ELEN90064 Advanced Control Systems

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught on campus.
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, Semester 2 / 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 2016 / 12.50
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 Dragan Nesic
Contact:	Email: **dnesic@unimelb.edu.au (mailto:dnesic@unimelb.edu.au)**
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 in both continuous-time and discrete-time

	Optimal control - dynamic programming; linear quadratic regulation in both continuous- time and discrete-time. Model predictive control in discrete- time; moving-horizon with constraints
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO's)** 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 (approximately 35-40 hours of work), 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:	Upon completion of this subject, students will have developed the following 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 Bachelor of Engineering (Mechanical and Manufacturing Engineering) Doctor of Philosophy - Engineering

	Master of Philosophy - Engineering
Related Majors/Minors/ Specialisations:	Master of Engineering (Electrical with Business) Master of Engineering (Electrical) Master of Engineering (Mechanical) Master of Engineering (Mechatronics)