ELEN90003 Multimedia Network Design

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: Thirty-six Total Time Commitment: 120 hours.
Prerequisites:	4-year Electrical 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 Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry. The University is dedicated to provide support to those with special requirements. Further details on the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/
Coordinator:	Assoc Prof William Shieh
Contact:	Melbourne School of Engineering Office Building 173, Grattan Street The University of Melbourne VIC 3010 Australia General telephone enquiries + 61 3 8344 6703 + 61 3 8344 6507 Facsimiles + 61 3 9349 2182 + 61 3 8344 7707 Email **eng-info@unimelb.edu.au (mailto:eng-info@unimelb.edu.au)**
Subject Overview:	The aim of this subject is to provide students with the state of the art knowledge and techniques (operational research and Teletraffic 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 methods; # Theory, algorithms and analysis of survivability and availability/ reliability in telecommunications networks; # Routing techniques and traffic flow models: load sharing, alternative routing, adaptive routing; # 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 Relaxation techniques) and their application in network design problems. The subject also includes an extensive case study of some challenging multimedia network design problems, for example:

	# 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, will include a practical network design project using Linear Programming or other optimisation techniques.
Objectives:	On completion of this subject, the students should have developed some basic skills and knowledge in the intersection of Operations Research and Teletraffic 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:	project report and presentation 30% A final exam of 70%. this final exam is a hurdle. A student must pass the exam to pass the subject.
Prescribed Texts:	None
Recommended Texts:	Additional Reading: # Iradj Ouveysi, "Multi-media Network Design": Chapter 6 - Network Flow Algorithms, and Chapter 7 - Network Dimensioning. # 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. # Other current sources will be recommended on the subject website
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; # Problem solving skills # Ability to evaluate and synthesise the research and professional literature; # Ability to interpret data and research results; # Sense of intellectual curiosity, and integrity and ethics of scholarship; # Ability to learn in a range of ways, including through information and communication technologies; # Capacity to confront unfamiliar problems; # An ability to evaluate and synthesise the research and professional literature; # Advanced working skills 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

	Master of Telecommunications Engineering Postgraduate Certificate in Engineering