ELEN30010 Digital System Design

Credit Points:	12.5
Level:	3 (Undergraduate)
Dates & Locations:	2015, Parkville This subject commences in the following study period/s: Semester 1, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 36 hours of lectures (3 one hour lectures per week) and 24 hours of workshops Total Time Commitment: 170 hours
Prerequisites:	The prerequisite for this subject is

Subject	Study Period Commencement:	Credit Points:
ELEN20005 Foundations of Electrical Networks	January, Semester 2	12.50

Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	ELEN20001(431-204)Digital Systems 2: System Design
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:	Prof Jonathan Manton
Contact:	Email: **jmanton@unimelb.edu.au (mailto:jmanton@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject develops a fundamental understanding of concepts used in the analysis and design of digital systems. Such systems lie at the heart of the information and communication technologies (ICT) that underpin modern society. This subject is one of four subjects that define the Electrical Systems Major in the Bachelor of Science and it is a core requirement for the Master of Engineering (Electrical and Mechatronics). It provides a foundation for various subsequent subjects, including ELEN30013 Electronic System Implementation, ELEN90066 Embedded System Design and ELEN90061 Communication Networks. **INDICATIVE CONTENT** Topics include: # Digital systems - quantifying and encoding information, digital data processing, design process abstractions; # Combinational logic – CMOS realisation of basic gates, timing contracts, acyclic networks, switching algebra, logic synthesis; # Sequential logic – cyclic networks and finite-state machines, metastability, synchronous timing, pipelining, control vs data-processing logic, stored-programme machines; # Microprocessors - instruction set and addressing architectures, interfacing and interrupts, programme development;

	# Interconnection structures - shared vs dedicated connections, addressing and arbitration, synchronous exchange, open-ended and REQ-ACK asynchronous exchange. These topics will be complemented by exposure to the hardware description language VHDL and the use of engineering design automation tools and configurable logic devices (e.g. FPGAs) in the laboratory.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** Having completed this subject it is expected that the student be able to: 1 Apply fundamental tools in the analysis of combinational and sequential logic systems, with an appreciation for the role and limitations of important digital abstractions 2 Apply fundamental concepts, including hardwired and programmed (e.g. microprocessor based) approaches, to implement digital systems that achieve specified functionality 3 Use a hardware description language (VHDL) for the documentation, simulation and synthesis of reasonably complex digital systems 4 Configure and test digital hardware development platforms in the laboratory
Assessment:	One written examination, not exceeding three hours at the end of semester, worth 60%; Continuous assessment of submitted tutorial, laboratory and small group (2-3 students) project work, not exceeding 30 pages in total over the semester (approximately 30-35 hours of work per student), worth 30%; 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, submitted tutorial quizzes, and reports for three homework projects. ILO 4 is assessed as part of submitted laboratory exercises and in-class discussions.
Prescribed Texts:	TBA
Breadth Options:	This subject potentially can be taken as a breadth subject component for the following courses: # **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2015/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2015/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2015/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2015/B-MUS)** You should visit **learn more about breadth subjects (http://breadth.unimelb.edu.au/breadth/info/index.html)** and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	On completion of this subject students should have developed the following generic skills: # Ability to apply knowledge of basic science and engineering fundamentals # Ability to undertake problem identification, formulation and solution # Ability to utilise a systems approach to design and operational performance # Ability to communicate effectively, with the engineering team and with the community at large # Capacity for independent critical thought, rational inquiry and self-directed learning # Expectation of the need to undertake lifelong learning, capacity to do so.
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, lecture notes, tutorial worksheets and solutions, a laboratory manual, homework project specifications, and reference text lists **CAREERS / INDUSTRY LINKS**

	Exposure to industry standard engineering design automation tools through laboratory activities
Related Majors/Minors/ Specialisations:	B-ENG Electrical Engineering stream Electrical Systems Master of Engineering (Electrical with Business) Master of Engineering (Electrical) Master of Engineering (Mechatronics) Science-credited subjects - new generation B-SCI and B-ENG. Selective subjects for B-BMED
Related Breadth Track(s):	Electrical Engineering