431-222 Electronic Circuit Design 1

Credit Points:	12.50
Level:	2 (Undergraduate)
Dates & Locations:	2009, This subject commences in the following study period/s: Semester 2, - Taught on campus.
Time Commitment:	Contact Hours: Twenty-four hours of lectures, 12 hours of tutorials and 12 hours of laboratory work Total Time Commitment: Not available
Prerequisites:	431-210 Electrical Circuits 2, 640-141 Physics A, 640-142 Physics B (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
Coordinator:	Dr Elaine Wong
Subject Overview:	Students completing this subject will be able to analyse and design simple active electronic circuits and understand the principles and operation of the semiconductor devices used in them. Topics include: amplifier concepts and characteristics (gain, impedance, bandwidth); amplifier types and circuit models (eg. voltage, transimpedance); cascaded amplifiers; omamp circuits (incl. effect of finite open-loop gain); basic semiconductor concepts (valence and conduction bands, conductors, insulators and semiconductors); carrier transport in semiconductors (electrons and holes, drift and diffusion, recombination - direct and indirect); doping of semiconductors; p-n junction under forward- and reverse- bias (current-voltage characteristic); p-n junction capactitance: diodes; diode basis circuit analysis (load line, constant voltage drop, small-signal model); diode circuits (rectification, limiting); zener diode (principle, characteristic, design of voltage reference); light emitting diodes (principle, biasing); MOSFET (enhancement) BJT transistor devices and circuits (device structure, operation, large signal characteristics, operation as a switch, biasing, small-signal characteristics and circuit model, single-stage common source/emmitter amplifier circuit analysis and design, low-frequency amplifier response, followers); linear voltage regulation (principle, example, current limiting); fixed voltage regulators; power supply decoupling; dc-dc converters (principles, step-up, step-down); heat and power design (heat sinking, thermal resistance).
Objectives:	On completing this subject the student should be able to: 1. Explain the physical principles that underpin the behaviour of various electronic devices; 2. Apply fundamental modelling techniques in the analysis and design of common electronic circuits; 3. Construct and test simple electronic circuits in the laboratory; 4. Use software tools to simulate the behaviour of electronic circuits.
Assessment:	One written 3-hour examination (60%), practice problems (10%), test (5%), laboratories (20%) and assignment (5%).

Prescribed Texts:	None
Recommended Texts:	Information Not Available
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 # understanding of the principles of sustainable design and development # understanding of professional and ethical responsibilities and commitment to them # 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
Related Course(s):	Bachelor of Engineering (Computer) and Bachelor of Arts Bachelor of Engineering (Computer) and Bachelor of Commerce Bachelor of Engineering (Computer) and Bachelor of Laws Bachelor of Engineering (Electrical) and Bachelor of Arts Bachelor of Engineering (Electrical) and Bachelor of Commerce Bachelor of Engineering (Electrical) and Bachelor of Laws