ELEN90064 Advanced Control Systems

Credit Points:	12.50
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	This subject is not offered in 2014.
Time Commitment:	Contact Hours: 36 hours of lectures and 24 hours of workshops and tutorials Total Time Commitment: 200 hours
Prerequisites:	The prerequisite for this subject is: **Subject** | **Study Period Commencement:** | **Credit Points:** ELEN90055 Control Systems | Semester 1 | 12.50 (prior to 2011, ELEN30001 Control 1 OR MCEN30008 Control Systems 1)
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	Anti-requisite for this subject is: **Subject** | **Study Period Commencement:** | **Credit Points:** ELEN40007 Control 2 (Advanced Control) | Not offered 2014 | 12.50
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:	Dr. Ying Tan Email: **yingt@unimelb.edu.au (mailto:yingt@unimelb.edu.au%20)**
Subject Overview:	**AIMS** This subject provides an introduction to modern control theory with a particular focus on state-space methods and optimal control. The role of feedback in control will be reinforced within this context, alongside the role of optimization techniques in control system synthesis. This subject is a core requirement in the Master of Engineering (Mechanical and Mechatronics). **INDICATIVE CONTENT** Topics include: State-space models - first-order vector differential/difference equations; Lyapunov stability; linearization; discretization; Kalman decomposition (observable, detectable, reachable and stabilizable subspaces); state-feedback and pole placement; output-feedback and observer design. Optimal control - dynamic programming; linear quadratic regulation; moving-horizon predictive control with constraints.

Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** Having complete this subject it is expected that the student be able to: 1. Apply fundamental state-space-techniques in the analysis and design of linear feedback control systems, as they arise in a variety of contexts; 2. Formulate and solve constrained optimization problems for control system synthesis; 3. Use software tools to simulate and design the linear behaviour of automatic control systems.
Assessment:	One written examination, not exceeding three hours at the end of semester, worth 60%; Continuous assessment of submitted project work completed in small groups (2-3 students), not exceeding 20 pages over the semester, worth 30%; A two-hour mid-semester test, worth 10%. Hurdle requirement: Students must pass the written exam to pass the subject. Intended Learning Outcomes (ILOs) 1 and 2 are assessed in the final written examination, the mid-semester test, and submitted reports for three projects. ILO 3 is assessed as part of submitted project work and in-class discussions.
Prescribed Texts:	TBA
Recommended 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 # Capacity for independent critical thought, rational inquiry and self-directed learning # Openness to new ideas and unconventional critiques of received wisdom # Ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member # Ability to communicate effectively, with the engineering team and with the community at large
Notes:	Credit may not be obtained for both ELEN40007(431-464) Control Systems (Advanced) and ELEN90064 Advanced Control Systems **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, worked problem sets, project specifications, and reference text lists. **CAREERS / INDUSTRY LINKS** Exposure to industry standard engineering design automation tools through laboratory activities
Related Course(s):	Bachelor of Engineering (Biomedical)Biosignals Master of Philosophy - Engineering Ph.D.- Engineering
Related Majors/Minors/ Specialisations:	Master of Engineering (Electrical with Business) Master of Engineering (Electrical) Master of Engineering (Mechanical) Master of Engineering (Mechatronics)