ENEM12010 *Engineering Dynamics*
Term 1 - 2023

Profile information current as at 17/05/2024 06:39 am

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 - 2023

- 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
More resources needed to be made available.

Recommendation
The unit resources should be reviewed and updated with new materials.

Feedback from Unit Evaluation

Feedback
The unit is well organised and structured with coherent delivery.

Recommendation
This practice should be continued.

Feedback from Class discussion

Feedback
Weekly online quizzes helped to review weekly topics and made it easier to stay on track with the unit.

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 - Aboriginal and Torres Strait Islander Cultures						

Textbooks and Resources

Textbooks

ENEM12010

Prescribed

Engineering Mechanics - DYNAMICS (SI Edition)
Edition: 14th edn (2016)
Authors: Hibbeler, RC
Pearson Education
Sydney , NSW , Australia
ISBN: 9781488689871
Binding: Paperback

Additional Textbook Information
Textbooks can be accessed online at the CQUniversity Library website. If you prefer your own copy, you can purchase a pack containing the text, eText and Modified Mastering Engineering at CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code)

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

Schedule

Week 1 - 06 Mar 2023

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 - 13 Mar 2023

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 - 20 Mar 2023

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 - 27 Mar 2023

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

Week 5 - 03 Apr 2023

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 - 10 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic
Vacation		**Assignment 1** Due: Vacation Week Wednesday (12 Apr 2023) 10:50 pm AEST

Week 6 - 17 Apr 2023

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 - 24 Apr 2023

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 - 01 May 2023

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 - 08 May 2023

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 - 15 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Vibrations: Free and Forced	Chapter 22 Section 22.1- 22.3	Week 10 Quiz **Assignment 2** Due: Week 10 Friday (19 May 2023) 11:45 pm AEST

Week 11 - 22 May 2023

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 - 29 May 2023

Module/Topic	Chapter	Events and Submissions/Topic

Revision	All Chapters

Review/Exam Week - 05 Jun 2023

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

Exam Week - 12 Jun 2023

Module/Topic	Chapter	Events and Submissions/Topic
Exam		

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 withing 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 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 Wednesday (12 Apr 2023) 10:50 pm AEST

Return Date to Students
Week 7 Wednesday (26 Apr 2023)
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, 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 an individual and communicate effectively with colleagues and peers.

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 (19 May 2023) 11:45 pm AEST

Return Date to Students
Week 12 Friday (2 June 2023)
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.

Referencing Style

- Harvard (author-date)

Submission
Online

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