ENEM12010 *Engineering Dynamics*
Term 1 - 2026

Profile information current as at 12/11/2026 11:42 am

All details in this unit profile for ENEM12010 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student).The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview
In this unit, you will apply Newtonian Physics to solve physical situations in engineering. This unit follows on from Year 1 Engineering Mechanics unit (where you have assessed physical situations in static equilibrium) and considers systems that are not in equilibrium i.e., respond to unbalanced forces that induce an acceleration in the system. You will study pure kinematics (a mathematical description of motion only) of particles and rigid bodies and kinetics, to determine motion in problems using Motion & Energy equations in 2D planar mechanisms,) particles and rigid bodies. The unit concludes with an introduction to mechanical vibrations.

Details
Career Level: *Undergraduate*
Unit Level: *Level 2*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites
Prerequisites: ENEG11006 Engineering Statics AND MATH11219 Applied Calculus
Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the Assessment Policy and Procedure (Higher Education Coursework).

Offerings For Term 1 - 2026
- Bundaberg
- Cairns
- Gladstone
- Mackay
- Online
- Rockhampton

Attendance Requirements
All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Website
This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

Regional Campuses
Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

Metropolitan Campuses
Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. Online Quizzes (Online Quiz(zes))
Weighting: 10%
2. Assignment 1 (Written Assessment)
Weighting: 20%
3. Assignment 2 (Written Assessment)
Weighting: 20%
4. Examination (Examination)
Weighting: 50%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the University's Grades and Results Policy for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the CQUniversity Policy site.
You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Academic Progression Policy and Procedure
- Student Refund and Credit Balance Policy and Procedure
- Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the CQUniversity Policy site.

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from SUTE

Feedback
Assessment feedback is to be checked for effectiveness.

Recommendation
More effective ways to provide feedback for assessments should be explored.

Feedback from SUTE

Feedback
Unit learning materials are to be updated to align closely with assessment tasks. This can help clarify the assessment requirements.

Recommendation
Unit learning materials are to be reviewed and updated to support diverse learning styles and closely align with assessment tasks.

Feedback from Class discussion

Feedback
The use of multiple-choice questions during the lecture was very good, as it helped to learn some basic information, and it is a good way to allow for interaction with students and the lecturer

Recommendation
This practice should be continued.

Unit Learning Outcomes

On successful completion of this unit, you will be able to:

1. Apply basic kinematics concepts such as displacement, velocity, and acceleration to predict the motion of bodies
2. Apply basic kinetics concepts such as force, momentum, work, and energy to predict the motion of bodies
3. Apply Newton’s laws of motion and the work-energy principle to particles dynamic systems, impulse-momentum principle, and coefficient of restitution
4. Apply principles of planar kinematics and kinetics of a rigid body
5. Derive the equations of motion for single degree freedom systems due to mechanical vibrations
6. Work effectively as an individual and communicate effectively with colleagues and peers.

The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:

Introductory

2.3 Application of systematic engineering synthesis and design processes. (LO: 1N)

Intermediate

1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1I 2I 3I 4I 5I)

1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1I 2I 3I 4I 5I)

1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1I 2I 3I 4I 5I)

1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 1I 2I 3I 4I 5I)

1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 1I 2I 3I 4I 5I)

1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 1I 2I 3I 4I 5I)

2.1 Application of established engineering methods to complex engineering problem solving. (LO: 1I 2I 3I 4I)

2.2 Fluent application of engineering techniques, tools and resources. (LO: 1I 2I 3I 4I)

2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 1I)

3.2 Effective oral and written communication in professional and lay domains. (LO: 6N 7I)

Note: LO refers to the Learning Outcome number(s) which link to the competency and the levels: N – Introductory, I – Intermediate and A - Advanced.

Refer to the Engineering Undergraduate Course Moodle site for further information on the Engineers Australia's Stage 1 Competency Standard for Professional Engineers and course level mapping information https://moodle.cqu.edu.au/course/view.php?id=1511

Alignment of Learning Outcomes, Assessment and Graduate Attributes

— N/A Level | • Introductory Level | • Intermediate Level | • Graduate Level | ◦ Professional Level | ◦ Advanced Level

Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
1 - Online Quiz(zes) - 10%	•	•	•	•	•	•
2 - Written Assessment - 20%	•	•	•			•
3 - Written Assessment - 20%				•	•	•
4 - Examination - 50%	•	•	•	•	•	

Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes					
	1	2	3	4	5	6
1 - Communication	•	•	•	•		•
2 - Problem Solving	•	•	•	•	•	
3 - Critical Thinking	•	•	•	•	•	•
4 - Information Literacy	•	•	•	•		•
5 - Team Work						
6 - Information Technology Competence	•	•	•	•	•	
7 - Cross Cultural Competence						
8 - Ethical practice						
9 - Social Innovation						
10 - First Nations Knowledges						

Textbooks and Resources

Textbooks

ENEM12010

Prescribed

ENGINEERING MECHANICS - DYNAMICS (SI EDITION) Edition Edition: 15
Edition: 15 (2023)
Authors: RC Hibbler
Pearson Sydney Sydney , NSW , Australia
sydney , nsw , Australia
ISBN: 1292451939

View textbooks at the University shop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- MATLAB and Simulink Suite Software

Referencing Style

All submissions for this unit must use the referencing style: Harvard (author-date)
For further information, see the Assessment Tasks.

Teaching Contacts

Ramadas Narayanan Unit Coordinator
r.narayanan@cqu.edu.au

Schedule

Week 1 - 09 Mar 2026

Module/Topic	Chapter	Events and Submissions/Topic
Unit Information, Basic concepts, Vectors, Particle, Rigid Body, Rectilinear Kinematics	Lecture Notes, Chapter 12, Sections 12.1- 12.3	

Week 2 - 16 Mar 2026

Module/Topic	Chapter	Events and Submissions/Topic
Curvilinear Motion, Relative Motion	Chapter 12, Sections 12.4-12.8,12-10	Week 2 Quiz

Week 3 - 23 Mar 2026

Module/Topic	Chapter	Events and Submissions/Topic
Absolute Dependent Motion Kinetics of a Particle	Chapter 12, Section 12.10 Chapter 13, Sections 13.1 - 13.6	Week 3 Quiz

Week 4 - 30 Mar 2026

Module/Topic	Chapter	Events and Submissions/Topic
Work and Energy	Chapter 14, Sections 14.1-14.6	Week 4 Quiz

Week 5 - 06 Apr 2026

Module/Topic	Chapter	Events and Submissions/Topic

Impulse & momentum - Conservation of momentum, impact	Chapter 15, Sections 15.1 - 15.7	Week 5 Quiz

Week 6 - 13 Apr 2026

Module/Topic	Chapter	Events and Submissions/Topic
Planar Kinematics of a rigid body- Rotation about fixed axis Absolute motion Analysis, Relative motion analysis	Chapter 16, Sections 16.1 - 16.5	Week 6 Quiz Assignment 1 Due: Week 6 Wednesday (15 Apr 2026) 11:45 pm AEST

Vacation Week - 20 Apr 2026

Module/Topic	Chapter	Events and Submissions/Topic
Vacation		

Week 7 - 27 Apr 2026

Module/Topic	Chapter	Events and Submissions/Topic
Planar Kinematics of a rigid body - Instantaneous Centre method	Chapter 16, Sections 16.6 - 16.7	Week 7 Quiz

Week 8 - 04 May 2026

Module/Topic	Chapter	Events and Submissions/Topic
Planar Kinematics of a rigid body - Force and Acceleration, Translation, Rotation and General Plane Motion	Chapter 17, Sections 17.1 - 17.5	Week 8 Quiz

Week 9 - 11 May 2026

Module/Topic	Chapter	Events and Submissions/Topic
Planar Kinetics of a Rigid Body: Work & Energy, Impulse & Momentum	Chapter 18 Sections 18.1 - 18.5 Chapter 19 Section 19.1 - 19.3	Week 9 Quiz

Week 10 - 18 May 2026

Module/Topic	Chapter	Events and Submissions/Topic
Vibrations: Free and Forced	Chapter 22 Section 22.1- 22.3	Week 10 Quiz

Week 11 - 25 May 2026

Module/Topic	Chapter	Events and Submissions/Topic
Damped Vibration, Energy Methods, Electrical Analogy	Chapter 22 Section 22.4- 22.6	Week 11 Quiz Assignment 2 Due: Week 11 Wednesday (27 May 2026) 11:45 pm AEST

Week 12 - 01 Jun 2026

Module/Topic	Chapter	Events and Submissions/Topic
Revision	All Chapters	

Exam Week - 08 Jun 2026

Module/Topic	Chapter	Events and Submissions/Topic
Exam		

Vacation/Exam Week - 15 Jun 2026

Module/Topic	Chapter	Events and Submissions/Topic

Assessment Tasks

1 Online Quiz(zes)

Assessment Title

Online Quizzes

Task Description
These weekly quizzes assess the content from each week. There will be 10 quizzes, starting in week 2 and continuing through week 11, with a total weighting of 10% for the course. The assessment task can be accessed on the course Moodle site weekly. Each quiz will be open for a week, and you must attempt it during that period. However, extenuating circumstances will be considered. Weekly due dates will be given in Moodle.
AIAS Statement: **No AI**: You must not use AI at any point during the assessment. You must demonstrate your core skills and knowledge.
This assessment is exempt from the 72-hour submission grace period.

Number of Quizzes
10

Frequency of Quizzes
Weekly

Assessment Due Date
Weekly due dates will be given in the Moodle

Return Date to Students
You will receive feedback immediately after you submit each quiz

Weighting
10%

Minimum mark or grade
50%

Assessment Criteria
The correct answer will earn full marks, and the incorrect answer will earn zero marks.
For 10 quizzes together, you must achieve at least 50% to pass this assessment.

Referencing Style
Harvard (author-date)

Submission
Online

Submission Instructions
Each quiz needs to be attempted and submitted within the stipulated time.

Learning Outcomes Assessed
- Apply basic kinematics concepts such as displacement, velocity, and acceleration to predict the motion of bodies
- Apply basic kinetics concepts such as force, momentum, work, and energy to predict the motion of bodies
- Apply Newton’s laws of motion and the work-energy principle to particles dynamic systems, impulse-momentum principle, and coefficient of restitution
- Apply principles of planar kinematics and kinetics of a rigid body
- Derive the equations of motion for single degree freedom systems due to mechanical vibrations
- Work effectively as an individual and communicate effectively with colleagues and peers.

2 Written Assessment

Assessment Title
Assignment 1

Task Description
This assignment assesses the content from Weeks 1 to 4. The assessment task will be available in the course Moodle site three weeks prior to its due date. You must provide detailed solutions to the problems given in the assignment in order to demonstrate your knowledge and understanding of the concepts and processes, incorporating any assumptions made, relevant sketches, a clear step-by-step solution and a conclusion/judgment on the answer.

AIAS Statement: **No AI**: You must not use AI at any point during the assessment. You must demonstrate your core skills and knowledge.

Assessment Due Date
Week 6 Wednesday (15 Apr 2026) 11:45 pm AEST

Return Date to Students
Week 8 Wednesday (6 May 2026)
Two weeks after the submission

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria
The submission will be graded based on the presentation, the method of solution, the appropriateness of the explanation, and the completeness of the solution. A complete solution should include any assumptions made, relevant sketches, a clear step-by-step solution and a conclusion/judgement on the answer.
You must achieve at least 50% to pass this assessment.

Referencing Style
Harvard (author-date)

Submission
Online

Submission Instructions
Submission file must be as a PDF document with file name as Assignment 1_Your Name.pdf

Learning Outcomes Assessed
- Apply basic kinematics concepts such as displacement, velocity, and acceleration to predict the motion of bodies
- Apply basic kinetics concepts such as force, momentum, work, and energy to predict the motion of bodies
- Apply Newton's laws of motion and the work-energy principle to particles dynamic systems, impulse-momentum principle, and coefficient of restitution
- Work effectively as an individual and communicate effectively with colleagues and peers.

3 Written Assessment

Assessment Title
Assignment 2

Task Description
This assignment assesses content from Week 5 to Week 9. The assessment task will be available in the unit Moodle site three weeks prior to its due date. You must provide detailed solutions to the problems given in the assignment in order to demonstrate your knowledge and understanding of the concepts and processes, incorporating any assumptions made, relevant sketches, a clear step-by-step solution and a conclusion/judgement on the answer
AIAS Statement: **No AI**: You must not use AI at any point during the assessment. You must demonstrate your core skills and knowledge.

Assessment Due Date
Week 11 Wednesday (27 May 2026) 11:45 pm AEST

Return Date to Students
Exam Week Wednesday (10 June 2026)
Two weeks after the submission

Weighting
20%

Minimum mark or grade
50%

Assessment Criteria
It will be graded based on the presentation, the method of solution, the appropriate explanation and the completeness of the solution. A complete solution should include any assumptions made, relevant sketches, a clear step-by-step solution and a conclusion/judgement on the answer.
You must achieve at least 50% to pass this assessment.

Referencing Style
Harvard (author-date)

Submission
Online

Submission Instructions

Please upload to Moodle online electronic assignment submission link as a PDF document with file name as Assignment 2_Your Name.pdf.

Learning Outcomes Assessed

- Apply principles of planar kinematics and kinetics of a rigid body
- Derive the equations of motion for single degree freedom systems due to mechanical vibrations
- Work effectively as an individual and communicate effectively with colleagues and peers.

Examination

Outline
Complete an invigilated examination.

Date
During the examination period at a CQUniversity examination centre.

Weighting
50%

Length
180 minutes

Minimum mark or grade
50%

Exam Conditions
Restricted

Materials
Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).
Calculator - all non-communicable calculators, including scientific, programmable and graphics calculators are authorised

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the Student Academic Integrity Policy and Procedure. This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?

For academic advice and guidance, the Academic Learning Centre (ALC) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?

Be Honest
If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

Seek Help
If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

Produce Original Work
Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem