ELEN90061 Communication Networks

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2014.
Time Commitment:	Contact Hours: 36 hours of lectures and up to 24 hours of workshops Total Time Commitment: 200 hours
Prerequisites:	Prerequisites for this subject are:

Subject	Study Period Commencement:	Credit Points:
ELEN30010 Digital System Design	Semester 1	12.50
ELEN90054 Probability and Random Models	Semester 1	12.50

Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Anti-requisites for this subject is :

Subject	Study Period Commencement:	Credit Points:
ELEN40005 Communication Networks	Not offered 2014	12.50

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/
Contact:	Email: **elen-subjectenquiry@unimelb.edu.au (mailto:elen-subjectenquiry@unimelb.edu.au)**
Subject Overview:	AIMS This subject provides an introduction to the basic principles, analysis, and design of communication networks. It will cover analytical tools, the layered network architecture, and network protocols. Analytical tools from queueing, optimisation, control, graph theories will be used to develop an in-depth understanding of basic principles and the role they play in network design. Queueing theory will be emphasised as the primary methodological framework for analysing network delay which is one of the most important performance measures in data networks. The concepts taught in this subject will allow a better understanding of the Internet as well as emerging communication paradigms such as Machine-to-Machine communication, Internet of Things, smart grid, and social networks. INDICATIVE CONTENT Topics to be covered may include: # Queuing theory: basics, birth-death processes, M/M/x and Markovian queues, networks of queues. # Optimisation and control methods for routing and flow (congestion) control.

	# Basics of graph theory and social network analysis relevant to communication networks. # Network topologies for core and access networks. # Voice and circuit-switched networks, packet switching and multiplexing gain. # The layered network architecture with a focus on physical-layer multiple access (TDM, WDM), link layer protocols and medium access control (MAC), network layer topologies, least-cost routing algorithms and protocols, transport layer protocols and the principles and techniques of practical reliable transport. # The Internet's network layer including the Internet Protocol (IP), ICMP, and routing protocols including an introduction to BGP and the operation of forwarding tables in routers and shortest prefix routing. # The Internet's transport layer protocols UDP and TCP, including the flow and congestion control algorithms. # LAN protocols in particular Ethernet, and configuration protocols DHCP and ARP. # Sensor networks, Machine-to-Machine communication, Internet of Things, social networks. # Network performance analysis and planning.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** Having completed this unit the student should be able to: 1 Quantitatively analyze the performance of simple queueing systems and communication networks; 1 Explain the basic principles of communication network design, the layered architecture and network protocols; 3 Design simple communication networks to achieve performance objectives.
Assessment:	One written examination, not exceeding three hours at the end of semester, worth 70%; Continuous assessment of submitted project work completed in small groups (2-3 students), not exceeding 20 pages over the semester, worth 20%; A one-hour mid-semester test, worth 10%. Hurdle requirement: Students must pass the written exam to pass the subject. Intended Learning Outcomes (ILOs) 1 to 3 are assessed in the final written examination, the mid-semester test, and submitted reports for two workshops.
Prescribed Texts:	TBA
Recommended Texts:	# Computer Networking: A Top Down Approach Featuring the Internet, 4th edition. Jim Kurose, Keith Ross Addison-Wesley, 2008. # Data Networks: 2nd edition. Dimitri Bertsekas, Robert Gallager Prentice-Hall, 1992. # Queuing Theory: Volume 1: Theory and Volume 2: Computer Applications, Leonard Kleinrock, John Wiley and Sons, 1975.
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:	# Ability to apply knowledge of basic science and engineering fundamentals # In-depth technical competence in at least one engineering discipline # Ability to undertake problem identification, formulation and solution # Ability to utilise a systems approach to design and operational performance # Capacity for independent critical thought, rational inquiry and self-directed learning # Ability to communicate effectively, with the engineering team and with the community at large
Notes:	**LEARNING AND TEACHING METHODS** The subject is delivered through lectures and workshop classes that combine both tutorial and hands-on laboratory activities. **INDICATIVE KEY LEARNING RESOURCES**

	Students are provided with lecture slides, tutorial worksheets and solutions, workshop notes, and reference text lists. **CAREERS / INDUSTRY LINKS** Exposure to networking standards and protocols used by industry throughout the world. Exposure to industry standard engineering design automation tools through laboratory activities.
Related Majors/Minors/ Specialisations:	B-ENG Electrical Engineering stream Master of Engineering (Electrical with Business) Master of Engineering (Electrical)