ENG M 680 Section B1

Network Optimization and Reliability

January 2006 – April 2006
Thursdays, 3:00 PM to 6:00 PM
Room: NREF 2-090

Instructor: **John Doucette**

Office: 5-8F Mechanical Engineering Building (5th floor West)

Office Hours: Fridays, 9:00 AM to 11:00 PM

Web-Site: http://www.mece.ualberta.ca/~doucette/engm680/

Textbook (will be available at the UofA Bookstore):

- W. Grover, *Mesh-Based Survivable Networks*, Prentice Hall PTR, Upper Saddle River, NJ, 2004. (ISBN 0-13-494-576-X)

Marking Scheme:

Assignments:	30%
Midterm Exam:	30%
Course Project:	30%
Class Participation:	10%

Course Content: Topics include an overview of network technology, network restorability, reliability, and availability, restoration and protection switching, basics of graph theory, traffic routing methods (all distinct routes, k-shortest paths, max-flow min-cut theory, min-cost network flow), optimization methods (linear programming, simulated annealing, genetic algorithms, tabu search), SONET and WDM rings, ring types, sizing and loading, multi-ring network design, dual-ring interconnect and availability, topology considerations, types of mesh-restorable networks, theory for optimal capacity design, capacity design heuristics, theory for topological design of mesh networks, distributed mesh restoration, mesh network availability analysis, and emerging concepts such as self-organizing networks, over-subscription design theory, *p*-cycles, and hybrid networks.

Course Format: This course will be primarily lecture based, using PowerPoint slides that will be made available in advance from the course web-site. These are supplemented with white-board notes for selected discussions and problem-solving examples, as well as a significant amount of self-study. All required reading and other student resources are contained in the course text-book and accompanying web-site. Selected research papers on advanced topics will also be made available for use in some assignments and the course project.

Note: Credit cannot be granted for this course if you have already taken ECE 681 (Survivable Networks).

Tentative Course Schedule: (subject to change)

Lecture	Date	Topic	Chapters
#1	12 Jan 2006	Introduction to Transport Networks	1 – 2
#2	19 Jan 2006	Basic network survivability concepts, availability and reliability engineering	3
#3	26 Jan 2006	Graph theory and routing	4.1 – 4.10
#4	02 Feb 2006	Optimization, linear programming, and algorithmic methods	4.11 – 4.18
#5	09 Feb 2006	Survivable rings, ring sizing, and ring loading	3.4.7 – 3.4.11, + other source material
#6	16 Feb 2006	Span and path restoration, capacity design and resource allocation	5 – 6
–	23 Feb 2006	**No Lecture – Reading Week**	–
#7	02 Mar 2006	Pre-configuration versus dynamic capacity provisioning, *p*-cycles	10, 5.2.2 – 5.2.4
#8	09 Mar 2006	**Midterm Exam**	–
#9	16 Mar 2006	Ring-mesh hybrid restoration, service availability analysis	11, 8
#10	23 Mar 2006	Multi-layer restoration, oversubscription	7
#11	30 Mar 2006	Topology design	9
#12	06 Apr 2006	**Project presentations**	–

Note: The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University.

Policy about course outlines can be found in Section 23.4(2) of the University Calendar.