ELEN40009 RF, Microwave and Optoelectronic Systems

Credit Points:	12.50
Level:	4 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: Twenty-four hours of lectures, 12 hours of tutorials and 12 hours of laboratory or project work Total Time Commitment: 120 hours
Prerequisites:	431-329 Electromagnetics, 431-222 Electronic Circuit Design 1 (prior to 2005 Electronic Devices)
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:	Prof Ampalavanapillai Nirmalathas
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:	On completion of this subject students should be able to describe the operation of a wide range of RF, microwave and optoelectronic devices. They should be able to design and analyse the performance of a variety of wireless and optoelectronic systems, including communication links. Topics include: Part 1: architecture of wireless systems; modulation/demodulation; noise figure (definition, measurement, calculation); operation, implementation and characteristics of various microwave and RF devices (attenuators, power combiners/splitters, couplers, switches, amplifiers and oscillators); antenna types and characteristics; calculating performance of transmitters and receivers; calculating wireless link performers; applications of RF and microwaves (communications, radar, remote sensing). Part 2: review of direct and indirect semiconductors; light-emitting diodes; lasers (principles and operation, types - Fabry-Perot and DFB); photogenerative absorption; photodiodes (pn, pin and avalanche devices: structure, operation, characteristics); transimpedance, amplifier; solar cells; optical fibre (multimode and singlemode - principle of operation, manufacture, optical transmission characteristics - attenuation, dispersion); simple photonic link design (receiver noise and bit-error rate, receiver sensitivity, power budget, margin, dispersion penalty); application of optical communications; introduction to optical transmission formats and protocols.

Objectives:	On completing this subject the student should be able to: # Explain the physical principles that underpin the operation of a variety of radio frequency, microwave and optoelectronic devices; # Model and analyse the performance of systems comprising such devices, including communication links.
Assessment:	One final examination (duration three hours) (70%), One mid-semester test (duration one hour) (10%), Laboratory work and written reports not exceeding 6000 words (20%).
Prescribed Texts:	None
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 # Ability to communicate effectively, not only with engineers but also with the community at large # 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 # Ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member # Understanding of the social, cultural, global and environmental responsibilities of the professional engineer, and the need for sustainable development # Expectation of the need to undertake lifelong learning, capacity to do so # Capacity for independent critical thought, rational inquiry and self-directed learning # Intellectual curiosity and creativity, including understanding of the philosophical and methodological bases of research activity # Openness to new ideas and unconventional critiques of received wisdom # Profound respect for truth and intellectual integrity, and for the ethics of scholarship
Related Course(s):	Bachelor of Engineering (Computer Engineering) Bachelor of Engineering (Electrical Engineering) Bachelor of Engineering (Electrical) and Bachelor of Arts Bachelor of Engineering (Electrical) and Bachelor of Commerce Bachelor of Engineering (Electrical) and Bachelor of Laws Bachelor of Engineering (Electrical) and Bachelor of Science Bachelor of Engineering (EngineeringManagement) Electrical Bachelor of Engineering (IT) Computer Engineering Bachelor of Engineering (IT) Electrical Engineering Bachelor of Engineering (Software Engineering) Postgraduate Certificate in Engineering