ELEN90028 Nonlinear Systems Theory

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
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 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:	Marcus Nathan Brazil Email: **brazil@unimelb.edu.au (mailto:brazil@unimelb.edu.au)**
Subject Overview:	**AIMS** The aim of this subject is to give students an introduction to some advanced topics in the analysis of nonlinear systems. **INDICATIVE CONTENT** Topics include: properties of solutions of nonlinear differential equations; Lyapunov stability theory; linearization; the invariance principle; converse stability theorems; input-output stability; stability of perturbed systems; averaging, singular perturbations.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** On completing this subject the student should be able to: 1 Understand the fundamental properties of nonlinear systems, such as the existence, uniqueness and continuity of solutions 2 Apply fundamental Lyapunov stability techniques in the analysis of nonlinear systems, as they arise in a variety of contexts 3 Apply input-output stability concepts for stability analysis of interconnected nonlinear systems 4 Apply averaging techniques for approximation of solutions and stability analysis of nonlinear systems 5 Apply singular perturbation techniques for approximation of solutions and stability analysis of nonlinear systems.
Assessment:	Continuous assessment of homework assignments, not exceeding 30 pages in total over the semester (approximately 55-60 hours of work), worth 40% Final 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) are assessed in the final exam and the submitted assignments.
Prescribed Texts:	None
Recommended Texts:	Hassan Khalil, *"Nonlinear Systems"*
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 # 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):	Master of Philosophy - Engineering Ph.D.- Engineering