431-621 Multimedia Network Design

Credit Points:	12.500
Level:	Graduate/Postgraduate
Dates & Locations:	2008, This subject commences in the following study period/s: Semester 2, - Taught on campus. On Campus.
Time Commitment:	Contact Hours: Thirty-six. Total Time Commitment: Estimated total time commitment of 120 hours.
Prerequisites:	4-year Electircal Engineering degree or equivalent.
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability
Subject Overview:	The aim of this subject is to provide students with the state of the art knowledge and techniques (operational research and telegraffic engineering) in communication network design. the objective is to use this knowledge in optimal dimensioning, design, and operation of multimedia networks. This subject will include: # Traffic flow problems: shortest path, spanning tree, maximum flow-minimum cut, single commodity flow problem, transportation and assignment problems and corresponding solution methodologies; # Theory, algorithms and analysis of survivability and availability/ reliability in telecommunications networks; # Routing techniques and traffic flow models: load sharing, alternative routing, adaptive routing, etc; # Techniques and algorithms for dimensioning of hierarchical networks (single house, multi house, multi service, end-to-end grade of service, etc.); and dimensioning of non-hierarchical networks (dimensioning principles, large-scale dimensioning methods, heuristic for routing optimisation. This subject will address some advance studies in optimisation theory (linear programming, Simplex algorithm, lagrangian realisation techniques, etc.) and their application in network design problems. The subject also includes an extensive case study of some challenging multimedia network design problems, e.g.: # Video on Demand networks; # Content Distribution Networks; # MPLS Traffic Engineering and failure recovery in multi service environment under Service Level Agreements; # Implementation of Spanning Tree Protocol in Ethernet based networks and associated problems. The topic, also, will include a practical network design project using Linear Programming or other optimisation techniques.

	On completion of this subject, the students should have developed some basic skills and knowledge in the intersection of operating research and telegraffic engineering. the main emphasis would be to teach students the art of mathematical modelling and problem solving applicable to some challenging problems in multimedia network design. Some basic objectives are itemised below: # Basic concepts of graph theory; # Routing and network flow problems in communication networks; # Techniques and algorithms for network flow problems; # Mathematical modelling and optimisation techniques; # Network dimensioning considering multi-hour, multi-service, survivability and availability/ reliability criteria; # Some advanced technologies in communication networks such as MPLS; Traffic engineering, QoS, CoS, and Differentiated Services analysis.
Assessment:	A mid-term exam of 20%, project ad presentation 30%, and a final exam of 50%. this final exam is a hurdle. A student must pass the exam to pass the subject.
Prescribed Texts:	Textbook:Iradj Ouveysi, "Multi-media Network Design": Chapter 6 - Network Flow Algorithms, and Chapter 7 - Network Dimensioning.(Class notes)Additional Reading:A. Kershenbaum, "Telecommunications Network Design Algorithms", McGraw Hill International Additions, Computer Science Series, 1993. ISBN: 0-07-112518-3.K.G. Murty, "Linear Combinational Programming", John Wiley and Sons, Inc., NEw York, 1976.Suggested not mandatory.
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	On completion of this subject, the students should have developed: # Analytical,critical and creative thinking, with and aptitude for continues self-directed learning; # Writing, problem solving and communication skills; # Ability to evaluate and synthesise the research and professional literature; # Sense of intellectual curiosity; # Ability to interpret data and research results; # Sense of intellectual integrity and ethics of scholarship; # Ability to learn in a range of way, including through information and communication technologies; # Capacity to confront unfamiliar problems; # An ability to evaluate and synthesise the research and professional literature; # Advanced working kills in the application of computer systems and software and a receptiveness to the opportunities offered by new technologies; # An ability to manage competing demands on time, including self-directed project work.
Related Course(s):	Master of Software Systems Engineering Master of Telecommunications Engineering