MCEN90028 Robotics and Automation 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, 24 hours of tutorials and laboratory work. Total Time Commitment: 200 hours
Prerequisites:	

Subject	Study Period Commencement:	Credit Points:
ELEN90055 Control Systems	Semester 1, Semester 2	12.50

Plus ONE of the following -

Subject	Study Period Commencement:	Credit Points:
MCEN90024 Mechatronics Design	Semester 2	12.50
MCEN30014 Mechanical Design	Semester 2	12.50
ELEN90053 Electronic System Design	Semester 2	12.50

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 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:	Assoc Prof Denny Oetomo
Contact:	**doetomo@unimelb.edu.au (mailto:doetomo@unimelb.edu.au)**
Subject Overview:	**AIMS** The subject aims to introduce the students to the automation technologies, specifically: robotics and process automation. The use of robots and automated systems in carrying out various tasks will be discussed and the fundamental computational techniques associated with the operation of a robotic manipulator and a general automated system will be introduced. The subject will familiarise the students with the roles, strengths, and capabilities of robotics and automation technologies, as well as how to achieve the said capabilities. **INDICATIVE CONTENT** Robotics (18 hours of lectures and 12 hours of tutorials): manipulator kinematics, including inverse and direct kinematics, manipulator velocity and static forces, trajectory planning, manipulator dynamics, linear control of manipulators and robotic programming.

	Artificial Intelligence and Computer Vision (8 hours of lectures and 3 hours of tutorials): Introduction to neural network and vision-based systems in automation. Networked control and optimization (6 hours of lectures and 3 hours of tutorials): Concepts for the automated factory environment with networked stations and networked control, use of Ethernet, wireless technology and protocols, safety and security issues.
Learning Outcomes:	**INTENDED LEARNING OUTCOMES (ILO)** Having completed this unit the student is expected to have the skills to: 1 Analyse and simulate the dynamic performance of robotic manipulators and machine tools 2 Undertake a systems analysis for a practical automation system 3 Specify software and hardware requirements 4 Integrate software, hardware and human components of an automation system 5 Make effective use of the relevant research literature.
Assessment:	One 2 hour end of semester written examination (40%), assesses ILOs 1 to 5 Group and individual projects, assignments and lab reports of equal weight (not exceeding 5000 words each) (60% total). Requiring approximately 75 - 80 hours of work per student in total. Assesses ILOs 1 to 5.
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:	On completion of this subject students should have the following skills: # Critical thinking and critical judgement of assumptions adopted # Abstract mathematical reasoning # Interpretation and analysis of data # Application of theory to practice # Ability to utilise a systems approach to design and operational performance # Ability to apply knowledge of basic science and engineering fundamentals # Ability to undertake problem identification, formulation and solution # Able to clearly communicate the process and outcomes of a technical investigation.
Notes:	**LEARNING AND TEACHING METHODS** The subject will be delivered through a combination of lectures and tutorials. The tutorials will initially cover the exercises to complement the lecture material. When a level of proficiency is attained, the subject will further focus on the discussion of the design of an automation system. The students will also engage in three assignments throughout the subject. **INDICATIVE KEY LEARNING RESOURCES** Students will have access to lecture notes, lecture slides, tutorials, tutorial solutions and assignments on the LMS site.
Related Course(s):	Doctor of Philosophy - Engineering Master of Philosophy - Engineering
Related Majors/Minors/ Specialisations:	B-ENG Mechanical Engineering stream Master of Engineering (Mechanical) Master of Engineering (Mechatronics)