ELEN90027 Linear Systems Theory

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2015.
Time Commitment:	Contact Hours: 36 hours of lectures Total Time Commitment: 200 hours
Prerequisites:	Enrolment in a research higher degree (Masters or PhD) in Engineering
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/
Contact:	Prof Dragan Nesic Email: **dnesic@unimelb.edu.au (mailto:dnesic@unimelb.edu.au)**
Subject Overview:	**AIMS** This subject provides a rigorous introduction to the mathematical tools commonly employed in the analysis of linear dynamical systems. Such system models arise across science and engineering. This subject is intended for research higher-degree students in engineering. **INDICATIVE CONTENT** Topics include: Linear Analysis - vector, normed and inner-product spaces, Banach and Hilbert spaces, linear operators, and matrix analysis; Sate-space models - input-output behaviour, reachability, observability, balanced truncation; coprime factorization Feedback control systems - internal stability, all stabilizing controllers Optimal filtering and control - quadratic measures of performance (H2 and Hinfinity); spectral factorization methods; Riccati equations
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** Having completed this subject it is expected that the student be able to: 1 Rigorously apply the mathematics of linear analysis to characterize and approximate the behaviour systems 2 Employ state-space methods to analyze and design linear feedback control systems 3 Formulate and solve optimal linear filtering and control problems
Assessment:	Continuous assessment of homework assignments, not exceeding 40 pages in total over the semester (approximately 55-60 hours of work), worth 40% One written examination at the end of semester, worth 60%. Hurdle requirement: Students must pass the end of semester examination to pass the subject. Intended Learning Outcomes (ILOs) 1 to 3 are assessed in the final written exam and through submitted homework assignments.
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 # 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 # Expectation of the need to undertake lifelong learning, capacity to do so # Capacity for independent critical thought, rational inquiry and self-directed learning # Profound respect for truth and intellectual integrity, and for the ethics of scholarship.
Notes:	**LEARNING AND TEACHING METHODS** This subject is delivered through lectures and homework assignments. **INDICATIVE KEY LEARNING RESOURCES** Students are provided with lecture notes, including worked examples, assignment problems, and recommended reading lists comprising textbooks and journal articles. **CAREERS / INDUSTRY LINKS** Exposure to research literature and the rigour expected at the level of postgraduate study.
Related Course(s):	Master of Philosophy - Engineering Ph.D.- Engineering