ENEM14015 *Dynamic System Modelling and Control*

Term 3 - 2017

Profile information current as at 12/10/2024 01:00 pm

All details in this unit profile for ENEM14015 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 project based learning unit examines the behaviour of mechanical systems. You will apply knowledge of engineering science and mathematics to model and analyse mechanical systems and consider the nature of engineering assumptions and the effects of uncertainty on analysis and modelling. You will apply control and vibration theory, design and analyse linear and non-linear mathematical models and use simulation software to predict the behaviour of mechanical systems. You will be expected to apply the modelling and analysis of mechanical systems to industrial problems and contexts. You will have opportunities to work individually and in teams to complete projects and to develop interpersonal and technical communication skills. You will prepare professional documentation of problem solutions and project reports. Distance education students are required to have access to a computer, to make frequent use of the Internet, and are required to participate in Residential School activities.

Details

Career Level: *Undergraduate*
Unit Level: *Level 4*
Credit Points: *12*
Student Contribution Band: *8*
Fraction of Full-Time Student Load: *0.25*

Pre-requisites or Co-requisites

Prerequisite: ENEM12007 Statics and 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 3 - 2017

- Melbourne
- Mixed Mode
- Perth

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 12-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 25 hours of study per week, making a total of 300 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. **Portfolio**
Weighting: 100%

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 feedback

Feedback
Portfolio assessment criteria needs more explanation as some criteria could be interpreted in different ways.

Recommendation
Will provide more information in relation to the portfolio assessment criteria in the Moodle site.

Feedback from Student feedback

Feedback
Basic theory on PID controllers could be explained better.

Recommendation
Will provide more examples of PID controllers that will help students to understand the concepts.

Feedback from Student feedback

Feedback
Allow more software training and access.

Recommendation
Will organise more help on MatLab software so students get a better understanding of it.

Unit Learning Outcomes

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

1. Design mathematical models that analyse and evaluate mechanical systems
2. Explain and apply control theory and control system approaches to mechanical systems
3. Explain the role of engineering assumptions in building mathematical models of mechanical systems
4. Relate theory to problems of introducing, operating and maintaining mechanical systems in the industrial context
5. Identify and evaluate engineering uncertainty and the limitations of mathematical models
6. Work collaboratively in a team to produce high quality outputs
7. Create professional documentation using mechanical systems terminology, symbols and diagrams

The learning outcomes are linked to Engineers Australia Stage 1 Competencies.

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	7
1 - Portfolio - 100%	•	•	•	•	•	•	•

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 - Portfolio - 100%	•	•	•	•	•	•	•	•		

Textbooks and Resources

Textbooks

ENEM14015

Prescribed

Modelling and analysis of dynamic systems
Edition: 3rd (2001)
Authors: Close, CM, Frederick, DK & Newell, JC
John Wiley & Sons
US
Binding: Hardcover
ENEM14015

Prescribed

Theory of Vibrations with Applications
Edition: 5th (2014)
Authors: Thomson, W & Dahleh, M
Pearson
England
Binding: Paperback

Additional Textbook Information
It is not mandatory to purchase the unit textbooks but these are referred during the unit. Recommended chapter readings and tutorial questions are referred to from these textbooks. The 'Theory of Vibrations with Applications' is used the most in the unit. Any tutorial questions sourced from the textbooks are provided to students so they can use alternative textbooks and resources for the theory resources. In particular the mechanical vibration textbook (Thomson, W & Dahleh, M 2014) is used the most in the unit. Also a low cost e-book version of (Close, CM, Frederick, DK & Newell, JC 2001) is available from the publisher's website.
Currently distance students will be required to purchase the MATLAB and Simulink Student Suite to undertake the unit, which is available from http://au.mathworks.com. Please contact the Engineering course coordinator Dr Aruna Jayasuriya (**a.jayasuriya@cqu.edu.au)** for the latest availability of software for distance students.

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- A4 scanner required for Distance students to scan any written work into their final portfolio submission
- Headphones
- MATLAB and Simulink Suite Software (For students without access to a CQUni campus), see the Textbook and Resources section for more information

Referencing Style

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

Teaching Contacts

Mitchell Mcclanachan Unit Coordinator
m.mcclanachan@cqu.edu.au

Schedule

Week 1 - 06 Nov 2017

Module/Topic	Chapter	Events and Submissions/Topic
Review of Mechanical Vibrations	Close: Ch: 1, 2, 3, 4, 8, 9, 14 ; Thomas: Ch: 1, 2, 3, 4	- Forming teams - Starting your portfolio - Tutorial Questions

Week 2 - 13 Nov 2017

Module/Topic	Chapter	Events and Submissions/Topic
Analysis of Vibratory Systems – Mathematical Theories and Modelling Approaches Project #1 - Mathematical Models	As above	- Starting Project #1 - Introduction to Matlab and Simulink - Tutorial Questions

Week 3 - 20 Nov 2017

Module/Topic	Chapter	Events and Submissions/Topic
Project #1 - Mathematical Models continued	As above	- Project #1 Due - Portfolio Progress Check - Tutorial Questions

Week 4 - 27 Nov 2017

Module/Topic	Chapter	Events and Submissions/Topic
Project #2 Single Degree of Freedom Systems	Close: Ch: 2, 3, 4, 7, 8, 9, 14, Thomas: Ch: 1, 2, 3, 4	- Starting Project #2 - Tutorial Questions

Vacation Week - 04 Dec 2017

Module/Topic	Chapter	Events and Submissions/Topic
Vacation Week		- Continue working in your teams on Project #2

Week 5 - 11 Dec 2017

Module/Topic	Chapter	Events and Submissions/Topic
Project #2 Single Degree of Freedom Systems continued	As above	- Project #2 Due - Portfolio Progress Check - Tutorial Questions

Week 6 - 18 Dec 2017

Module/Topic	Chapter	Events and Submissions/Topic
Project #3 Multiple Degree of Freedom Systems	Close: Ch: 2, 3, 4, 7, 8, 9, 14 , Thomas: Ch: 4, 5, 6, 8.	- Starting Project #3 - Tutorial Questions

Week 7 - 01 Jan 2018

Module/Topic	Chapter	Events and Submissions/Topic
Project #3 Multiple Degree of Freedom Systems continued	As above	- Continue with Project #3 - Tutorial Questions

Week 8 - 08 Jan 2018

Module/Topic	Chapter	Events and Submissions/Topic
Project #3 Multiple Degree of Freedom Systems continued		- Project #3 Due - Portfolio Progress Check - Introduction to Demonstration Problems - Tutorial Questions

Week 9 - 15 Jan 2018

Module/Topic	Chapter	Events and Submissions/Topic
Project #4 Real Data Modelling, System Commissioning & Control	Close: Ch: 5, 7, 8, 9, 14, 15 , Thomas: Ch: 4, 5, 6, 8	- Starting Project #4 - Lab Reports Due - Tutorial Questions

Week 10 - 22 Jan 2018

Module/Topic	Chapter	Events and Submissions/Topic

Project #4 Real Data Modelling, System Commissioning & Control continued	As above	- Continue with Project#4 - Tutorial Questions

Week 11 - 29 Jan 2018

Module/Topic	Chapter	Events and Submissions/Topic
Project #4 Real Data Modelling, System Commissioning & Control continued	As above	- Project #4 Due - Portfolio Progress Check - Tutorial Questions

Week 12 - 05 Feb 2018

Module/Topic	Chapter	Events and Submissions/Topic
Portfolio Finalisation		- Portfolio Finalisation Sessions

Review/Exam Week - 12 Feb 2018

Module/Topic	Chapter	Events and Submissions/Topic
		Portfolio Due: Exam Week Friday (16 Feb 2018) 5:00 pm AEST

Exam Week - 12 Feb 2018

Module/Topic	Chapter	Events and Submissions/Topic
		Portfolio Due: Exam Week Friday (16 Feb 2018) 5:00 pm AEST

Term Specific Information

On Campus and Distance students are required to attend compulsory laboratories. Details of these will be available on the Unit's Moodle website, 2 weeks before the start of the term.

Assessment Tasks

1 Portfolio

Assessment Type
Portfolio

Task Description
The final assessment for the unit will be 100% on the individual student’s portfolio submission. In general, students must demonstrate in their portfolio how the learning outcomes have been achieved through their individual contribution to four group projects, laboratory program, textbook problems, demonstration problems and any additional questions the students wish to submit. Students must demonstrate their contribution to the projects, what they have learnt from the technical content of projects and the processes involved in completing the projects. The project details, laboratory program and demonstration problems will be provided via the Moodle unit website in alignment with the unit schedule. The portfolio is the full record of your journey through this unit. It should include all notes, theory development, worked examples, demonstration problems, laboratory notes and workings, explorations in design, management and team issues and a reflective journal. The portfolio should only contain portions of project work which you completed or made substantial contributions to. Any contributions by others should be clearly indicated. Brief descriptions of the major parts of the portfolio are listed below.

- Reflective Journal
In the reflective journal section of the portfolio students will reflect on what they have set out to learn, how they have approached their learning, what they have achieved, where in industry they could apply what was learnt and what they would do differently in future to improve. The journal should also include reflections on management and teamwork skills learnt during the unit.

- Workbook
Four projects will be completed by teams during the term. Each team shall submit a report per project. Feedback will be provided on the project submissions. Project grades are not directly used in the student's individual grade however poor project results and poor project participation makes it more difficult for the student to demonstrate their competency in the unit learning outcomes and complete any additional textbook and demonstration problems. The workbook section

should contain your notes and portions of project work which you completed or made substantial contributions to. Any contributions by others should be clearly indicated. Use the above mentioned reflective journal to record your input into team discussions and mangement. The workbook should also contain the weekly tutorial questions you completed.

- Compulsory Laboratories

There is a compulsory hands-on laboratory program in the unit to aid your understanding. All students, Internal and Distance, will complete a full laboratory program. Details of these will be available on the Unit's Moodle website, 2 weeks before the start of the term. Distance students may request to attend the laboratory sessions at other campuses (however these may be over a couple of weeks depending on the campus). Laboratory reports are required in which students are requested to show measurements, results, calculations, discussion and reflections (the laboratory sheets will be available on the moodle site before term). The laboratory reports will help by providing evidence for parts of the required portfolio assessment criteria. Laboratory reports will be due around week 9, please refer to the moodle site for exact the due date. Feedback will be given on the submitted lab report to enable students to determine the appropriateness of it for use as evidence in their final portfolio. A satisfactory laboratory report is required to pass the unit.

- Demonstration Problems

A selection of optional demonstration problems will be made available on the Moodle for students to complete and include in their final portfolio. Completing these problems will assist students to demonstrate their individual achievement of the Learning Outcomes. The demonstration problems are closely related to the projects, so a high involvement in the projects will help with the demonstration problems. Students are not limited or confined to the demonstration problems but are free to include their own exploration of the unit content by individually extending (or correcting) the group projects or choosing other questions to demonstrate the Learning Outcomes.

A Distinction or High Distinction Level a high individual achievement of the Learning Outcomes and the demonstration problems and other individual work will assist the student in creating the necessary evidence for this. Without any Demonstration Problems or other individual work it will be very difficult to attain a High Distinction, unless you can demonstrate an exceptional level of involvement in the projects. Direct transcribing of any provided worked tutorial solutions cannot be used as evidence.

- Supporting Matlab, Simulink and Excel Spreadsheet files

In the portfolio submission, include any files you created during the unit. The files should have appropriate file names and be referenced in your portfolio document. If a file is not entirely your own work you should clearly indicate your contribution in the comments section of the file or elsewhere in the final portfolio document. Compress the files into a single 'zip' archive and submit it with the written portfolio document.

- Viva Voce

Following the grading of the Final Portfolio, students may be requested to attend a 10 minute Viva Voce to discuss their Final Portfolio. If required, the viva will be conducted either face-face, by video conferencing or via telephone.

Assessment Due Date

Exam Week Friday (16 Feb 2018) 5:00 pm AEST

Return Date to Students

Assessment will be returned after CQU Certification of Grades

Weighting

100%

Assessment Criteria

The portfolio will be used to assess your increase in knowledge, effective management of yourself and others, team work, communication, commitment and learning processes. Students are expected to nominate a grade that they consider should be awarded. This must be clearly substantiated with evidences of individual work in support of such claims. These claims will be assessed based on the how well the material presented in the portfolio demonstrates the attainment of the unit learning outcomes.

The award of grade will depend the student’s demonstrated individual achievement of the learning outcomes of the unit, the student’s involvement in the team projects and the holistic development of each student. A detailed Portfolio Assessment Criteria Matrix is available on the Moodle unit site indicating the requirements for acceptable, good and excellent levels for each Learning Outcome. The final grading rubric (shown below) is based on the attainment levels of the Learning Outcomes.

Fail	Unacceptable in one or more learning outcomes
Pass	A minimum of Acceptable in all learning outcomes
Credit	A minimum of Good in 3 learning outcomes

Distinction	A minimum of Excellent in 2 learning outcomes and a maximum of 2 learning outcomes at Acceptable
High Distinction	A minimum of Excellent in 5 learning outcomes and a maximum of 1 learning outcome at Acceptable or A minimum of Excellent in 4 learning outcomes and the remainder at Good

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Scan your portfolio and submit it with any other supporting electronic files online via the moodle unit website

assessmentOutcome

- Design mathematical models that analyse and evaluate mechanical systems
- Explain and apply control theory and control system approaches to mechanical systems
- Explain the role of engineering assumptions in building mathematical models of mechanical systems
- Relate theory to problems of introducing, operating and maintaining mechanical systems in the industrial context
- Identify and evaluate engineering uncertainty and the limitations of mathematical models
- Work collaboratively in a team to produce high quality outputs
- Create professional documentation using mechanical systems terminology, symbols and diagrams

assessmentGradAttribute

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

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