

411-336 Process Dynamics and Control

Credit Points:	12.500
Level:	Undergraduate
Dates & Locations:	2008, This subject commences in the following study period/s: Semester 2, - Taught on campus.
Time Commitment:	Contact Hours: Forty-eight hours. Total Time Commitment: Not available
Prerequisites:	431-202 Engineering Analysis B (prior to 2001, 421-205 Engineering Analysis B) or equivalent
Corequisites:	None
Recommended Background Knowledge:	None
Non Allowed Subjects:	None
Core Participation Requirements:	<p><p>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.</p> <p>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</p></p>
Coordinator:	Assoc Prof D Shallcross
Subject Overview:	<p>Students successfully completing the subject should understand the factors influencing the dynamic response of chemical processes and be able to analyse and implement process control strategies.</p> <p>Content: Process Dynamics: Examples of controlled and manipulated variables and control schemes in chemical plants. Time domain, Laplace and frequency domain analyses of process dynamics modelled by linear ordinary differential equations. Transfer functions, amplitude ratio and phase angle, Bode plots. Modelling of complex chemical plants by a series of first, second order and dead time processes. Process identification by step response and frequency response, pulse testing. Step response vector and dynamic matrix.</p> <p>Process Control: Transfer function of PID controller, closed loop transfer function. Effects of varying proportional gain, derivative and integral times. Effects of measurement lag. Routh stability analysis, Bode stability criterion, gain and phase margins, Ziegler-Nichols tuning. Cascade control and improvements arising from cascade control. Dead time compensation and other and model-based process control. Feedforward compensation, steady-state and lead-lag feedforward. Interactions in multiple-input multiple-out processes, Bristol relative gain array, decoupling. Introduction to dynamic matrix control. Computer-based process control, sampling interval, Shannon sampling theorem and computer implementation of process control.</p>
Assessment:	A mid-semester test worth 20% held in or about Week 6 and end of semester examination worth 80%.
Prescribed Texts:	None
Recommended Texts:	Information Not Available
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:	<ul style="list-style-type: none"> # 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
Related Course(s):	<p> Bachelor of Engineering (Biomedical)Biocellular Bachelor of Engineering (Chemical Engineering) Bachelor of Engineering (Chemical and Biomolecular Engineering) Bachelor of Engineering (Chemical) and Bachelor of Arts Bachelor of Engineering (Chemical) and Bachelor of Commerce Bachelor of Engineering (Chemical) and Bachelor of Laws Bachelor of Engineering (Chemical) and Bachelor of Science Bachelor of Engineering (EngineeringManagement) Chemical Bachelor of Engineering(Biochemical Engineering)and Bachelor of Science </p>