



ENEE13019 Control Systems Analysis and Design

Term 2 - 2018

Profile information current as at 28/04/2024 02:55 am

All details in this unit profile for ENEE13019 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.

Corrections

Unit Profile Correction added on 03-08-18

Examination Length: 180 minutes

General Information

Overview

You will be able to work in teams to model, analyse and investigate design options for analogue and digital control systems. On satisfactory completion, you will be able to articulate typical control systems building blocks, and select appropriate components and interfaces for specific applications. In addition, you will be able to develop mathematical models to analyse the behaviour of selected dynamic systems and to design controllers for these systems. Distance Education students will be required to attend a residential school to promote development of unit learning outcomes.

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

Prerequisites: (ENEE13020 Digital Electronics AND ENEE13018 Analogue Electronics) OR ENEX12002 Introductory Electronics OR ENEE12016 Signals and Systems.

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 2 - 2018

- Bundaberg
- Cairns
- Gladstone
- Mackay
- Mixed Mode
- 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).

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. **Written Assessment**

Weighting: 20%

2. **Laboratory/Practical**

Weighting: 10%

3. **Laboratory/Practical**

Weighting: 10%

4. **Written Assessment**

Weighting: 20%

5. **Examination**

Weighting: 40%

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 By email, student face to face and telephone conversations.

Feedback

Students appreciate videoed lectures which explain the learning objectives for that particular session provided by unit co-ordinator lecturer.

Recommendation

Unit coordinator/lecturer to continue to use videoed lectures as a learning mechanism to deliver the learning objectives for unit.

Feedback from By email, student face to face and telephone conversations.

Feedback

Students appreciate the unit co-ordinators use of Zoom videoconferencing workshops as a mechanism to discuss content of the unit, to identify problems with their understanding of the technical aspects of the unit content, to seek and be provided with information advice and feedback with regards to tutorial problems and assessment items.

Recommendation

Unit coordinator/lecturer to continue to use Zoom videoconferencing workshops as a mechanism to discuss content of the unit, to identify problems with their understanding of the technical aspects of the unit content, to seek and be provided with information advice and feedback with regards tutorial problems and assessment items.

Feedback from By email, student face to face and telephone conversations.

Feedback

Students appreciate timely, detailed and focused feedback on their assessment submissions.

Recommendation

Unit coordinator/lecturer to continue to provide timely, detailed and focused feedback on students assessment submissions.

Unit Learning Outcomes

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

1. Explain the principles of automatic control systems (analogue and/or digital) and typical associated control system building blocks
2. Articulate the principles and applications of sensors and amplifiers; final control elements in an automatic control system (analogue and/or digital)
3. Evaluate the role of the analogue and/or digital controller in a control system
4. Model and analyse the behaviour of dynamic systems and the controller in combination using appropriate mathematical, graphical and computer aided tools.
5. Investigate and report the process of analogue and/or digital controller design for a dynamic system; solved collaboratively or autonomously.
6. Communicate and document analogue and/or digital control system solutions, calculations and approaches, using correct terminology, symbols and diagrams

The Learning Outcomes for this unit are linked with Engineers Australia's **Stage 1 Competency Standard 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 - Written Assessment - 20%	•	•				
2 - Laboratory/Practical - 10%					•	•
3 - Laboratory/Practical - 10%					•	•
4 - Written Assessment - 20%			•	•		
5 - Examination - 40%	•	•	•	•		

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 - Written Assessment - 20%	•	•	•	•		•				
2 - Laboratory/Practical - 10%	•	•	•	•	•	•				
3 - Laboratory/Practical - 10%	•	•	•	•	•	•				

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
4 - Written Assessment - 20%	•	•	•	•		•				
5 - Examination - 40%	•	•	•							

Textbooks and Resources

Textbooks

ENEE13019

Prescribed

Control Systems Engineering

Edition: 7th edn or later (2013 or later)

Authors: Nise, N.S.

John Wiley & Sons

Hoboken, NJ, USA

ISBN: 978-1-118-17051-9

Binding: Hardcover

Additional Textbook Information

[View textbooks at the CQUniversity Bookshop](#)

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Access to a digital camera
- Access to a document scanner and pdf converter
- A speaker and mic or a head set

Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

Teaching Contacts

Patrick Keleher Unit Coordinator

p.keleher@cqu.edu.au

Schedule

Week 1 - 09 Jul 2018

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to Control Systems, Laplace Transforms & Their inverses, transfer function	1 & 2 (2.1-2.3) & 13 (13.1-13.3)	

Week 2 - 16 Jul 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Modelling in Electrical and Mechanical Systems	2 (2.4-2.8) & 13 (13.4)	
Week 3 - 23 Jul 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Modelling in the Time Domain	3	
Week 4 - 30 Jul 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Reduction of Multiple Subsystems	5 & 13 (13.5)	Assignment 1 Due: Week 4 Friday (3 Aug 2018) 10:00 pm AEST
Week 5 - 06 Aug 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Poles, Zeros and System Response	4	
Vacation Week - 13 Aug 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Week 6 - 20 Aug 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Stability	6 & 13 (13.6)	
Week 7 - 27 Aug 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Steady State Error	7 & 13 (13.7)	
Week 8 - 03 Sep 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Control Systems - PLCs and SCADA	No text reference	
Week 9 - 10 Sep 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Controller Design: Root Locus	8 & 13 (13.8, 13.9)	
Week 10 - 17 Sep 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Design Using Compensation Techniques	9 (9.1, 9.2) & 13 (13.10)	Laboratory Report 1 Due: Week 10 Wednesday (19 Sept 2018) 10:00 pm AEST Assignment 2 Due: Week 10 Friday (21 Sept 2018) 10:00 pm AEST
Week 11 - 24 Sep 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Frequency Response techniques	10 & 11	Laboratory Report 2 Due: Week 11 Wednesday (26 Sept 2018) 10:00 pm AEST
Week 12 - 01 Oct 2018		
Module/Topic	Chapter	Events and Submissions/Topic
Topic Review: Students and Lecturer (timetabled session)	All chapters covered during term and lecturer supplied materials	
Review/Exam Week - 08 Oct 2018		
Module/Topic	Chapter	Events and Submissions/Topic

Topic Review: Students (No timetabled session)

Exam Week - 15 Oct 2018

Module/Topic

Chapter

Events and Submissions/Topic

Assessment Tasks

1 Assignment 1

Assessment Type

Written Assessment

Task Description

Refer to the Moodle site for **complete details** of the assessment item. This is only a basic outline of the features relating to the assessment task. This assessment task will comprise questions, which require you to provide descriptive answers and detailed mathematical solutions in order to demonstrate your knowledge and understanding of the concepts and processes; including you providing your opinions, analysis and interpretation. Failure to adopt this approach will result in you obtaining a lower grade for your submission as you will not be appropriately demonstrating your knowledge and understanding. This assignment is from the content covered in weeks 1 to 2.

Assessment Due Date

Week 4 Friday (3 Aug 2018) 10:00 pm AEST

Return Date to Students

Week 6 Friday (24 Aug 2018)

Weighting

20%

Assessment Criteria

Refer to the Moodle site for **complete details** of the Assignment Assessment Criteria sheet. This is only a basic outline of the features relating to the assessment task. Each submission will be assessed for presentation and layout, correct procedure, analysis and accuracy and appropriate referencing. The major assessment criteria relate to Analysis & Interpretation, Communication and Information Literacy. Ensure you access and read the details outlined in the Assignment Assessment Criteria sheet **before** commencing the assessment item. **As you undertake** the assessment item ensure you address all assessment criteria outlined. Also, at the completion of the assessment item, prior to submission, **undertake an audit** to ensure you have appropriately addressed all assessment criteria.

Referencing Style

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

Submission

Online

Submission Instructions

You are expected to submit your submission electronically using the upload link in the Moodle site. The upload link on the unit Moodle site will become active as the due date for that assessment item approaches. Note the upload link closes at the time indicated (AEST) and becomes inaccessible; so upload well in advance of this submission time. It is not expected students will type up calculations. Students should scan hand calculations for online submission. If uploading a handwritten submission your handwriting must be neat and legible and be written using a permanent pen - ie. biro. No submission will be assessed that is written in pencil as they can be extremely difficult to read. In order for us to assess your submission electronically all submissions (electronic files or handwritten) must be scanned/collated as a single PDF file; no other file types are accepted. Submissions not scanned nor saved as a single PDF file will not be assessed. It is your responsibility to convert your files to PDF format. No coversheet is required when submitting assessment items electronically. Also please do not include any unnecessary graphics on the front page of your submission as it only serves to increase the size of your file and greatly increase the upload time in submitting your file. It is expected you would include a plain front page (without any unnecessary graphics) that highlights the unit code and name, lecturer's name, assessment type and number (eg. Assignment 1), your student number and then your name; list all group members. Please note it is expected you will adopt the file-naming protocol indicated on the Moodle site and for it to be followed as exactly as it is indicated. It is extremely important that you do this as your individual file is one of many and replicating the correct file-naming protocol reduces chances of omissions, losses and errors.

Learning Outcomes Assessed

- Explain the principles of automatic control systems (analogue and/or digital) and typical associated control system building blocks
- Articulate the principles and applications of sensors and amplifiers; final control elements in an automatic control system (analogue and/or digital)

Graduate Attributes

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

2 Laboratory Report 1

Assessment Type

Laboratory/Practical

Task Description

Laboratories are a group activity and all group members need to participate in any preliminary task(s), the conduction of the laboratory exercise and the generation of the laboratory report. Detailed laboratory report format is provided on the Moodle site.

Assessment Due Date

Week 10 Wednesday (19 Sept 2018) 10:00 pm AEST

Return Date to Students

Week 11 Wednesday (26 Sept 2018)

Weighting

10%

Minimum mark or grade

50%

Assessment Criteria

Refer to the Moodle site for **complete details** of the Laboratory Assessment Criteria sheet. This is only a basic outline of the features relating to the assessment task. Each submission will be assessed for presentation and layout, correct procedure, analysis and accuracy and appropriate referencing. The major assessment criteria relate to Data Collection & Analysis, Communication and Information Literacy. Ensure you access and read the details outlined in the Laboratory Assessment Criteria sheet **before** commencing the assessment item. **As you undertake** the assessment item ensure you address all assessment criteria outlined. Also, at the completion of the assessment item, prior to submission, **undertake an audit** to ensure you have appropriately addressed all assessment criteria.

Referencing Style

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

Submission

No submission method provided.

Learning Outcomes Assessed

- Investigate and report the process of analogue and/or digital controller design for a dynamic system; solved collaboratively or autonomously.
- Communicate and document analogue and/or digital control system solutions, calculations and approaches, using correct terminology, symbols and diagrams

Graduate Attributes

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

3 Laboratory Report 2

Assessment Type

Laboratory/Practical

Task Description

Laboratories are a group activity and all group members need to participate in any preliminary task(s), the conduction of the laboratory exercise and the generation of the laboratory report. Detailed laboratory report format is provided on the Moodle site.

Assessment Due Date

Week 11 Wednesday (26 Sept 2018) 10:00 pm AEST

Return Date to Students

Week 12 Friday (5 Oct 2018)

Weighting

10%

Minimum mark or grade

50%

Assessment Criteria

Refer to the Moodle site for **complete details** of the Laboratory Assessment Criteria sheet. This is only a basic outline of the features relating to the assessment task. Each submission will be assessed for presentation and layout, correct procedure, analysis and accuracy and appropriate referencing. The major assessment criteria relate to Data Collection & Analysis, Communication and Information Literacy. Ensure you access and read the details outlined in the Laboratory Assessment Criteria sheet **before** commencing the assessment item. **As you undertake** the assessment item ensure you address all assessment criteria outlined. Also, at the completion of the assessment item, prior to submission, **undertake an audit** to ensure you have appropriately addressed all assessment criteria.

Referencing Style

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

Submission

No submission method provided.

Learning Outcomes Assessed

- Investigate and report the process of analogue and/or digital controller design for a dynamic system; solved collaboratively or autonomously.
- Communicate and document analogue and/or digital control system solutions, calculations and approaches, using correct terminology, symbols and diagrams

Graduate Attributes

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

4 Assignment 2

Assessment Type

Written Assessment

Task Description

Refer to the Moodle site for **complete details** of the assessment task. This is only a basic outline of the features relating to the assessment task. This assessment task will comprise questions, which require you to provide descriptive answers and detailed mathematical solutions in order to demonstrate your knowledge and understanding of the concepts and processes; including you providing your opinions, analysis and interpretation. Failure to adopt this approach will result in you obtaining a lower grade for your submission as you will not be appropriately demonstrating your knowledge and understanding. This assignment is from the content covered in weeks 1 to 7.

Assessment Due Date

Week 10 Friday (21 Sept 2018) 10:00 pm AEST

Return Date to Students

Week 12 Friday (5 Oct 2018)

Weighting

20%

Assessment Criteria

Refer to the Moodle site for **complete details** of the Assignment Assessment Criteria sheet. This is only a basic outline of the features relating to the assessment task. Each submission will be assessed for presentation and layout, correct procedure, analysis and accuracy and appropriate referencing. The major assessment criteria relate to Analysis & Interpretation, Communication and Information Literacy. Ensure you access and read the details outlined in the Assignment Assessment Criteria sheet **before** commencing the assessment item. **As you undertake** the assessment item ensure you address all assessment criteria outlined. Also, at the completion of the assessment item, prior to submission, **undertake an audit** to ensure you have appropriately addressed all assessment criteria.

Referencing Style

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

Submission

Online

Submission Instructions

You are expected to submit your submission electronically using the upload link in the Moodle site. The upload link on the course Moodle site will become active as the due date for that assessment item approaches. Note the upload link closes at the time indicated (AEST) and becomes inaccessible; so upload well in advance of this submission time. It is not expected students will type up calculations. Students should scan hand calculations for online submission. If uploading a handwritten submission your handwriting must be neat and legible and be written using a permanent pen - ie. biro. No submission will be assessed that is written in pencil as they can be extremely difficult to read. In order for us to assess your submission electronically all submissions (electronic files or handwritten) must be scanned/collated as a single PDF file; no other file types are accepted. Submissions not scanned nor saved as a single PDF file will not be assessed. It is your responsibility to convert your files to PDF format. No coversheet is required when submitting assessment items electronically. Also please do not include any unnecessary graphics on the front page of your submission as it only serves to increase the size of your file and greatly increase the upload time in submitting your file. It is expected you would include a plain front page (without any unnecessary graphics) that highlights the course code and name, lecturer's name, assessment type and number (eg. Assignment 2), your student number and then your name; list all group members. Please note it is expected you will adopt the file-naming protocol indicated on the Moodle site and for it to be followed as exactly as it is indicated. It is extremely important that you do this as your individual file is one of many and replicating the correct file-naming protocol reduces chances of omissions, losses and errors.

Learning Outcomes Assessed

- Evaluate the role of the analogue and/or digital controller in a control system
- Model and analyse the behaviour of dynamic systems and the controller in combination using appropriate mathematical, graphical and computer aided tools.

Graduate Attributes

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

Examination

Outline

Complete an invigilated examination.

Date

During the examination period at a CQUniversity examination centre.

Weighting

40%

Length

180 minutes

Minimum mark or grade

50%

Exam Conditions

Open Book.

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