COURSE OUTLINE

MEC700 Machine System Design

School: School of Science, Technology and Engineering

2026 | Trimester 2

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 develops the understanding of a student to be able to apply advanced knowledge to Machine Design. As such, the course presents advanced professional and scholarly platforms for further learning and development.

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
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

1.3. Course Topics

Topics may include:

- Fatigue considerations in machine design.
- Failure theories and analysis.
- Surface failure and lubrication.
- Reliability analysis.
- Finite element analysis and computer modelling.
- Design optimisation.
- Sustainability in mechanical design.

2. What level is this course?

700 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 On successful completion of this course, you should be able to...	GRADUATE QUALITIES MAPPING Completing these tasks successfully will contribute to you becoming...	PROFESSIONAL STANDARD MAPPING * Engineers Australia Stage 1 Professional Engineer Competency Standards
1 Investigate and analyse complex design problems and concepts using creativity and initiative to synthesise innovative solutions to new and emerging problems.	Creative and critical thinker	2, 2.1.f, 2.1, 3, 3.3.a, 3.3.b, 3.3
2 Justify, interpret and communicate technical and theoretical findings to technical and non-technical audiences.	Engaged	3, 3.2.a, 3.2
3 Apply self-reliance and autonomy in problem solving of technical and research-based projects and independent learning with an aptitude for further enquiry and development.	Engaged	3, 3.5.c, 3.5.e, 3.5
4 Research and evaluate complex theory and processes related to integrating whole-of-system design and concepts of efficiency and reliability in machine systems.	Knowledgeable Creative and critical thinker	1, 1.1.a, 1.1, 2, 2.1.d, 2.1.f
5 Consider how sustainability, environmental and social constraints impact the design of machinery.	Sustainability-focussed	1, 1.6.c, 1.6

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	
1	Elements of competency: Knowledge and Skill Base
1.1.a	Knowledge and Skill Base - Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline: Engages with the engineering discipline at a phenomenological level, applying sciences and engineering fundamentals to systematic investigation, interpretation, analysis and innovative solution of complex problems and broader aspects of engineering practice.
1.6.c	Knowledge and Skill Base - Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline: Appreciates the social, environmental and economic principles of sustainable engineering practice.
1.1	Knowledge and Skill Base: Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
1.6	Knowledge and Skill Base: Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
2	Elements of competency: Engineering Application Ability

CODE	COMPETENCY
2.1.f	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Conceptualises alternative engineering approaches and evaluates potential outcomes against appropriate criteria to justify an optimal solution choice.
2.1.d	Engineering Application Ability - Application of established engineering methods to complex engineering problem solving: Investigates complex problems using research-based knowledge and research methods.
2.1	Engineering Application Ability: Application of established engineering methods to complex engineering problem solving.
3	Elements of competency: Professional and Personal Attributes
3.3.a	Professional and Personal Attributes - Creative, innovative and pro-active demeanour: Applies creative approaches to identify and develop alternative concepts, solutions and procedures, appropriately challenges engineering practices from technical and non-technical viewpoints; identifies new technological opportunities.
3.3.b	Professional and Personal Attributes - Creative, innovative and pro-active demeanour: Seeks out new developments in the engineering discipline and specialisations and applies fundamental knowledge and systematic processes to evaluate and report potential.
3.2.a	Professional and Personal Attributes - Effective oral and written communication in professional and lay domains: Is proficient in listening, speaking, reading and writing English.
3.5.c	Professional and Personal Attributes - Orderly management of self, and professional conduct: Demonstrates commitment to life-long learning and professional development.
3.5.e	Professional and Personal Attributes - Orderly management of self, and professional conduct: Thinks critically and applies an appropriate balance of logic and intellectual criteria to analysis, judgement and decision making.
3.2	Professional and Personal Attributes: Effective oral and written communication in professional and lay domains.
3.3	Professional and Personal Attributes: Creative, innovative and pro-active demeanour.
3.5	Professional and Personal Attributes: Orderly management of self, and professional conduct.

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	Oral	Individual	25%	10 minutes	Week 5	Online Assignment Submission with plagiarism check
All	2	Report	Individual	50%	3500 words	Week 8	Online Assignment Submission with plagiarism check
All	3	Oral	Individual	25%	10 minutes	Week 12	Online Assignment Submission with plagiarism check

All - Assessment Task 1: Presentation

GOAL:	Application of developed knowledge to the analysis of a machine design.
PRODUCT:	Oral
AUTHORSHIP STATEMENT:	
FORMAT:	Application of developed knowledge to the analysis of a machine design.
CRITERIA:	

No.		Learning Outcome assessed
1	Investigation and analysis of complex design problems and concepts using creativity and initiative to synthesise innovative solutions to new and emerging problems.	1 3
2	Justification, interpretation and communication of technical and theoretical findings to technical and non-technical audiences.	1 2 3
3	Application of self-reliance and autonomy in problem solving of technical and research-based projects and independent learning with an aptitude for further enquiry and development.	3

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

All - Assessment Task 2: Report

GOAL:	Assessment and evaluation of a developed computer model.
PRODUCT:	Report
AUTHORSHIP STATEMENT:	
FORMAT:	Assessment and evaluation of a developed computer model.
CRITERIA:	

No.		Learning Outcome assessed
1	Justification, interpretation and communication of technical and theoretical findings to technical and non-technical audiences.	1 2
2	Application of self-reliance and autonomy in problem solving of technical and research-based projects and independent learning with an aptitude for further enquiry and development.	3 4

GENERIC SKILLS:	Communication, Organisation, Applying technologies, Information literacy

All - Assessment Task 3: Presentation

GOAL:	Presentation of the broader context of the developed model and its impact.
PRODUCT:	Oral
AUTHORSHIP STATEMENT:	
FORMAT:	Presentation of the broader context of the developed model and its impact.
CRITERIA:	

No.		Learning Outcome assessed
1	Justification, interpretation and communication of technical and theoretical findings to technical and non-technical audiences.	2 3
2	Research and evaluation of complex theory and processes related to integrating whole-of-system design and concepts of efficiency and reliability in machine systems.	1 4
3	Consideration of how sustainability, environmental and social constraints impact the design of machinery.	4 5

GENERIC SKILLS:	Communication, 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

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