



# ENEM12010 *Engineering Dynamics*

## Term 1 - 2021

Profile information current as at 08/05/2024 12:42 pm

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 - 2021

- 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 Quiz(zes)**

Weighting: 10%

#### 2. **Written Assessment**

Weighting: 20%

#### 3. **Written Assessment**

Weighting: 20%

#### 4. **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
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and 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 Unit Evaluation

##### Feedback

Concepts were well explained, with a comprehensive amount of worked examples to help further understanding.

##### Recommendation

This practice will be continued.

#### Feedback from Unit Evaluation

##### Feedback

The unit was well managed in spite of complete online delivery. Lecturers' enthusiasm for the unit and the positive teaching attributes were exceptional.

##### Recommendation

This practice will be continued.

#### Feedback from Unit Evaluation

##### Feedback

Weekly quizzes made it easier to stay on track and on top of work.

##### Recommendation

This practice will be continued.

#### Feedback from Unit Evaluation

##### Feedback

The lectures are set out in a very logical manner with quizzes throughout to maintain interest and focus. Lecturers kept students engaged in the topics by showing real-life applications of the concepts through videos and animations. It made the unit very enjoyable.

##### Recommendation

This practice will 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 individual and part of a team
7. Communicate effectively with colleagues and peers

Learning outcomes are linked to Engineers Australia Stage 1 Competencies and also discipline capabilities. You can find the mapping for this on the [Engineering Undergraduate Course website](#).

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



## Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
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	7
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 - Aboriginal and Torres Strait Islander Cultures							

## Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Online Quiz(zes) - 10%	•	•	•	•		•				
2 - Written Assessment - 20%	•	•	•	•		•				
3 - Written Assessment - 20%	•	•	•	•	•	•	•			
4 - Examination - 50%	•	•	•	•		•		•		

## Textbooks and Resources

### Textbooks

ENEM12010

#### Prescribed

**Engineering Mechanics - DYNAMICS (SI Edition) 14th edn (2016)**

Edition: 14 (2016)

Authors: R C Hibbeler

Peason

Global edition , QLD , Australia

ISBN: 9781292088723

Binding: Paperback

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Interactive Physics software
- 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](mailto:r.narayanan@cqu.edu.au)

## Schedule

### Week 1 - 08 Mar 2021

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 - 15 Mar 2021

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 - 22 Mar 2021

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 - 29 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
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Work and Energy	Chapter 14, Sections 14.1-14.6	Week 4 Quiz
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#### Week 5 - 05 Apr 2021

Module/Topic	Chapter	Events and Submissions/Topic
Impulse & momentum - Conservation of momentum, impact	Chapter 15, Sections 15.1 - 15.7	Week 5 Quiz

#### Vacation Week - 12 Apr 2021

Module/Topic	Chapter	Events and Submissions/Topic
Vacation		<b>Assignment 1</b> Due: Vacation Week Friday (16 Apr 2021) 11:55 pm AEST

#### Week 6 - 19 Apr 2021

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

#### Week 7 - 26 Apr 2021

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 - 03 May 2021

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 - 10 May 2021

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 - 17 May 2021

Module/Topic	Chapter	Events and Submissions/Topic
		Week 10 Quiz
Vibrations: Free and Forced	Chapter 22 Section 22.1- 22.3	<b>Assignment 2</b> Due: Week 10 Friday (21 May 2021) 11:55 pm AEST

#### Week 11 - 24 May 2021

Module/Topic	Chapter	Events and Submissions/Topic
Damped Vibration, Energy Methods, Electrical Analogy	Chapter 22 Section 22.4- 22.6	Week 11 Quiz

#### Week 12 - 31 May 2021

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

#### Review/Exam Week - 07 Jun 2021

Module/Topic	Chapter	Events and Submissions/Topic
Review /Exam Period		

## Assessment Tasks

### 1 Online Quizzes

**Assessment Type**

Online Quiz(zes)

**Task Description**

These weekly quizzes assess contents from each week. There will be 10 quizzes starting from week 2 extending up to week 11 and all quizzes together will have 10% weighting of the course. The assessment task can be accessed from the course Moodle site on a weekly basis. Each quiz will be open for a week and students need to attempt within the open period. Weekly due dates will be given in the Moodle.

**Number of Quizzes**

10

**Frequency of Quizzes**

Weekly

**Assessment Due Date**

Weekly due dates will be given in the Moodle

**Return Date to Students**

Students will be getting feedback immediately after the submission of the quizzes.

**Weighting**

10%

**Minimum mark or grade**

50%

**Assessment Criteria**

The correct answer will get full marks and the incorrect answer will be given zero marks.

**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 individual and part of a team

**Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

## 2 Assignment 1

### Assessment Type

Written Assessment

### Task Description

This assignment assesses contents from Week 1 to Week 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, clear step by step solution and conclusion/judgements on the answer.

### Assessment Due Date

Vacation Week Friday (16 Apr 2021) 11:55 pm AEST

### Return Date to Students

Two weeks after the submission

### Weighting

20%

### Assessment Criteria

The submission will be graded based on the presentation, the method of solution, appropriate explanation and completeness of the solution. A complete solution should include any assumptions made, relevant sketches, clear step by step solution and conclusion/judgement on the answer.

### Referencing Style

- [Harvard \(author-date\)](#)

### Submission

Online

### 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 individual and part of a team
- Communicate effectively with colleagues and peers

### Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Information Technology Competence

## 3 Assignment 2

### Assessment Type

Written Assessment

### Task Description

This assignment assesses contents 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, clear step by step solution and conclusion/judgement on the answer

### Assessment Due Date

Week 10 Friday (21 May 2021) 11:55 pm AEST

### Return Date to Students

Two weeks after the submission



**Weighting**

20%

**Assessment Criteria**

It will be graded based on the presentation, the method of solution, appropriate explanation and completeness of the solution. A complete solution should include any assumptions made, relevant sketches, clear step by step solution and conclusion/judgement on the answer.

**Referencing Style**

- [Harvard \(author-date\)](#)

**Submission**

Online

**Learning Outcomes Assessed**

- 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 individual and part of a team
- Communicate effectively with colleagues and peers

**Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Cross Cultural Competence

**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