COURSE OUTLINE

MCH600 Advanced Industrial Robotic Systems

School: School of Science, Technology and Engineering

2026 | Trimester 1

UniSC Moreton Bay	BLENDED LEARNING	Most of your course is on campus but you may be able to do some components of this course online.
Online	ONLINE	You can do this course without coming onto campus, unless your program has specified a mandatory onsite requirement.

Please go to unisc.edu.au for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1. Description

This course will provide you with an in-depth analysis of advanced robotic systems with a focus on contemporary engineering methods for dynamic modelling and simulation of robots. You will solve real world dynamic problems involving a wide range of industrial applications. Throughout the course you will use computer algebra systems such as the Python scientific stack to develop complex models and undertake dynamic analysis. This will allow results obtained through computer modelling to be correlated with those measured experimentally in the laboratory or in an industrial setting.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Asynchronous weekly learning material	1hr	Week 1	12 times
Seminar – On campus	1hr	Week 1	3 times
Tutorial/Workshop 1 – On campus	2hrs	Week 1	10 times
Laboratory 1 – Mandatory on campus intensive	10hrs	Break week	Once Only
ONLINE			
Learning materials – Asynchronous weekly learning material	1hr	Week 1	12 times
Seminar – Online	1hr	Week 1	3 times
Tutorial/Workshop 1 – Online	2hrs	Week 1	10 times
Laboratory 1 – Mandatory on campus intensive	10hrs	Break week	Once Only

1.3. Course Topics

Topics may include:

- Definitions and classification.
- Degree of freedom and the adequacy for intended tasks.
- Kinematic description and control of robots.
- Calibration of a robot manipulator.
- Mobility and differential motion.
- Programming the robot.
- Interaction with the environment.

2. What level is this course?

600 Level (Specialised)

Demonstrating a specialised body of knowledge and set of skills for professional practice or further learning. Advanced application of knowledge and skills in unfamiliar contexts.

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

COURSE LEARNING OUTCOMES	GRADUATE QUALITIES MAPPING	PROFESSIONAL STANDARD MAPPING *
On successful completion of this course, you should be able to...	Completing these tasks successfully will contribute to you becoming...	Engineers Australia Stage 1 Professional Engineer Competency Standards
1 Apply technical knowledge and theories to analyse alternative industrial robotic systems and justify optimal solutions for various applications	Creative and critical thinker	1.2.a, 1.2, 2, 2.1.a, 2.1
2 Assess the soundness of industrial robotic systems by computing real-time realisation and calculating performance parameters.	Creative and critical thinker	2, 2.1.b, 2.1
3 Apply mathematical and theoretical knowledge to design and model advanced industrial robotic systems to meet specific requirements.	Empowered	1.2.a, 1.2, 2, 2.3.a, 2.3
4 Determine performance and troubleshoot industrial robotic systems as part of mechatronic systems and automation.	Empowered	2, 2.2.c, 2.2
5 Demonstrate advanced knowledge of common terminologies and conventions in industrial robotic systems.	Knowledgeable	1, 1.3.a, 1.3
6 Identify and interpret current developments in the selection of robotic systems.	Knowledgeable	1, 1.3.a, 1.3

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	
1.2.a	Knowledge and Skill Base - Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline: Develops and fluently applies relevant investigation analysis, interpretation, assessment, characterisation, prediction, evaluation, modelling, decision making, measurement, evaluation, knowledge management and communication tools and techniques pertinent to the engineering discipline.

CODE	COMPETENCY
1	Elements of competency: Knowledge and Skill Base
1.3.a	Knowledge and Skill Base - In-depth understanding of specialist bodies of knowledge within the engineering discipline: Proficiently applies advanced technical knowledge and skills in at least one specialist practice domain of the engineering discipline.
1.2	Knowledge and Skill Base: Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
1.3	Knowledge and Skill Base: In-depth understanding of specialist bodies of knowledge within the engineering discipline.
2	Elements of competency: Engineering Application Ability
2.1.a	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Identifies, discerns and characterises salient issues, determines and analyses causes and effects, justifies and applies appropriate simplifying assumptions, predicts performance and behaviour, synthesises solution strategies and develops substantiated conclusions.
2.1.b	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Ensures that all aspects of an engineering activity are soundly based on fundamental principles - by diagnosing, and taking appropriate action with data, calculations, results, proposals, processes, practices, and documented information that may be ill-founded, illogical, erroneous, unreliable or unrealistic.
2.3.a	Engineering Application Ability - Application of systematic engineering synthesis and design processes: Proficiently applies technical knowledge and open ended problem solving skills as well as appropriate tools and resources to design components, elements, systems, plant, facilities and/or processes to satisfy user requirements.
2.2.c	Engineering Application Ability - Fluent application of engineering techniques, tools and resources: Determines properties, performance, safe working limits, failure modes, and other inherent parameters of materials, components and systems relevant to the engineering discipline.
2.1	Engineering Application Ability: Application of established engineering methods to complex engineering problem solving.
2.2	Engineering Application Ability: Fluent application of engineering techniques, tools and resources.
2.3	Engineering Application Ability: Application of systematic engineering synthesis and design processes.

5. Am I eligible to enrol in this course?

Refer to the UniSC Glossary of terms for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1. Pre-requisites

Enrolled in GC003, GD003, MC003, GC004, GD004 or MC004.

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

5.5. Microcredential Information

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL).

6.2. Details of early feedback on progress

Early feedback will be provided through completion of weekly activities in workshops. Furthermore, feedback on each assessment will be provided which will be used to help with the following assessment.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1	Report	Individual	25%	1000 words	Week 5	Online Assignment Submission with plagiarism check
All	2a	Report	Individual or Group	25%	1500 words	Week 9	Online Assignment Submission with plagiarism check
All	2b	Oral and Written Piece	Individual or Group	50%	10 minutes and 2000-words	Week 12	Online Assignment Submission with plagiarism check

All - Assessment Task 1: Report

GOAL:	An analysis of an industrial robotic system that demonstrates the students' ability to apply knowledge and skills acquired in the course.
PRODUCT:	Report
AUTHORSHIP STATEMENT:	
FORMAT:	An analysis of an industrial robotic system that demonstrates the students' ability to apply knowledge and skills acquired in the course.
CRITERIA:	
GENERIC SKILLS:	Communication, Problem solving, Organisation, Applying technologies, Information literacy

No.		Learning Outcome assessed
1	Application of technical knowledge and theories to analyse alternative industrial robotic systems and justify optimal solutions for various applications	1
2	Assessment of the soundness of industrial robotic systems by computing real-time realisation and calculating performance parameters.	2
3	Determination of performance and troubleshooting of industrial robotic systems as part of mechatronic systems and automation.	4

All - Assessment Task 2a: Group Report

GOAL:	Individual and/or group project that will design an industrial scale robotic system.
PRODUCT:	Report
AUTHORSHIP STATEMENT:	
FORMAT:	Individual and/or group project that will design an industrial scale robotic system.

CRITERIA:

No.		Learning Outcome assessed
1	Application of technical knowledge and theories to analyse alternative industrial robotic systems and justify optimal solutions for various applications	1
2	Assessment of the soundness of industrial robotic systems by computing real-time realisation and calculating performance parameters.	2
3	Application of mathematical and theoretical knowledge to design and model industrial robotic systems to meet specific requirements.	3
4	Determination of performance and troubleshooting of industrial robotic systems as part of mechatronic systems and automation.	4
5	Identification and interpretation of current developments in the selection of robotic systems.	6

GENERIC SKILLS:	Communication, Collaboration, Problem solving, Organisation, Applying technologies

All - Assessment Task 2b: Presentation

GOAL:	Individual and/or group project that will design an industrial scale robotic system.
PRODUCT:	Oral and Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	Individual and/or group project that will design an industrial scale robotic system.

CRITERIA:

No.		Learning Outcome assessed
1	Application of technical knowledge and theories to analyse alternative industrial robotic systems and justify optimal solutions for various applications	1
2	Demonstration of advanced knowledge of common terminologies and conventions in industrial robotic systems.	5
3	Identification and interpretation of current developments in the selection of robotic systems.	6

GENERIC SKILLS:	Communication, Collaboration, Problem solving, Organisation, Applying technologies, Information literacy

7. Directed study hours

A 12-unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Student workload is calculated at 12.5 learning hours per one unit.

8. What resources do I need to undertake this course?

Please note: Course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Canvas site– Please log in as soon as possible.

8.1. Prescribed text(s) or course reader

There are no required/recommended resources for this course.

8.2. Specific requirements

Not applicable

9. How are risks managed in this course?

Health and safety risks for this course have been assessed as low. It is your responsibility to review course material, search online, discuss with lecturers and peers and understand the health and safety risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training for students, and following the instructions of the University staff.

10. What administrative information is relevant to this course?

10.1. Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:
(a) The final mark is in the percentage range 47% to 49.4%; and
(b) The course is graded using the Standard Grading scale

Eligibility for Supplementary Assessment Your eligibility for supplementary assessment in a course is dependent of the following conditions applying: - The final mark is in the percentage range 47% to 49.4% - The course is graded using the Standard Grading scale - You have not failed an assessment task in the course due to academic misconduct

10.3. Assessment: Submission penalties

Late submissions may be penalised up to and including the following maximum percentage of the assessment task's identified value, with weekdays and weekends included in the calculation of days late:
(a) One day: deduct 5%;
(b) Two days: deduct 10%;
(c) Three days: deduct 20%;
(d) Four days: deduct 40%;
(e) Five days: deduct 60%;
(f) Six days: deduct 80%;
(g) Seven days: A result of zero is awarded for the assessment task.

The following penalties will apply for a late submission for an online examination:
Less than 15 minutes: No penalty
From 15 minutes to 30 minutes: 20% penalty
More than 30 minutes: 100% penalty

10.4. Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.5. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The Student Charter sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.6. General Enquiries

For course-specific questions, contact your teaching staff or Course Coordinator.

For other enquiries or to access support, please contact Student Central:

- UniSC Student Central
- UniSC Adelaide Student Central