ENEX13005 *Machine Design and Vibrations*
Term 1 - 2021

Profile information current as at 16/04/2024 09:46 pm

All details in this unit profile for ENEX13005 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
This unit will introduce you to the fundamental synthesis of mechanisms and machines. You will start by carrying out analysis of linkages in terms of their transmission angles, toggle positions and mobility for a certain mechanism. The kinematic analysis of any mechanism requires an acceleration analysis that depends on its position and velocity. You will be able to carry out this position, velocity, and acceleration analysis of these mechanisms (kinematic systems) using analytical equations and graphical methods. This unit will enable you to work on 3D CAD modelling and computer simulation of various mechanisms or machines. You will move on to kinetic analysis of systems thereby discussing static and dynamic balancing of rotating masses. After learning concepts of dynamics, you will study vibrations (free and forced) of single and multi-degree of freedom systems and will be able to carry out analysis of such systems using force and energy methods. Students enrolled online are required to attend a compulsory Residential School and have access to a computer and make frequent use of the internet.

Details
Career Level: *Undergraduate*
Unit Level: *Level 3*
Credit Points: *6*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.125*

Pre-requisites or Co-requisites
MATH11219 Applied Calculus AND [ENEM12007 Statics & Dynamics OR ENEM12010 Engineering Dynamics].
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

- Mackay
- Mixed Mode

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).

Residential Schools
This unit has a Compulsory Residential School for distance mode students and the details are:
Click here to see your Residential School Timetable.

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: 20%
2. **Written Assessment**
Weighting: 15%
3. **Written Assessment**
Weighting: 20%
4. **Practical Assessment**
Weighting: 15%
5. **Portfolio**
Weighting: 30%

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 Student Unit and Teaching Evaluation

Feedback

Students appreciated live lectures/tutorials in which student's queries were answered instantly.

Recommendation

Teaching staff will keep making an effort to deliver all lectures/tutorial live.

Feedback from Student Unit and Teaching Evaluation & Email

Feedback

The interim report assessment was thanked by students for providing a forum to exchange ideas, feedback and progress. Students mentioned that it helped them consolidate their understanding of the topics.

Recommendation

The marking rubric and feedback form for the interim report assessment will be reviewed and further improved to assist students in exchanging ideas and knowledge towards completing their final project.

Feedback from Student Unit and Teaching Evaluation & Email

Feedback

Students pointed out that tutorial materials for Autodesk Inventor were based on the previous version so that unnecessary confusion was made.

Recommendation

Autodesk Inventor tutorials will be reviewed and amended as per the latest version of Autodesk Inventor.

Unit Learning Outcomes

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

1. Apply key concepts of kinetics and kinematics to analyse machine design and synthesis
2. Use analytical and graphical techniques to carry out position, velocity, and acceleration analysis
3. Apply concepts of dynamics in balancing of rotating components
4. Analyse vibrations in single and multiple degree of freedom systems
5. Communicate professionally using relevant technical terminology, symbols, and diagrams and effectively document calculations and solutions
6. Work autonomously and as a team member to analyse problems and present solutions.

Learning outcomes will be linked to Engineers Australia stage 1 competency standards for Professional Engineers.

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) - 20%	•	•				

Assessment Tasks	Learning Outcomes					
	1	2	3	4	5	6
2 - Written Assessment - 15%	•	•				
3 - Written Assessment - 20%			•	•		
4 - Practical Assessment - 15%					•	•
5 - Portfolio - 30%			•	•	•	•

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						

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) - 20%	•	•	•			•				
2 - Written Assessment - 15%	•	•	•	•		•				
3 - Written Assessment - 20%	•	•	•			•				
4 - Practical Assessment - 15%	•	•	•		•	•	•			
5 - Portfolio - 30%	•	•	•			•				

Textbooks and Resources

Textbooks

ENEX13005

Supplementary

Design of Machinery
Edition: 6th edn (2020)
Authors: Robert L. Norton
McGraw-Hill Education
New York , NY , USA
ISBN: 9781260590845
Binding: Hardcover
ENEX13005

Supplementary

Mechanical Vibrations
Edition: 6th (2018)
Authors: Singiresu S. Rao
Pearson Education
Harlow , United Kingdom
ISBN: 9780134361307
Binding: eBook

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

Referencing Style

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

Teaching Contacts

Jay Sul Unit Coordinator
j.sul@cqu.edu.au

Schedule

Week 1 - 08 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Introduction and Kinematics fundamentals • Introduction to the unit and information session • Introduction to the machine design and vibration • Applications of kinematics • DoF in 2D and types of motion • Joints, links and kinematic diagrams	Design of Machinery (R. L. Norton) • Chapters 1 and 2	

Week 2 - 15 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Graphical linkage synthesis • Linkage synthesis - Graphical, manual and dimensional techniques with examples • Two-position synthesis • Three-position synthesis	Design of Machinery (R. L. Norton) • Chapter 3	

Week 3 - 22 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Position analysis of linkages • Types of motion • Position analysis - Graphical, algebraic and vector loop methods for four-bar linkages and four-bar-crank slider	Design of Machinery (R. L. Norton) • Chapter 4	

Week 4 - 29 Mar 2021

Module/Topic	Chapter	Events and Submissions/Topic
Analytical linkage synthesis • 2 and 3 position motion generation by analytical and graphical synthesis • 4 and 5 position motion generation using analytical synthesis	Design of Machinery (R. L. Norton) • Chapter 5	

Week 5 - 05 Apr 2021

Module/Topic	Chapter	Events and Submissions/Topic
Velocity analysis of linkages • Recap of Engineering Dynamics • Graphical (vector) and instant centre methods (Kennedy's theorem) • Mechanical advantages	Design of Machinery (R. L. Norton) • Chapter 6	

Vacation Week - 12 Apr 2021

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 19 Apr 2021

Module/Topic	Chapter	Events and Submissions/Topic
Acceleration analysis of linkages • Graphical (vector) and analytical methods • Coriolis acceleration	Design of Machinery (R. L. Norton) • Chapter 7	**Assignment#1 - Kinematic analysis of linkages** Due: Week 6 Monday (19 Apr 2021) 9:00 am AEST **Interim report for Design of a walking mechanism with minimum imbalance and vibration** Due: Week 6 Monday (19 Apr 2021) 9:00 am AEST

Week 7 - 26 Apr 2021

Module/Topic	Chapter	Events and Submissions/Topic
Dynamics fundamentals • Lumped models • Kinetics • Virtual work	Design of Machinery (R. L. Norton) • Chapter 10	Peer- and self-assessment for Interim report for Design of a walking mechanism with the minimum imbalance and vibration Due: Week 7 Monday (26 Apr. 2021) 11:59 pm AEST

Week 8 - 03 May 2021

Module/Topic	Chapter	Events and Submissions/Topic

Static and Dynamic balancing • Static and dynamic balancing on rotating masses • Effect of balancing on shaking and input torque	Design of Machinery (R. L. Norton) • Chapter 12	

Week 9 - 10 May 2021

Module/Topic	Chapter	Events and Submissions/Topic
Basic concepts of vibration • Importance and types of vibration • Natural frequency • Critical damping and damping ratio • Introduction to mathematical modeling and Laplace transform	Mechanical Vibrations (S. S. Rao) • Chapters 1	

Week 10 - 17 May 2021

Module/Topic	Chapter	Events and Submissions/Topic
Free and forced vibration • Forced harmonic vibration and resonance • Logarithmic decrement • Support motion • Rotating unbalance	Mechanical Vibrations (S. S. Rao) • Chapters 2 and 3	Residential School, 17 May (Mandatory for both on-campus and mixed-mode students)

Week 11 - 24 May 2021

Module/Topic	Chapter	Events and Submissions/Topic
Transient vibration • Stability of a system • Poles and Zeros • Root Locus • Bode plot	Mechanical Vibrations (S. S. Rao) • Chapter 4	

Week 12 - 31 May 2021

Module/Topic	Chapter	Events and Submissions/Topic
Two degree-of-freedom system • 2 DoF undamped free vibration • 2 DoF damped free vibration • 2 DoF forced vibration • 2 DoF translational and rotational	Mechanical Vibrations (S. S. Rao) • Chapter 5	Computer lab session **Assignment#2 - Design of a suspension system** Due: Week 12 Monday (31 May 2021) 9:00 am AEST

Review/Exam Week - 07 Jun 2021

Module/Topic	Chapter	Events and Submissions/Topic
		Laboratory worksheet Due: Review/Exam Week Monday (7 June 2021) 9:00 am AEST

Exam Week - 14 Jun 2021

Module/Topic	Chapter	Events and Submissions/Topic
		Final report for Design of a walking mechanism with minimum imbalance and vibration Due: Exam Week Friday (18 June 2021) 11:59 pm AEST

Assessment Tasks

1 Assignment#1 - Kinematic analysis of linkages

Assessment Type
Online Quiz(zes)

Task Description
This assignment assesses students with the content from Week 1 to Week 5. 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 relevant sketches, clear step-by-step solution and conclusion/judgement on answers.

Number of Quizzes

Frequency of Quizzes

Assessment Due Date
Week 6 Monday (19 Apr 2021) 9:00 am AEST

Return Date to Students
Week 6 Friday (23 Apr 2021)
Students will get their results immediately after the due time, except for their sketch.

Weighting
20%

Minimum mark or grade
50

Assessment Criteria

- Correctly identify the problem to be solved (key terms, units, elements or parts of a problem)
- Choose the most appropriate approach to solving the problem
- Clearly present the solutions with sketches (if necessary) for the problems
- Attempt logical alternative approaches to solving the problem

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Students to finish their unlimited attempts for online quizzes through unit's Moodle site

Learning Outcomes Assessed

- Apply key concepts of kinetics and kinematics to analyse machine design and synthesis
- Use analytical and graphical techniques to carry out position, velocity, and acceleration analysis

Graduate Attributes

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

2 Interim report for Design of a walking mechanism with minimum imbalance and vibration

Assessment Type
Written Assessment

Task Description
Task 1: Design (or find) a 1 (or 2) DOF walking mechanism that is reasonably simple but still functional. You will need to assume the working condition of the walking mechanism, such as its walking speed, motor speed, and weight and materials of each link and the main body. This task will need to be completed concurrently with Task 2.
Design requirement

- A 1 (or 2) degree-of-freedom walking mechanism with at least three planar links per leg
- Constant horizontal walking speed from a constant input motor speed with an ovoid foot-path to step over obstacles
- Provide a reasonable assumption of the mass of each link
- Only one leg may be considered with a clear explanation about which type of full walking mechanism your design is part of
- The foot in your design needs to touch the supporting surface for at least a half of the cycle for a 2-leg mechanism

Task 2: Demonstrate the kinematic and kinetic analysis of the design of your choice. This task will need to be completed concurrently with Task 1.

- Simplify the mechanism of your choice and provide a schematic diagram
- Conduct position, velocity and acceleration analyses of each link in the system
- Present the trajectory of foot-paths and changes in velocity and acceleration for one complete cycle
- Analyse how fast it can walk and how speed varies with the input speed
- Verify your analytical approach using Dynamic Simulation in Autodesk Inventor

Assessment Due Date
Week 6 Monday (19 Apr 2021) 9:00 am AEST
Peer and self-assessment task to be completed by Week 7

Return Date to Students
Week 8 Monday (3 May 2021)
Students to see feedback through the submission link

Weighting
15%

Minimum mark or grade
50

Assessment Criteria
You are required to assess your peers' interim reports as well as your own according to the following marking guideline and expected to provide sincere feedback and accurate marks for your peers. This is a valuable change for reflection after viewing other submissions. 67% of this assessment will be from the marks from your peers and the rest will be from the quality of your feedback to your peers.
- Presentation (/20)
Judge the overall report presentation. Consider:

- Does the report overall give you a good impression?
- Does the quality of the presentation give you confidence in the quality of the content?
- What is the overall quality of English expression? Is technical jargon correctly used? Is the language clear and concise?
- Is the report correctly sectioned? Do the sections flow correctly and aid the overall argument?
- Are figures presented in a clear way that maximises the communication of information?
- Is the referencing consistent and easy to follow?
- Does the abstract/executive summary cover all aspects of the report while maintaining its conciseness?
- Overall, is the contained information efficiently communicated to the reader?

- Context and aims (/20)
Judge how well the project has been put into context. Consider:

- What background information has been provided to justify that the project is meaningful/achievable?
- Do you, as a reader, understand the context of the problem and how solving it makes a valuable contribution to knowledge?

- Design of walking mechanism and kinematic diagram (/20)
Judge how well the biped mechanism has been modelled and how accurate kinematic analysis is. Consider:

- A kinematic diagram that clearly describes the walking mechanism
- Its design meets the requirement specified in the assignment document
- Reasonable assumptions for its dimensions and materials; therefore, the mass of each link and the entire system is justified.

- Kinematic analysis and verification process (/20)
Judge how accurate the kinematic analysis has been conducted to describe its correct motion. Consider:

- Good position, velocity and acceleration analysis with relevant diagrams
- The relationship between the input motor speed and walking speed has been defined.
- Presentation of Autodesk Inventor model
- Hand calculations have been verified with Dynamic Simulation in Autodesk Inventor

- Discussions and conclusions (/10)
Judge how well results have been described and if a good summary is provided.

- Correct interpretations and descriptions of the design and results
- A good summary of the report and clear statements of meeting aims and objectives defined in the introductory

part
- Identification of items to improve in the final report

- Progress (/10)
Judge if its progress is as expected up to Task 2

- Completion of Task 1 with all required deliverables
- Completion of Task 2 with all required deliverables

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission to be made through a link provided in unit's Moodle site

Learning Outcomes Assessed

- Apply key concepts of kinetics and kinematics to analyse machine design and synthesis
- Use analytical and graphical techniques to carry out position, velocity, and acceleration analysis

Graduate Attributes

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

3 Assignment#2 - Design of a suspension system

Assessment Type
Written Assessment

Task Description
Task 1: Design of a shock absorber system for a Segway patroller - Find the necessary stiffness and damping constant of the shock absorber system under the given conditions.
- The current Segway patroller weighs 55 kg. The total weight of the new system and its rider is expected to be A x 10 kg.
- The new suspension system is expected to reduce the vibration amplitude to 1/B and C cycles when the Segway patroller is subjected to an initial vertical displacement due to a road bump.
Task 2: Demonstrate the performance of your design - The new Segway patroller with the suspension system of yours is to be tested on a rough road whose surface varies sinusoidally with an amplitude of Y= 0.05 m and a wavelength of 3 m. If the Segway patroller travels at D km/h, what is the displacement amplitude of the new Segway patroller with the suspension system from Task 1.

Assessment Due Date
Week 12 Monday (31 May 2021) 9:00 am AEST

Return Date to Students
Review/Exam Week Friday (11 June 2021)
Students to see feedback through the submission link

Weighting
20%

Minimum mark or grade
50

Assessment Criteria
- Presentation (/25%)

- The report is in a professional and consistent format.
- The report needs the proposed specification (file format, length, etc.)
- Good quality of English expression is demonstrated, and its language is clear and concise.
- The report is properly sectioned to aid the overall argument.
- All figures and tables are labelled properly and discussed in the text.
- Figures and tables are relevant and informative.

- Correct citation and reference styles are used in accordance with the suggested referencing system.
- Good use of visual aids is demonstrated.

- Introduction and background (/15%)

- A clear statement about why the report was commissioned in the first place.
- Comprehensive, detailed and focused context about the presented work is given.
- Succinctly lead the reader to the purpose of the work being documented.
- The objectives of the work are expressed well.
- Previous reports and research, if the present report builds on, are included.

- Methods and results (/25%)

- Detailed information on the approach and/or materials used in the study
- Sufficient references are provided to support the methodology used in the report.
- Results are presented in a logical way.
- Clear but concise evidence in the form of statistics, graphs and tables
- Justification for conclusions and recommendations

- Discussion (/20%)

- Analysis using your own words on the method and results
- Good interpretation and explanation of the results
- Relation of the results with the literature
- Examine whether and how the questions raised in the introduction have been answered.

- Conclusions (/15%)

- Clear agreement with all the objectives that were set out in the introduction is made.
- The significant findings and elements from the report are highlighted.
- The main points of the report are drawn.
- A clear statement about how the topic relates to its context (an evaluation of the importance of the topic, implication and/or recommendation for future studies)

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission to be made through a link provided in unit's Moodle site

Learning Outcomes Assessed

- Apply concepts of dynamics in balancing of rotating components
- Analyse vibrations in single and multiple degree of freedom systems

Graduate Attributes

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

4 Laboratory worksheet

Assessment Type
Practical Assessment

Task Description
You are going to conduct three labs, namely Free vibration, Forced vibration and Mass balance. After conducting these labs, you will complete each task given in the lab worksheet template. You don't need to give lengthy answers for the discussion tasks. You must show all workings where applicable. You must cite the sources of your argument and discussions as per the referencing style specified in the unit profile. This lab worksheet must NOT exceed 15 pages. You will submit it to the submission link provided in Moodle.

Assessment Due Date
Review/Exam Week Monday (7 June 2021) 9:00 am AEST

Return Date to Students
Exam Week Friday (18 June 2021)
Students to see feedback through the submission link

Weighting
15%

Minimum mark or grade
50

Assessment Criteria
Each of the tasks given in the lab worksheet template will be assessed by

- Accurate results
- Accurate plots with correct axis titles and legends
- Reasonable discussions with supporting references

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission to be made through a link provided in unit's Moodle site

Learning Outcomes Assessed

- Communicate professionally using relevant technical terminology, symbols, and diagrams and effectively document calculations and solutions
- Work autonomously and as a team member to analyse problems and present solutions.

Graduate Attributes

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

5 Final report for Design of a walking mechanism with minimum imbalance and vibration

Assessment Type
Portfolio

Task Description
Your final report will include Tasks 1 and 2 with further improvement from your interim report.
Task 3: Conduct vibration analysis of your design

- Isolate the walking mechanism including its body with a housing and motor from its surrounding
- Assume its motor is placed right in the middle of the housing on top of a beam. You will need to assume for the length, width, thickness and material of the beam, based on the size of your mechanism.
- Determine the global mass centre of your design and demonstrate an analytical approach to determine the forced amplitude of the motor under the operating condition defined earlier.
- Suggest how the forced amplitude can be minimised and prove your solutions

Task 4: Verification of your analysis and Evaluation of your design

- Replicate your design in Autodesk Inventor
- Verify your analysis in Task 2 using Dynamic Simulation in Autodesk Inventor
- Verify your analysis in Task 3 using Dynamic Simulation in Autodesk Inventor

Assessment Due Date
Exam Week Friday (18 June 2021) 11:59 pm AEST

Return Date to Students

Students will receive their mark in 2 weeks of their submission.

Weighting
30%

Minimum mark or grade
50

Assessment Criteria
The following criteria will be used to grade your report. This is not the suggest structure of your report.
- Innovation and creativity (/20%)

- The demonstrated mechanism is designed by oneself or an effort is made to improve the current design.
- How complex or simple the chosen design is.
- How accurate the chosen mechanism is interpreted.

- Presentation (/20%)

- The report is in a professional and consistent format.
- The report meets the proposed specification (file format, length, etc.)
- Good quality of English expression is demonstrated, and its language is clear and concise.
- The report is sectioned properly to aid the overall argument.
- All figures and tables are labelled properly and discussed in the text.
- Figures and tables are relevant and informative.
- Correct citation and reference styles are used in accordance with the suggested referencing system
- Good use of visual aids is demonstrated.

- Introduction and background (/15%)

- A clear statement about why the report was commissioned in the first place.
- Comprehensive, detailed and focused context about the presented work is given.
- Succinctly lead the reader to the purpose of the work being documented.
- The objectives of the work are expressed well.
- Previous reports and research, if the present report builds on, are included.

- Methods and results (/20%)

- Detailed information on the approach and/or materials used in the study
- Sufficient references are provided to support the methodology used in the report.
- Results are presented in a logical way.
- Clear but concise evidence in the form of statistics, graphs and tables
- Justification for conclusions and recommendations

- Discussion (/15%)

- Analysis using your own words on the method and results
- Good interpretation and explanation of the results
- Relation of the results with the literature
- Examine whether and how the questions raised in the introduction have been answered.

- Conclusions (/10%)

- Clear agreement with all the objectives that were set out in the introduction is made.
- The significant findings and elements from the report are highlighted.
- The main points of the report are drawn.
- A clear statement about how the topic relates to its context (an evaluation of the importance of the topic, implication and/or recommendation for future studies)

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submission to be made through a link provided in unit's Moodle site

Learning Outcomes Assessed

- Apply concepts of dynamics in balancing of rotating components

- Analyse vibrations in single and multiple degree of freedom systems
- Communicate professionally using relevant technical terminology, symbols, and diagrams and effectively document calculations and solutions
- Work autonomously and as a team member to analyse problems and present solutions.

Graduate Attributes

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

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