTutorial per week

Assessment: Assignments Final exam

Subject Description: This subject is an advanced web applications development subject utilizing the visual basic integrated development environment. Requirements analysis and component solution architectures for e-commerce applications will be studied and solutions implemented utilizing advanced features of VB IDE. See Subject Outline for details

ITCS932 Web Design 6cp

Spring Wollongong On Campus

Contact Hours: 2hr Lecture, 1hr Lab per week

Assessment: Assignments 100%

Subject Description: This subject introduces students to the design and programming of multi-tier web sites, where

dynamic pages present data from databases. Programming will be done with frameworks, such as Apple Web Objects to create web applications that support dynamic web pages and object models of databases. Topics include the design and creation of user process, site architecture, elegant page layouts and simple site navigation. Pages will be designed and content created with professional web tools, such as Adobe web tools. Emphasis is placed on user process, good media design, clean architecture and efficient algorithms.

ITCS933 Software Engineering Requirements and Specifications 6cp

Spring Wollongong On Campus

Contact Hours: 2hr Lecture per week

Assessment: Assignments 50% Examination 50%

Subject Description: This subject will demonstrate how software development can be viewed as a kind of engineering - an activity of building useful things to serve recognisable purposes. For software engineers, these useful things are a special kind of machine known as software systems. This subject emphasises the importance of understanding the application domains that software systems interact with and the problems we try to solve in these domains. The subject focuses on writing explicit and precise descriptions known as: (1) Requirements - descriptions of application domains and the problems to be solved there; (2) Specifications - descriptions of the interface between the machine and the application domain. The subject addresses techniques used to record, elicit, and reason about these descriptions. The subject examines the approach to Requirements and Specification techniques taken by a range of systems engineering methodologies. The concepts of method engineering are introduced and the role of software tools to support this activity is discussed.

ITCS934 Software Process Management 6cp

Autumn Wollongong On Campus

Contact Hours: 3hr Lecture, 1hr Tutorial per week

Assessment: Assignments 50% Examination 50%

Subject Description: Software development is a difficult and challenging task. Apart from the most trivial of problems, the software development process is generally a collaborative rather than an individual effort. To manage the development of complex software artifacts, various principles and practices of software engineering have been formulated. Acquainting students with the principles and practices of managing the software development process is the primary aim of this subject.

ITCS935 Software Engineering Formal Methods 6cp

Autumn Wollongong On Campus

Contact Hours: 3hrs Lecture per week

Assessment: Assignments 50% Examination 50%

Subject Description: This subject introduces students to formal methods for software specification. The role of formal methods in the software development process is explained, and it is illustrated with case studies of the industrial application of formal methods. The subject uses the Z notation as an example of a formal specification technique, and

software tools for the manipulation of Z specifications are introduced. Case studies in the application of formal methods to safety-critical and real-time software systems are presented.

ITCS936 Detailed Design of Integrated Solutions for eBusiness 6cp

Spring Wollongong On Campus

Intake C Sydney On Campus

Contact Hours: Wollongong 1hr Lecture, 2hrs Tutorial; Intake C Saturdays 9.30am-4.30pm

Exclusions: ITCS436

Assessment: Assignment 50% Exam 50%

Subject Description: This subject develops the students' understanding of the system development process by taking the student through all the phases of analysis design and construction of an eBusiness solution. The methods adopted provide an in-depth understanding of the logistical problems associated with gathering user requirements, and analysis and design, using the 'Patterns for eBusiness' method.

ITCS937 Security, Risk Management and Control in Electronic Commerce 6cp

Autumn Wollongong On Campus

Contact Hours: 1 hr Lecture, 2 hr Tutorial per week

Pre-requisites: IACT906

Assessment: Tutorial Participation/Exercises/Discussion; Essay; Risk Assessment Project (Major Group Assignment); Seminar Presentation.

Subject Description: This subject aims to provide students with a deep understanding of the security, risk management and regulatory aspects of e-commerce facing businesses in the on-line business environment. Today most businesses compete in a global business environment; a sound business strategy that addresses these issues is essential. This subject covers key issues in e-commerce, including: security options, trusted authorities, secure payment systems for the Internet, the regulatory environment and Government policy; risk management and control.

ITCS938 eBusiness Technologies 6cp

Autumn Wollongong On Campus

Contact Hours: 1hr Lecture, 2hrs Tutorial per week

Restrictions: Not available to MCompStud students

Exclusions: IACT305

Assessment: Mid Session Test 10% Assignment 30% Exam 60%

Subject Description: The subject explores the technology being adopted by organisations and the various means of maximising business potential using Internet technology, including eBusiness (B2B, B2C, B2G etc.). The focus of the course is from the IT professional perspective, giving the student a feel for what is required in a commercial business environment. The technology aspects will cover both developing in house software, as well as selecting 'best practice' outsourced options. Comparisons are drawn between the two adoption methods, and the student is engaged by scenario role playing as part of the group assignments.

ITCS940 Multimedia Programming Foundations 6cp

Autumn/Spring Wollongong On Campus

Contact Hours: 1hr Lecture, 2hrs Lab Tutorial per week

Assessment: Programming Assignments - 60% Final exam - 40%

Subject Description: This subject provides an introduction to multimedia programming by exploring multimedia infrastructure and developing skills in the programming technologies used in multimedia. Infrastructure includes both how the elements of a multimedia system relate, for example MPEG 21, and foundational concepts used in producing multimedia, for example matrix transforms, simulations, kinematics and the dynamics of motion. Programming technologies include OO programming, 2D graphics, simple image and audio processing in Java; web presentation technologies such as SMILE; multimedia messaging; and an overview of multimedia applications programming interfaces, such as Java media framework and QuickTime, XML, and authoring and scripting languages. This will be studied in the context of the broad range of multimedia techniques and the social and ethical issues involved.

ITCS941 Multimedia Graphics 6cp

Not on offer in 2004

Assessment: Assignments (Programming and/or essay) - 60% Exam - 40%

Subject Description: This subject explores the creation of graphics for multimedia applications, covering graphics theory, programming and creative tools. It will commence with an overview of 2D graphics, including an examination of the support for 2D graphics in languages, such as Java 2D and their use in creative tools, such as Adobe Illustrator. It will focus on 3D graphics. Theory topics include basic three dimensional theory, reflection models, shading techniques, rendering, event models of user interaction, parametric representations, anti-aliasing, compositing of images, colour management, ray tracing, radiosity, shadows, texture, colour science and simple animation. Programs will be implemented in a common graphics language used in multimedia, such as OpenGL. The subject will compare and contrast it to other graphics programming technologies used in multimedia, such as MPEG-4 objects, Java 3D and VRML.

ITCS942 Multimedia 3D Modelling and Animation 6cp

Not on offer in 2004

Assessment: Individual Assignments - 30% Group project - 30% Exam - 40%

Subject Description: This subject studies the design, creation and animation of 3D models with a professional 3D modelling tool, such as Lightwave. Model design and creation topics include coordinate frames, solids of revolution, designing objects from a set of 3D primitives, lighting, design for motion, textures, filters, shading, effects, inverse kinematics, rendering and surface modelling. Animation involves the theory of object motion and relative motion between components of an object, the practical problems of rendering images to visualise motion, the creative skills of coordinating image sequences with audio (voice, music and sound effects) and the programming of

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images and audio into timed sequences to produce movies in multimedia formats, such as MPEG-1 and QuickTime.

ITCS943 Game Design and Programming 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr Lecture, 1 hr Lab/Tutorial

Assessment: Assignments - 40% Essay - 20% Oral presentation - 10% Group project - 30% Exam - 40%

Subject Description: This subject studies the design and implementation of games engines, artificial intelligence and media creation for different genres of games. It starts with the design of game play within the context of different genres of games. It examines in detail the technical requirements of games engines both for playing the game and presenting the multimedia to the user. A significant component of the subject is the use of artificial intelligence (expert systems, fuzzy logic and simulation) to make the game appear intelligent to the user.

ITCS945 Multimedia Project 12cp

Spring 04/Sum 05 Wollongong On Campus

Contact Hours: Regular meeting with supervisor

Pre-requisites: 24 cp of subjects from Master of Multimedia Technologies with $\geq 75\%$ average

Assessment: Multimedia Seminars - 10% Project proposal - 10% Regular appraisals - 10% Project report - 70%

Subject Description: This subject involves undertaking a project in an area of multimedia. Projects will be closely aligned to the content of the subjects in the Master of Multimedia, and related to the research interests of the staff. They will be chosen to develop the student's research skills. Each student will deliver a seminar on a recent paper in the area of their project. Also, each student will prepare a final thesis and deliver a multimedia seminar about the work undertaken.

ITCS949 MIIT Research Project 12cp

Annual/Spring Wollongong On Campus

Contact Hours: Regular meetings with supervisor

Assessment: Project management (10%) Project proposal (10%) Regular appraisals (10%) Project report (70%)

Subject Description: This subject involves undertaking a project related to the student's employment. The projects are to be closely aligned with current developments in IT, ideally associated with project development or management and are chosen to develop the student's research skills. Each student is required to deliver an oral seminar and to prepare a final thesis on the result of the work undertaken.

ITCS950 Patterns for eBusiness 6cp

Autumn Wollongong On Campus

Contact Hours: 1hr Lecture, 2hrs Tutorial per week

Exclusions: CSCI942

Assessment: Assignments (60%) Exam (40%)

Subject Description: This subject explores advanced 'pattern-oriented' approaches to the design and development of eBusiness solutions. The 'Patterns for eBusiness' initiative provides a conceptual framework that can be exploited at all

stages in the eBusiness software lifecycle. In particular, this conceptual framework and vocabulary bridges the communications gap between business analysts and systems developers seeking to devise integrated solutions for eBusiness.

ITCS951 Web Services for Dynamic eBusiness 6cp

Spring Wollongong On Campus

Contact Hours: 1hr Lecture, 2hrs Tutorial per week

Exclusions: ITCS451

Assessment: Assignments (60%) Exam (40%)

Subject Description: Web Services are at the core of what is being termed the next generation of eBusiness. The term 'Web Services' refers to the set of standard protocols and associated technologies that enable software applications to communicate with each other across the Internet. To effectively exploit the potential of Web Services requires appropriate effort in the proper design of business processes and service architectures.

MATH902 Solution to Differential Equations By One-Parameter Groups 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr per week

Assessment: Assignments 25%; presentation 5%; final exam 70%.

Subject Description: One-parameter groups and Lie series, linear ordinary differential equations, first and second order ordinary differential equations, linear and non-linear partial differential equations.

MATH903 Mean Periodic Functions 6cp

Not on offer in 2004

Subject Description: An introduction to L. Schwartz's theory of mean periodic functions using the transform of J P Kahane. Applications to differential equations.

MATH904 Stability for Partial Differential Equations 6cp

Not on offer in 2004

Assessment: Assignments and examination

Subject Description: This subject is concerned with parabolic and elliptic partial differential equations. The main topic is the stability of solutions under changes in initial values or other parameters connected with the equations. Some of the tools that will be used are an analysis of the spectrum for elliptic operators and the Linearization Principle.

MATH905 Functional Analysis and Control Theory 6cp

Not on offer in 2004

Assessment: Assignments and examination

Subject Description: This subject introduces several function spaces and then examines how they can be used in the theory of partial differential equations and control theory. Some of the topics considered will be the existence and uniqueness of solutions for hyperbolic and parabolic partial differential equations and the exact controllability for systems governed by the wave equation.

MATH912 Mathematics of Microwave Heating 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr per week

Subject Description: Electrostatics, Gauss' law, magnetic fields, induction, Maxwell's equations, the damped wave equation, the forced heat equation, solutions of microwave heating for constant conductivity, temperature dependent conductivity, hotspots.

MATH913 Fluid Mechanics and Wave Theory 6cp*Not on offer in 2004*

Subject Description: Hyperbolic partial differential equations, conservation laws, shallow water equations, dispersive waves, solution theory, gas dynamics, shock waves, flow past bodies, conformal mapping, aerofoil theory.

MATH914 Analytic Dynamics 6cp*Not on offer in 2004*

Subject Description: Lagrangian and Hamiltonian formulations, symmetry and conservation laws. Regular and chaotic motion. Strange attractors.

MATH915 Applied Non-Linear Partial Differential Equations 6cp*Not on offer in 2004*

Subject Description: Fluid flow in porous media. Exact solution of related nonlinear boundary value problems. Introduction to inverse scattering transforms and soliton equations. Tests for integrability of a nonlinear equation. Chaotic flows.

MATH916 Heat Conduction and Moving Boundary Problems 6cp*Not on offer in 2004*

Subject Description: Solutions of the heat equation, semi-infinite media, solution by Fourier series, solutions by heat-balance, classical moving boundary problems, large Stefan number expansions, integral formulation, bounds, integral equations, polynomial approximations, boundary fixing series solutions.

MATH917 Advanced Numerical Analysis 6cp*Not on offer in 2004*

Subject Description: Solution of Ordinary and Partial Differential Equations. Integration including multiple integration. Solution of Integral Equations. The algebraic eigenvalue problem.

MATH918 Computational Fluid Mechanics 6cp*Not on offer in 2004*

Subject Description: Finite-difference and finite element methods applied to incompressible inviscid flow problems and incompressible viscous flow problems. Introduction to Boundary-element technique and its application to potential flows. The relationship between these numerical approaches will also be discussed.

MATH921 Advanced Functional Analysis 6cp*Not on offer in 2004*

Subject Description: Normed spaces, Banach spaces, linear operators, applications of the theory of linear operators to other areas of analysis such as Fourier analysis, quadrature formulae and integral equations.

MATH922 Harmonic Analysis 6cp*Not on offer in 2004***MATH923 Measure and Integration 6cp***Not on offer in 2004*

Subject Description: Lebesgue measure and more general measures, measurable functions, Lebesgue integration and its properties, behaviour of integrals under taking limits, product integrals.

MATH924 Distributions 6cp*Not on offer in 2004*

Subject Description: Mikusinski's theory of convolution quotients and an introduction to L. Schwartz's theory of distributions. Properties of the space of continuous functions of a single real variable (equipped with a suitable topology) and dual space.

MATH925 Topics in Algebra 6cp*Not on offer in 2004*

Subject Description: Partially ordered sets, lattices, modular lattices, Boolean Algebras and Boolean rings, orthomodular lattices.

MATH926 Logic and Set Theory 6cp

Spring Wollongong On Campus

Contact Hours: 2 hours per week

Subject Description: Axiomatic propositional and predicate logic, nonclassical logics, applications to circuit theory and logic programming, introduction to Axiomatic Set Theory.

MATH927 Combinatory Logic 6cp*Not on offer in 2004*

Subject Description: Introduction to Pure and Illature combinatory logic, relation to lambda-conversion, functionality, application to propositional and predicate calculus.

MATH928 Advanced Measure Theory 6cp*Not on offer in 2004*

Subject Description: Construction of outer, measures, Hausdorff measures, signed measures, Radon-Nikodym theorem, differentiation of measures.

MATH929 General Topology 6cp
Not on offer in 2004

Subject Description: This subject is a systematic discussion of topological spaces and associated concepts which are of fundamental importance in various areas of mathematics. The topics covered will include topologies, bases and sub bases for topologies, separation properties of topologies, product and quotient topologies, and connectedness and compactness. Depending upon students' interests and backgrounds, excursions into the following or other areas are possible: topological groups, programming language semantics, elementary algebraic topology, dimension theory and cardinal invariants.

MATH931 Statistical Behaviour in Dynamical Systems 6cp

Spring Wollongong On Campus

Subject Description: Two different statistical phenomena in dynamical systems are considered; recurrence and averaging. In tossing an unbiased coin, recurrence is illustrated by eventually obtaining 'heads', while averaging is illustrated by obtaining approximately the same number of 'heads' and 'tails' over a large number of tosses. The ideas are discussed in the context of systems on an interval, probability and general ergodic theory. Applications will be discussed, and these may include number theory, information theory, mathematical economics, chaos and statistical mechanics.

MATH941 Financial Calculus and Logistics 6cp

Autumn Wollongong On Campus

Contact Hours: 3 hr per week

Exclusions: Not to count with MATH317

Assessment: Assignments 30%, Exam 70%.

Subject Description: MATH941 is an compulsory subject for students enrolled in the Master of Financial Mathematics degree. The subject consists of two sections: Financial Calculus: This is an introductory mathematical modelling course into the rapidly accelerating area of financial derivatives. It explores the properties of options and provides a theoretical framework within which these options can be valued and hedged. Logistics: This section introduces general principles of mathematical logistics, using inventory modelling as the main example.

MATH942 Numerical Methods in Finance 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr per week

Exclusions: Not to count with MATH321

Assessment: Laboratory 20% Assignments 10%, Exam 70%.

Subject Description: MATH942 is designed to develop practical skills in numerical and computational mathematics to solve problems that have no analytic solution. Various numerical techniques, such as Newton's iteration method, finite difference and finite element methods, for solving algebraic as well as differential equations are discussed. Methods that are particularly of interest for finance problems such as the Monte Carlo method and the binomial method are also studied.

MATH943 Practitioner's Seminars and Industrial Practice 2cp

Annual Wollongong On Campus

Contact Hours: 1 hr per week

Assessment: Seminar participation 30%, Report 70%.

Subject Description: MATH943 is designed to let students enrolled in Master of Financial Mathematics to develop a knowledge base for the state-of-the-art technology and skills required in business and finance. Leading experts in industry relate first-hand experiences of problems and techniques that arise in the financial industry. Students will be required to hand in reports on the topics discussed in the seminars, two weeks after each seminar is presented.

MATH971 Advanced Topics in Applied Mathematics A 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr per week

Subject Description: Topics will be selected from the areas of interest of staff members or visiting staff members of the School. In 2000, the special topic will be Elasticity and Fracture Mechanics.

MATH972 Advanced Topics in Applied Mathematics B 6cp

Autumn/Spring Wollongong On Campus

Contact Hours: 2 hr per week

Subject Description: Topics will be selected from the areas of interest of staff members or visiting staff members of the School.

MATH973 Advanced Topics in Pure Mathematics A 6cp
Not on offer in 2004

Subject Description: Topics will be selected from the areas of interest of staff members or visiting staff members of the School. These may include topics in Analysis, Algebra, Logic or Number Theory.

MATH974 Advanced Topics in Pure Mathematics B 6cp
Not on offer in 2004

Subject Description: Topics will be selected from the areas of interest of staff members or visiting staff members of the School. These may include topics in Analysis, Algebra, Logic or Number Theory.

MATH977 Advanced Topics in Mathematics A 6cp
*Not on offer in 2004***MATH978 Advanced Topics in Mathematics B** 6cp
Not on offer in 2004

MATH980 Preliminary Topics in Mathematics A 6cp

Autumn Wollongong On Campus

Contact Hours: 3hr per week**Subject Description:** A selection of topics will be available from time to time to serve as preliminary material in the Master of Mathematics.**MATH981 Preliminary Topics in Mathematics B 6cp**

Spring Wollongong On Campus

Contact Hours: 3 hr per week**Subject Description:** A selection of topics will be available from time to time to serve as preliminary material in the Master of Mathematics.**MATH982 Preliminary Topics in Mathematics C 6cp***Not on offer in 2004***MATH989 Project Part 1 6cp***Not on offer in 2004***MATH990 Project Part 2 6cp**

Autumn/Spring Wollongong On Campus

Co-requisites: MATH188**MATH991 Project 12cp**

Annual Wollongong On Campus

Spring 04/ Aut 05 Wollongong On Campus

MCS9102 Systems 6cp

Spring Wollongong On Campus

Contact Hours: 4 hrs Lecture; 2 hrs Lab/Tutorial per week**Exclusions:** ITCS905**Assessment:** Assignments (40%) Examinations (60%)**Subject Description:** This subject establishes the position of Computer Science and Information Technology in a non-programming context. Areas introduced include Human-Computer Interface, Information Modelling, Intelligent Systems, Networks, Operating Systems, Software Design and Development and Professional ethics, rights and responsibilities.**MCS9103 Algorithms and Problem Solving 6cp**

Autumn/Spring Wollongong On Campus

Contact Hours: 4 hours Lecture, 2 hours Laboratory/Tutorial per week**Assessment:** Assignments (40%) Examinations (60%)**Subject Description:** This subject introduces the basic concepts of algorithms and their relationship to data structures and problem solving. This subject emphasises problem solving techniques leading to the development of algorithms rather than their implementation or a formal mathematical treatment of algorithms. Topics include sorting, searching and counting problems and the principal algorithms used in their solution.

Common approaches to algorithm development and analysis will be examined.

MCS9112 Theory of Computer Science 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 1 hr Tutorial per week**Exclusions:** ITCS916**Assessment:** 1.6 Assignments 40% 2. Final Examination 60%**Subject Description:** The concepts of algorithms and computability together with techniques for analysis of the efficiency and complexity of algorithms are studied. Logical formalisms and their application in computing environments and the use of logical reasoning in establishing the correctness of implementations of algorithms are discussed. The abstract models such as finite state machines, pushdown automata and Turing machines are treated.**MCS9114 Procedural Programming 6cp**

Autumn/Spring Wollongong On Campus

Contact Hours: 4 hr Lecture; 2 hr Laboratory/Tutorial per week**Exclusions:** ITCS901**Assessment:** Assignments (40%) Examinations (60%)**Subject Description:** This subject introduces the procedural approach to program design and implementation. Covers basic language constructs for defining variables of built-in types, flow control constructs and simple I/O. Explores functional decomposition as a design technique, and the implementation of functions. Introduces simple user-defined data types and aggregates.**MCS9124 Object Programming 6cp**

Spring Wollongong On Campus

Contact Hours: 4 hr Lecture; 2 hr Laboratory/Tutorial per week**Pre-requisites:** MCS9114 & MCS9103**Exclusions:** ITCS902**Assessment:** Exam - 60% Assignment - 40%**Subject Description:** this subject develops skills in object-oriented program design and implementation. Covers characterisation of abstract data types and their realisation as classes. Explores the implementation of standard data types including lists, binary trees, queues. Investigates implementation of standard searching and sorting algorithms. Provides experience in the use of dynamic data structures.**MCS9201 Information Technology & Citizens' Rights 6cp**

Autumn Wollongong On Campus

Contact Hours: 1 hr Lecture, 2 hr Tutorial per week**Exclusions:** ITCS908**Assessment:** 1. 2x Mini report 30% 2. 2x On-line Discussion groups 20% 3. Group report 30% 4. Final report 20%**Subject Description:** This subject will examine the information technology industry which encompasses: telecommunications; computing; broadcasting and publishing. It will analyse the encroachment of industry activities that use electronic media on: citizens' rights in matters of data surveillance; freedom of

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access to information and ownership of intellectual property. The extent to which technical solutions to these problems can and cannot be provided will be discussed and alternative non-technical (eg administrative or regulatory) solutions will also be treated. An investigation of the current legal safeguards, their legislative histories and the need for new legislation will be covered.

MCS9203 Algorithms and Data Structures 6cp

Autumn Wollongong On Campus

Contact Hours: 3 hr Lecture, 2 hour Laboratory per week

Pre-requisites: MCS9124 or ITCS902

Exclusions: ITCS918

Assessment: assignments 40%; final exam 60%

Subject Description: Approaches to analysing algorithm complexity, introduced in earlier subjects, will be reviewed. The use of abstract data types as a design technique, and their implementation in solutions to problems, will form a large part of the subject. The concept of efficient code and ways to measure efficiency (both empirically, by timings, and theoretically) will be studied.

MCS9204 The C Family and Unix 6cp

Autumn/Spring Wollongong On Campus

Contact Hours: 4 hr Lecture, 2 hr Laboratory per week

Pre-requisites: MCS9124 or ITCS902

Exclusions: Not to count with ITCS903

Assessment: Assignments 40% Final Examination 60%

Subject Description: Students will be introduced to the C programming language and the UNIX operating system. Particular attention will be paid to the differences that exist between C and C++ and ways in which C++ constructs can be implemented in C. The tools available in the UNIX environment for program development and maintenance will be covered plus the methods of interfacing code to operating system functions, and libraries such as the C++ Standard Template Library.

MCS9205 Development Methods & Tools 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 2 hour Laboratory per week

Pre-requisites: MCS9121

Assessment: 50% for a final examination. 50% for assignments

Subject Description: To provide students with practical skills and knowledge of systems analysis and design techniques. Students will be given instruction in a particular, standard analysis and design method. The techniques and phases of the selected method will be treated thoroughly and in detail. The instruction will utilise case studies, and it will be supported by Computer Aided Software Engineering (CASE) technology. In addition to individual learning, students will be introduced to group analysis and design activities.

MCS9212 Interacting Systems 6cp

Autumn Wollongong On Campus

Contact Hours: 3 hr Lecture, 2 hr Laboratory/Tutorial per week

Pre-requisites: MCS9102 or ITCS905

Exclusions: ITCS909

Assessment: Assignments 40% Final Exam 60%

Subject Description: This subject examines the relationships between the program and its environment: with the user via a consideration of HCI and graphical interfaces; with the computer via the operating system; with data via the file system and with other programs via the network.

MCS9213 Java Programming & the Internet 6cp

Autumn Wollongong On Campus

Spring Wollongong On Campus

Contact Hours: Autumn 3 hr Lecutre, 2 hr Laboratory per week

Pre-requisites: MCS9124

Exclusions: ITCS907

Assessment: assignments 50%; exams 50%

Subject Description: This subject provides: 1. an introduction to the Java language and some of its standard class libraries 2. experience with object oriented design and implementation techniques 3. an understanding of the Internet and its importance to modern software systems. Topics will include: Java language, subset of Java class libraries (windowing, graphics, networking, threads), object oriented design and implementation, Internet issues, basics of TCP/IP protocols, Web technologies, HTML and Javascript, CGI programming, introduction to security issues.

MCS9214 Distributed Systems 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 1 hr Laboratory per week

Assessment: assignments 40%; exam 60%

Subject Description: This subject introduces basic concepts of internetworking and distributed systems. Physical communications media are introduced, then the focus shifts to network protocols (TCP/IP), then client-server model and the sockets interface. Other topics to be covered include network addressing and security (firewalls). Real-world programming examples from Unix and Windows-NT environments will be presented. Students will undertake laboratory exercises on Linux-based PCs.

MCS9235 Database Systems 6cp

Autumn/Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 2 hr Laboratory per week

Assessment: 1.Assignments- 25% 2. Class tests - 15% 3. Final examination- 60%

Subject Description: This subject investigates three major areas of modern database systems: 1. design of relational databases br 2. programming of relational databases br 3. concurrency control and data recovery in database systems br Topics will include: Introduction to conceptual database modelling; Principles of relational database model; Structured Query Language (SQL) and its procedural extensions (PL/SQL, Embedded SQL, JDBC); Database server programming; Normalization of relational databases; and Transaction management and recovery in database systems

MCS9301 Information and Communication Security Issues 6cp

Spring Wollongong On Campus

Contact Hours: 1 hr Lecture, 2 hr Tutorial per week**Pre-requisites:** MCS9201**Assessment:** Assignment 1- 10%; Seminar presentation + seminar 40% Exam 50%

Subject Description: This subject will examine current controls, both legislative and technical, aimed at maintaining data integrity, ease of access to information, and protection of ownership, in the light of on going developments in computer security, multimedia communications, international electronic networks, and electronic publishing. The subject will cover communication security; issues relating to the monitoring of international agreements; OECD guidelines for security of information; maintaining privacy provisions; password security; and future IT developments and their implications for monitoring intellectual property rights and communication security.

MCS9303 World Wide Networking 6cp

Spring Wollongong On Campus

Contact Hours: 1 hr Lecture, 2 hr Tutorial/Laboratory per week**Pre-requisites:** MCS9102**Exclusions:** ITCS910, ITCS923**Assessment:** Exam - 40% Assignment - 60%

Subject Description: This subject investigates the issues list in the objectives below within the context of world wide networking. Emphasis will be placed on group work with students required to participate in problem solving communications tasks. Web based activities will be an essential element in the conduct of this subject. Other activities may include: the setting up and conduct of a video-conference with students at another University, the running of a bulletin board or Internet mailing list or the maintenance of a World Wide Web site. Contributions to this subject have been made by several members of staff within the School.

MCS9315 Database Design and Implementation 6cp

Autumn Wollongong On Campus

Contact Hours: 3 hr Lectures per week**Pre-requisites:** MCS9235**Exclusions:** ITCS921**Assessment:** 1. Assignments – 3x10% 2. Class tests - 4x5% 3. Final examination - 50%

Subject Description: This subject investigates the process of relational database design starting from conceptual database design, through logical database design up to and including physical database design, database tuning and administration. The topics will include conceptual database design based on Object Modelling Technique, methodologies for conceptual design, view integration, logical database design, database normalization and de-normalization, physical database design, generation of database applications, database tuning, design of distributed database systems.

MCS9317 Database Performance Tuning 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 2 hr Laboratory per week**Pre-requisites:** MCS9235**Assessment:** Assignments 20% Tests 20% Final examination 60%

Subject Description: The subject addresses the performance problems of relational database systems. In particular, it presents optimisation of query processing in relational database systems, performance tuning of database applications, transaction processing in database systems, optimisation of transaction processing, performance tuning of relational database servers, performance tuning of three tier database applications. Laboratory classes demonstrate the techniques used for elimination of performance problems in database systems. Oracle 9i database management system is used for demonstration purposes and all practical work in the subject.

MCS9322 Systems Administration 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 1 hr Laboratory per week**Pre-requisites:** MCS9204**Assessment:** Assignments 40%; Final Examination 60%

Subject Description: This subject will cover the practical and theoretical aspects of system administration. The various resource areas which have to be managed will be discussed and examined, and the possible methods of monitoring and controlling them in various systems will be investigated. The features unique to both single processor and networked systems will be investigated.

MCS9323 Artificial Intelligence 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 1 hr Laboratory per week**Pre-requisites:** MCS9114**Assessment:** Final Examination 60% Laboratory Assignments 20% Term project 20%

Subject Description: This subject reviews the main components of Artificial Intelligence research including knowledge representation, reasoning, natural language understanding, and perception. Focuses on Expert Systems and the computational models they embody. Introduces the programming languages Lisp and Prolog.

MCS9324 Human Computer Interface 6cp

Spring Wollongong On Campus

Contact Hours: 2 hr Lecture, 1 hr Tutorial per week**Assessment:** Final Exam 40% Assessment 60%

Subject Description: This subject examines the design evaluation and implementation of interactive computing systems for human use (HCI) and the major phenomena surrounding them. Also considered are joint performance of tasks by humans and machines, structure of human machine communication, social and organizational interactions with machine design, human capabilities to use machines including their learnability as well as algorithms and programming of the interface itself, engineering concerns that

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arise in designing interfaces, the process of specification design and implementation of interfaces and design tradeoffs.

MCS9334 Real Time Programming 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 1 hr Laboratory per week

Pre-requisites: MCS9114

Assessment: Five assignments at 8% each = 40% Final examination (3 hours) = 60%

Subject Description: The emphasis of this subject is on low-level interfacing of computer peripherals in high-level languages. Students will be required to complete a number of practical assignments. Topics to be covered will include (a) IBM PC Programmer's model, (b) interrupt handling, (c) I/O registers, (d) data input, error detection and correction, filtering, storage and output, (e) programmable chips for digital, serial, analog and disk I/O, graphics, memory management and real-time clocks. It should be noted that according to Course Rule 003 {Interpretation Point 2 (t)} each credit point for a single session subject has the value of about 2 hours per week including class attendance. Therefore, the amount of time spend on each 6 credit point subject should be at least is at least 12 hours per week, which includes lectures/tutorials/labs etc.

MCS9337 Organisation of Programming Languages 6cp

Spring Wollongong On Campus

Contact Hours: 3 hr Lecture, 1 hr Laboratory per week

Pre-requisites: MCS124

Assessment: Assignments 40% Exam 60%

Subject Description: This subject develops an understanding of major programming paradigms including imperative, functional, logical, object-oriented, and procedural paradigms. Introduces formal language specification. Covers language definition and syntax; data types and data structures, control structures and data flow; run-time considerations; and interpreted languages.

MCS9361 Computer Security 6cp

Autumn Wollongong On Campus

Contact Hours: 3 hr Lecture per week

Pre-requisites: MCS9124

Exclusions: ITCS922

Assessment: The exam contributes 70% to the final mark The laboratory work contributes 30% to the final mark

Subject Description: This subject develops the knowledge and skills necessary to identify the security problems that may occur in a distributed computer environment, and then to devise means for countering the threats. Covers: Identification: passwords, challenge-response protocols Private Key Cryptography: classical ciphers, Feistel cryptosystems Public Key Cryptography: RSA, Merkle-Hellman, El-Gamal, Elliptic-Curve cryptosystems Hashing: Birthday paradox, serial and parallel hashing, MD family, keyed hashing Digital Signatures: generic, RSA, El-Gamal, blind, undeniable, fail-stop Key Establishment Protocols: classical key transport, DH agreement, Kerberos, SPX, STS protocol, BAN logic Access Control: MAC, DAC, RBAC, implementations of access control,

security kernel, Multics, UNIX, capabilities, access control lists, Network Security: IPsec, viruses, web security, copyright protection .

MCS9457 Advanced Topics in Database Management 6cp

Spring Wollongong On Campus

Contact Hours: 2 hr Lecture per week

Pre-requisites: MCS9315

Exclusions: CSCI957

Assessment: Implementation project (20%) mini research project (30%) final examination (50%)

Subject Description: This subject covers two advanced topics from modern database management systems: object-oriented databases and transaction management in database systems. The topics include the details such as design and implementation of object-oriented database systems, hybrid transaction management, optimistic transaction management, nested transactions, management of long transactions, and management of transaction in distributed systems.

STAT901 Modern Inference 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr per week

Subject Description: Introduction to programming in S-Plus; bootstrap methods; Monte-Carlo methods; permutation tests; nonparametric regression; the sign, Kruskal-Wallis and Spearman tests and extensions of them; ties.

STAT902 Advanced Data Analysis 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr per week

Assessment: Assignments 30%; exam 70%.

Subject Description: A selection of topics from: Regression model building and checking; Causal modelling; Cluster analysis; Multi-dimensional scaling; Log-linear models; Generalised linear models; Time series methods; Principal components, Factor analysis; Canonical correlations; Statistical computer packages.

STAT903 Survey Design and Analysis 6cp

Spring Wollongong On Campus

Contact Hours: 2 hr per week

Assessment: assignments 20%, reports 10%; exam 70%

Subject Description: Survey methods - survey development; Cluster and multi-stage sampling; Repeated and longitudinal surveys; Non-sampling errors; General methods of variance estimation; Small area estimation; Non-response adjustment; Analysis of complex survey data; Report writing.

STAT904 Statistical Consulting 6cp

Spring Wollongong On Campus

Contact Hours: 2 hr per week

Subject Description: Project management; Client liaison; Problem identification; Consulting ethics and principles; Sources of data; Choosing design and analysis procedures;

Common problems in statistical consulting; Setting sample size - power calculations; Consulting case studies; Report writing.

STAT905 Time Series **6cp**
Not on offer in 2004

Subject Description: Prediction theory; Linear models; identification, estimation, diagnostic checking; Multivariate models.

STAT906 Experimental Design **6cp**
Not on offer in 2004

Subject Description: The general linear model; Complete and incomplete block designs; The construction of optimal block designs; Factorial designs and fractional factorial designs; Response surface methodology.

STAT920 Stochastic Methods in Finance **6cp**
Autumn Wollongong On Campus

Contact Hours: 3 hr per week

Assessment: Assignments 30%; exam 70%.

Subject Description: STAT920 covers necessary probabilistic concepts and models such as linear stochastic models, nonlinear stochastic models and nonlinear chaotic models used in finance. Topics discussed in this subject also include martingale methods, stochastic processes, optimal stopping, the modeling of uncertainty using a Wiener process, Ito's formula as a tool of stochastic calculus, fundamentals of stochastic differential equations and the applications of these methods to finance.

STAT921 Multiple Regression and Time Series **6cp**
Spring Wollongong On Campus

Contact Hours: 3 hr per week

Assessment: Assignments 40%; exam 60%.

Subject Description: STAT921 is an advanced course covering relationships between variables and the analysis of observational studies and designed experiments. Topics covered include multiple linear regression, non-linear regression, generalised linear regression, ARIMA models, forecasting of time series and Box-Jenkin's approach.

STAT922 Statistical Inference and Multivariate Analysis **6cp**

Autumn Wollongong On Campus

Contact Hours: 3 hr per week

Exclusions: Not to count with STAT333.

Assessment: Assignments 30%; exam 70%.

Subject Description: STAT922 covers inference (estimation and hypothesis testing) in both one and many dimensions. Topics covered include transformations, maximum likelihood and minimum variance unbiased estimation, the likelihood ratio, score and Wald tests, vector random variables, the multivariate Normal distribution, principal components analysis, factor analysis and discriminant analysis.

STAT923 Operations Research and Applied Probability **6cp**

Spring Wollongong On Campus

Contact Hours: 3 hr per week

Exclusions: Not to count with STAT304

Assessment: Assignments 30%, Exam 70%

Subject Description: The operations research component includes linear programming, simplex algorithm, duality, sensitivity analysis, transportation and assignment problems, integer programming, and use of computer software. The applied probability component includes Markov chains, birth and death processes and queuing theory.

STAT941 Statistical Quality Control 1 **6cp**
Not on offer in 2004

Subject Description: Why control charts?; Level of variability; Differences between specification limits and control limits; Deming's philosophy; Quality circles; Cause and effect diagrams; Pareto diagrams; Control charts; Benefits of using control charts; Shewhart charts, such as x-charts, c-charts, p-charts, R-charts, s-charts; Cumulative sum (CUSUM) control charts; Exponentially weighted moving averages; Moving average and moving range charts; Average run length of the above mentioned control charts; Comparison of charting methods; Process capability indices; Determining process capability using control charts; Some case studies.

STAT942 Design and Analysis For Quality Control **6cp**
Not on offer in 2004

Subject Description: Experimental design; Principles of design; Importance of randomisation; Randomised block designs; Factorial designs; Fractional factorials; Taguchi's philosophy and how it relates to experimental design; Introduction to variance components; Fixed models as opposed to random (mixed) models; Estimation of variance components; Evolutionary processes.

STAT943 Statistical Quality Control 2 **6cp**
Not on offer in 2004

Pre-requisites: MATH188

STAT944 Regression and Observational Studies **6cp**

Not on offer in 2004

Subject Description: Linear regression; Regression diagnostics; Multicollinearity; Residual analysis; Response surface methodology; Logistic regression; Planning of observational studies; Effects of matching and covariates as controls. Concepts of confounding.

STAT949 Statistical Thinking **6cp**
Not on offer in 2004

Subject Description: The importance of variability; Why statistics?; Statistics and quality; Exploratory data analysis;

Subject Descriptions

Numerical and graphical summaries; Measures of location and spread; Elementary probability; The Binomial; Poisson and Normal Distributions; The role of the Central Limit Theorem in statistics; The nature and purpose of statistical inference; Point estimation and confidence intervals; Concepts of hypothesis testing; Simulation techniques; Sampling methods; Elementary control charts.

STAT955 Sample Surveys and Experimental Design (With Project) 8cp

Autumn Wollongong On Campus

Contact Hours: 2 hr Lectures, 1 hr Tutorial

Pre-requisites: STAT232, or STAT252 at Credit level or better, or STAT151 at Credit level or better, or PSYC232 at Credit level or better, or ECON121 at Credit level or better, or (STAT131 and STAT231 both at Credit level or better)

Exclusions: Not to count with STAT335 or STAT355

Assessment: Assignments 20%, project 25%; exam 55%. (Note: students should expect to spend approximately 4 hours/week on the project.)

Subject Description: Experimental designs: completely randomised, randomised complete block, Latin Square, factorial; the analysis of the data arising from these designs. Steps in conducting a sample survey; methods such as simple random sampling and stratified sampling, number raised and ratio estimation. Statistical computing is an essential part of this subject. Project: Students will undertake a project that relates the work of this subject to an investigation in their field of major interest.

STAT971 Preliminary Topics in Statistics A 6cp

Autumn Wollongong On Campus

Contact Hours: 2 hr per week

Subject Description: A selection of topics will be available from time to time to serve as preliminary material in the Master of Statistics.

STAT972 Preliminary Topics in Statistics B 6cp

Autumn/Spring Wollongong On Campus

Contact Hours: 2 hr per week

Subject Description: A selection of topics will be available from time to time to serve as preliminary material in the Master of Statistics.

STAT981 Advanced Topics in Statistics A 6cp

Autumn Wollongong On Campus

Subject Description: Current research interests of staff of the School of Mathematics and Applied Statistics and visitors to the School.

STAT982 Advanced Topics in Statistics B 6cp

Not on offer in 2004

Subject Description: Current research interests of staff of the School of Mathematics and Applied Statistics and visitors to the School.

STAT983 Advanced Topics in Statistics C 6cp *Not on offer in 2004*

Subject Description: Current research interests of staff of the School of Mathematics and Applied Statistics and visitors to the School.

STAT990 Minor Project 6cp

Autumn/Spring Wollongong On Campus

STAT991 Project 12cp

Annual Wollongong On Campus

Spring 04/Aut 05 Wollongong On Campus