

# MEC304 Engineering Dynamics

School: School of Science, Technology and Engineering

2026 | Trimester 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](http://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

Within mechanical engineering the understanding of how object move and interact is fundamental to the design of engineering systems. This course introduces students to the concepts of Newtonian mechanics on which the field of engineering dynamics is founded. The course features an application-based treatment in order for students to be able to readily assimilate the theory and concepts introduced.

### 1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
<b>BLENDED LEARNING</b>			
<b>Learning materials</b> – Asynchronous weekly learning material	2hrs	Week 1	12 times
<b>Seminar</b> – On campus	1hr	Week 1	3 times
<b>Tutorial/Workshop 1</b> – On campus	2hrs	Week 1	10 times
<b>Laboratory 1</b> – On campus	2hrs	Week 7	5 times

### 1.3. Course Topics

Topics may include:

- Revision of rectilinear and curvilinear motion
- Kinematics of a particle
- Relative motion
- Kinetics of a particle
- Kinematics of a rigid body
- Mass moment of inertia
- Kinetics of a rigid body

## 2. What level is this course?

300 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study year of an undergraduate program.

### 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...	Competencies from multiple Professional Bodies (see below) *
1 Explain basic kinematics concepts: displacement, velocity and acceleration (and their angular counterparts) to describe the motion of points, objects and systems of groups of objects.	Knowledgeable	1, 1, 1.1.a, 1.1.a, 1.2.a, 1.2.a, 1.1, 1.1, 1.2, 1.2
2 Resolve dynamics problems through analysis and determine which concepts apply to apply an appropriate solution strategy considering practical constraints and real-world applications.	Creative and critical thinker	1, 1, 1.2.a, 1.2.a, 1.2, 1.2, 2, 2, 2.2, 2.2
3 Apply basic dynamics concepts: force, momentum, work and energy to e.g. machinery, vehicles, and structures.	Empowered	2, 2, 2.1.a, 2.1.a, 2.2.b, 2.2.b, 2.1, 2.1, 2.2, 2.2
4 Apply Newton's laws of motion and other basic dynamics concepts - the Work-Energy and Impulse-Momentum principles and the coefficient of restitution to understand the effect forces have upon objects and structures.	Empowered	2, 2, 2.1.a, 2.1.a, 2.2.b, 2.2.b, 2.1, 2.1, 2.2, 2.2

#### \* Competencies by Professional Body

CODE	COMPETENCY
<b>ENGINEERS AUSTRALIA STAGE 1 PROFESSIONAL ENGINEER COMPETENCY STANDARDS</b>	
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.
1.2.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.
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	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.
2.2.b	Engineering Application Ability - Fluent application of engineering techniques, tools and resources: Constructs or selects and applies from a qualitative description of a phenomenon, process, system, component or device a mathematical, physical or computational model based on fundamental scientific principles and justifiable simplifying assumptions.

CODE	COMPETENCY
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.
ENGINEERS AUSTRALIA STAGE 1 ENGINEERING TECHNOLOGIST COMPETENCY STANDARDS	
1	Elements of competency: Knowledge and Skill Base
1.1.a	Knowledge and Skill Base - Systematic, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the technology domain: Engages with the technology domain at a phenomenological level, applying sciences and engineering fundamentals to systematic investigation, interpretation, analysis and innovative solution of broadly-defined problems and engineering technology practice.
1.2.a	Knowledge and Skill Base - Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the technology domain: 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 technology domain.
1.1	Knowledge and Skill Base: Systematic, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the technology domain.
1.2	Knowledge and Skill Base: Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the technology domain.
2	Elements of competency: Engineering Application Ability
2.1.a	Engineering Application Ability - Application of established engineering methods to broadly-defined problem solving within the technology domain: 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.
2.2.b	Engineering Application Ability - Application of engineering techniques, tools and resources within the technology domain: Understands the principles, limitations and accuracy of mathematical, physical or computational modelling.
2.1	Engineering Application Ability: Application of established engineering methods to broadly-defined problem solving within the technology domain.
2.2	Engineering Application Ability: Application of engineering techniques, tools and resources within the technology domain.

## 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

### 5.2. Co-requisites

Not applicable

### 5.3. Anti-requisites

MEC205

### 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	40%	One hour per quiz	Throughout teaching period (refer to Format)	Online Assignment Submission with plagiarism check
All	2	Written Piece	Individual	30%	2000 words	Week 9	Online Assignment Submission with plagiarism check
All	3	Examination - Centrally Scheduled	Individual	30%	2 hours	Exam Period	Online Assignment Submission with plagiarism check

### All - Assessment Task 1: Online Quizzes

<b>GOAL:</b>	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.		
<b>PRODUCT:</b>	Quiz/zes		
<b>AUTHORSHIP STATEMENT:</b>			
<b>FORMAT:</b>	Submission week: 3-12		
<b>CRITERIA:</b>	<b>No.</b>		<b>Learning Outcome assessed</b>
	1	Accuracy of the explanation and/or numerical result.	1 3 4
	2	Application of dynamics concepts	1 2 3 4
<b>GENERIC SKILLS:</b>	Problem solving, Applying technologies, Information literacy		

### All - Assessment Task 2: Assignment

<b>GOAL:</b>	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.	
	Assessment Criteria: 1 Accuracy of the application of dynamics concepts; 2 Identification and verification of the system being analysed using sketches and modelling; 3 Appropriate solution strategy; 4 Communication of results	
<b>PRODUCT:</b>	Written Piece	
<b>AUTHORSHIP STATEMENT:</b>		
<b>FORMAT:</b>	Written piece.	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1 Accuracy of the application of dynamics concepts.	2 3 4
	2 Identification and verification of the system being analysed using sketches and modelling.	1 2
	3 Appropriate solution strategy.	2
	4 Communication of results	1 2
<b>GENERIC SKILLS:</b>	Communication, Problem solving, Applying technologies, Information literacy	

### All - Assessment Task 3: Final Examination

<b>GOAL:</b>	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.	
<b>PRODUCT:</b>	Examination - Centrally Scheduled	
<b>AUTHORSHIP STATEMENT:</b>		
<b>FORMAT:</b>	Written exam	
	Assessment Criteria: 1 Accuracy of the explanations of basic dynamics concepts; 2 Application of the dynamics concepts; 3 Appropriate solution strategy; 4 Communication of results"	
<b>CRITERIA:</b>	<b>No.</b>	<b>Learning Outcome assessed</b>
	1 Accuracy of the explanations of basic dynamics concepts.	
	2 Application of the dynamics concepts.	
	3 Appropriate solution strategy.	
	4 Communication of results.	
<b>GENERIC SKILLS:</b>		

## 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:

- (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](#)