ELEN30012 Signals and Systems

Credit Points:	12.50
Level:	3 (Undergraduate)
Dates & Locations:	2010, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
Time Commitment:	Contact Hours: 3 one hour lectures and one two hour workshop per week Total Time Commitment: 120 hours
Prerequisites:	Prerequisites for this subject are

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

620-293 Engineering Mathematics (/view/2010/620-293) OR

Subject	Study Period Commencement:	Credit Points:
MAST20026 Real Analysis with Applications	Semester 1, Semester 2	12.50

Corequisites: Corequisite for this subject is :

Subject	Study Period Commencement:	Credit Points:
COMP20005 Engineering Computation	Semester 1, Semester 2	12.50

Recommended Background Knowledge: Knowledge of the following subjects are recommended

Subject	Study Period Commencement:	Credit Points:
ELEN30009 Electrical Network Analysis and Design	Semester 1	12.50
ELEN30010 Digital System Design	Semester 1	12.50

Non Allowed Subjects:	431-221 Fundamentals of Signals and Systems
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:	Assoc Prof Margreta Kuijper
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)**

	(http://eng-unimelb.custhelp.com/)
Subject Overview:	This subject formally introduces the mathematical techniques that underpin the analysis and design of electrical networks, telecommunication systems, signal-processing systems and automatic control systems, among others. Topics include: # Signals – continuously and discretely indexed signals, important signal types, frequency-domain analysis (Fourier, Laplace and Z transforms), nonlinear transformations and harmonics, sampling, and aliasing; # Systems – viewing differential / difference equations as systems of signals, the notions of input, output and internal signals, block diagrams (series, parallel and feedback connections), properties of input-output models (causality, delay, stability, gain, shift-invariance, linearity), transient and steady state behaviour; # Linear shift-invariant models – continuous and discrete impulse response and convolution operator models, transfer functions and frequency response, time-domain interpretation of stable and unstable poles and zeros, state-space models (construction from high-order ODEs, canonical forms, state transformations and stability), and the discretisation of models for systems of continuously indexed signals. This material will be complemented by exposure to the use of MATLAB for computation and simulation and examples from diverse areas including electrical engineering, biology and economics.
Objectives:	On completing this subject the student should be able to: # Rigorously apply fundamental mathematical tools to model, analyse and design signals and systems in both the time-domain and frequency-domain; # Recognise the broad applicability of the mathematics of signals and systems theory, particularly within electrical engineering; # Use MATLAB to study the behaviour of signals and systems as they arise in a variety of contexts.
Assessment:	One written examination, not exceeding three hours at the end of semester, worth 60% (must pass written exam to pass subject); Continuous assessment of project work, not exceeding 30 pages in total over the semester, worth 30%;A one hour mid-semester test, worth 10%.
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/2010/B-ARTS)** # **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2010/B-COM)** # **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2010/B-ENVS)** # **Bachelor of Music (https://handbook.unimelb.edu.au/view/2010/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
Related Course(s):	Bachelor of Engineering Bachelor of Science
Related Majors/Minors/ Specialisations:	Electrical Systems Master of Engineering (Electrical)