COURSE OUTLINE

MEC205 Dynamics 1

School: School of Science, Technology and Engineering

2026 | Semester 1

UniSC Sunshine Coast
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.

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

We live in a dynamic world. Most Mechanical Engineering systems include components and mechanisms that are in motion e.g. the movement of a piston which results in the propulsion of the vehicle. The principles of dynamics underpin your engineering degree. This course follows on from the Engineering Statics and considers systems that are not in equilibrium i.e. with velocity and/or acceleration. The course reviews basic concepts and develops a number of theories and principles to assist in the analysis of the motion of particles, bodies, interconnected bodies, mechanisms and geared systems.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Students are required to watch a pre-recorded learning material in Canvas	2hrs	Week 1	13 times
Tutorial/Workshop 1 – Students are asked to solve the tutorial questions based on the theories and methods in the learning materials	2hrs	Week 1	13 times

1.3. Course Topics

- The Free Body Diagram Method: its application to solve problems involving the forces on particles and rigid bodies, and to determine their resulting linear and curvilinear motions;
- Mechanisms: how to analyse and derive the velocities and accelerations of their rigid body components;
- The Work Energy method: its application to solve problems involving the motions of systems of particles;
- Newton's Laws of Motion, Principles of Conservation of Energy and Momentum and Coulomb's Laws of Friction: Their application to problems involving the plane motion of particles, bodies, interconnected bodies, and links within mechanisms;
- Selection of the most appropriate of these techniques for a given problem;
- Kinematic and kinetics analysis of plane mechanisms

2. What level is this course?

200 Level (Developing)

Building on and expanding the scope of introductory knowledge and skills, developing breadth or depth and applying knowledge and skills in a new context. May require pre-requisites where discipline specific introductory knowledge or skills is necessary. Normally, undertaken in the second or third full-time year of an undergraduate programs.

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 Explain basic kinematics concepts: displacement, velocity and acceleration (and their angular counterparts).	Knowledgeable	1.1, 1.2
2 Apply basic dynamics concepts: force, momentum, work and energy	Knowledgeable Empowered	2.1, 2.2
3 Apply Newton's laws of motion and other basic dynamics concepts - the Work-Energy principle,Impulse-Momentum principle and the coefficient of restitution	Empowered	2.1, 2.2
4 Solve dynamics problems by appraising given information and determining which concepts apply, and then applying an appropriate solution strategy	Knowledgeable Creative and critical thinker Empowered	1.2, 2.2

* Competencies by Professional Body

CODE	COMPETENCY
ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS	
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.
1.2	Knowledge and Skill Base: Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin 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.

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

(MTH104 or MTH202) and ENG102 and enrolled in SC404, SC405, SC410, SC411 or SC425

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

ENG205 or MEC2401 (USQ)

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

Some questions used in the previous year's assessment will be peer-reviewed in Week 3's tutorial.

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	Quiz/zes	Individual	30%	Short answer	Refer to Format	Online Test (Quiz)
All	2	Written Piece	Individual	30%	2000 Words	Week 9	Online Submission
All	3	Examination - Centrally Scheduled	Individual	40%	2 hours	Exam Period	Exam Venue

All - Assessment Task 1: Online activities

GOAL:	This is an ongoing introductory task that ensures you have a firm foundation in dynamics principles and applications. You will explain basic kinematics concepts - displacement, velocity and acceleration (and their angular counterparts) as they relate to real engineering problems. You will then apply basic dynamics concepts - force, momentum, work and energy to solve problems.
PRODUCT:	Quiz/zes
AUTHORSHIP STATEMENT:	
FORMAT:	Weekly short answer responses to a selection of questions. The assignment report is to be submitted via Canvas. Submit: weeks 3 - 12
CRITERIA:	

No.		Learning Outcome assessed
1	Accuracy of the explanation and/or numerical result	1 2
2	Application of dynamics concepts	3

GENERIC SKILLS:	Problem solving, Applying technologies

All - Assessment Task 2: Assignment

GOAL:	The assignment is designed to evaluate your knowledge of dynamics concepts and to demonstrate the use of standard methods to analyse and solve dynamics problems.
PRODUCT:	Written Piece
AUTHORSHIP STATEMENT:	
FORMAT:	A number of engineering problems involving motions of particles and rigid bodies will be given. You will respond by analysing the problem and providing a solution by applying mathematical methods.
CRITERIA:	

No.		Learning Outcome assessed
1	Accuracy of the application of dynamics concepts	1 2
2	Identification and verification of the system being analysed using sketches and modelling	1
3	Appropriate solution strategy	2 3
4	Communication of results	4

GENERIC SKILLS:	Communication, Problem solving, Applying technologies

All - Assessment Task 3: Final Examination

GOAL:	The final exam is designed to evaluate your sound knowledge of dynamics concepts and for you to demonstrate that you can use standard methods to analyse dynamic systems.
PRODUCT:	Examination - Centrally Scheduled
AUTHORSHIP STATEMENT:	
FORMAT:	You will respond to a set of questions representing problems from dynamics systems
CRITERIA:	

No.		Learning Outcome assessed
1	Accuracy of the explanations of basic dynamics concepts	1 2
2	Application of the dynamics concepts	1 2
3	Appropriate solution strategy	2 3
4	Communication of results	4

GENERIC SKILLS:	Communication, Problem solving, Applying technologies

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

You need regular access to the resource(s) below. Many texts are available as ebooks through the Library at no additional cost.

REQUIRED?	AUTHOR	YEAR	TITLE	EDITION	PUBLISHER
Required	R. C. Hibbeler	0	Engineering Mechanics: Dynamics in SI Units, Global Edition	14	Pearson

8.2. Specific requirements

N/A

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: 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 submission of assessment tasks may be penalised at the following maximum rate: - 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task. - 10% (of the assessment task's identified value) for the third day - 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task. - A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task. Weekdays and weekends are included in the calculation of days late. To request an extension you must contact your course coordinator to negotiate an outcome.

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

In person:

- **UniSC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **UniSC Moreton Bay** - Service Centre, Ground Floor, Foundation Building, Gympie Road, Petrie
- **UniSC SouthBank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **UniSC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **UniSC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **UniSC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

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