ENEE12016 *Signals and Systems*

Term 2 - 2024

Profile information current as at 05/09/2024 02:30 pm

General Information

Overview

Electrical systems are fundamental to our way of life, including electrical power, telecommunications, and automatic control systems. In this unit, you will learn mathematical techniques to analyse and design a wide range of electrical systems, such as communication, electrical power distribution, and transmission and control systems. You will be introduced to the concept of linear time-invariant systems and several mathematical tools used for system analysis, especially electrical system analysis, such as forward and inverse Laplace transforms, s-domain circuit analysis, and transfer function. You will also be introduced to the frequency response of a system, identify filter types, and design filters for given specifications. Through this unit, you will gain programming experience in using simulation software to analyse signals and linear systems. This unit will provide you with the opportunities to further develop communication skills through developing technical documentation and reports. All students must have access to a computer, frequently use the Internet, and complete the compulsory practical activities. Furthermore, the unit also aims to promote the UN sustainable development Goal 9 - Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation by developing an understanding of how to build resilient and sustainable automation and intelligence systems to support industrial innovation.

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

Pre-requisite: ENEE12014 Electrical Circuit Analysis
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 - 2024

- 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).

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: 30%
2. **Practical and Written Assessment**
Weighting: 30%
3. **Written Assessment**
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 Unit survey

Feedback
The lectures and tutorials are very long, making them hard to learn in one go.

Recommendation
Break the lectures and tutorials into sizable chunks based on logical concepts and topics to allow easier digestion of materials.

Feedback from Unit survey

Feedback
A computational modelling maths unit perhaps should be a prerequisite and provided to better prepare students for using Matlab in this unit.

Recommendation
Discuss with the School management to make MATH12225 - Applied Computational Modelling a prerequisite for the unit.

Feedback from Unit survey

Feedback
The textbook while very thorough is very cumbersome to get through.

Recommendation
Consider replacing the current textbook with a new one that focuses more on practical guidance rather than theoretical rigorousness and abstraction.

Feedback from Unit survey

Feedback
Although very comprehensive, the assessment workload was very high. Especially since the labs were too long, they took significant time to do, affecting the available valuable learning time for the lectures and tutorials.

Recommendation
Revise assessments and labs to streamline and reduce the length and the number of pieces without compromising on their thoroughness.

Unit Learning Outcomes

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

1. Explain the concept of linear time-invariant systems, signal convolution, and special functions
2. Apply signal analysis techniques in time and frequency domains using the Laplace transform
3. Identify and design frequency response systems
4. Perform signal analysis in time and frequency domains using the Fourier transform
5. Use simulation software to validate signal and system analysis techniques
6. Develop technical documentation to present analysis processes, solutions, and designs using appropriate diagrams, symbols, and terminology that conform to Australian and international standards.

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:

Intermediate 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 3I 4I 5I) 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 2N 3I 4N 5N) 3.3 Creative, innovative and pro-active demeanour. (LO: 5I) 3.4 Professional use and management of information. (LO: 5I)

Advanced 1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1A 2A 3A) 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 2I 3A 4I 5I) 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1A 2A 3A 4A 5A) 1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 2I 3A 4I 5A) 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 2A 3A 4A 5A) 2.2 Fluent application of engineering techniques, tools and resources. (LO: 2I 3I 4I 5A) 2.3 Application of systematic engineering synthesis and design processes. (LO: 5A) 3.2 Effective oral and written communication in professional and lay domains. (LO: 6A 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 informationhttps://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) - 30%	•	•	•	•		
2 - Practical and Written Assessment - 30%	•	•		•	•	•
3 - Written Assessment - 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						

Textbooks and Resources

Textbooks

ENEE12016

Prescribed

Electric Circuits
Global Edition, 11th edition (2019)
Authors: James W. Nilsson and Susan Riedel
Pearson
Upper Saddle River , NJ , USA
ISBN: 9781292261041
Binding: Paperback

Additional Textbook Information
There is an electronic version of the Textbook at a cheaper price. Students can purchase the book with a copy of MasteringEngineering included at the the CQU Bookshop here: http://bookshop.cqu.edu.au

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Microsoft Office, Acrobat Reader, ability to uncompress files (ie. windows or winzip or 7-zip)
- MATLAB and Simulink Suite Software
- Zoom (both microphone and webcam capability)

Referencing Style

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

Teaching Contacts

Lam Bui Unit Coordinator
l.bui@cqu.edu.au

Schedule

Week 1 - 08 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Signals and Systems	CRO for Week 1	

Week 2 - 15 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Linear Time Invariant Systems	CRO for Week 2	

Week 3 - 22 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
Laplace Transforms	Chapter 12 of the textbook: Electric Circuits, 11th Edition by Nilsson and Riedel	**Online Quiz 1**: Due on Friday of Week 3 at 11:59 pm AEST

Week 4 - 29 Jul 2024

Module/Topic	Chapter	Events and Submissions/Topic
s Domain Circuit Analysis	Chapter 13 of the textbook: Electric Circuits, 11th Edition by Nilsson and Riedel	

Week 5 - 05 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Transfer Functions	Chapter 13 of the textbook: Electric Circuits, 11th Edition by Nilsson and Riedel	**Online Quiz 2**: Due on Friday of Week 5 at 11:59 pm AEST

Vacation Week - 12 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 19 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Stability of LTI Systems	CRO for Week 6	

Week 7 - 26 Aug 2024

Module/Topic	Chapter	Events and Submissions/Topic
Fourier Series Representation of Periodic Signals	Chapter 16 of the textbook: Electric Circuits, 11th Edition by Nilsson and Riedel	**Online Quiz 3**: Due on Friday of Week 7 at 11:59 pm AEST

Week 8 - 02 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Fourier Transform	Chapter 17 of the textbook: Electric Circuits, 11th Edition by Nilsson and Riedel	

Week 9 - 09 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Residential School	Review of previous learning materials	**Residential School**: Week 9, **Online via ZOOM** **Online Quiz 4**: Due on Friday of Week 9 at 11:59 pm AEST

Week 10 - 16 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Frequency Characteristics of LTI Systems	CRO for Week 10	

Week 11 - 23 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Frequency Selective Circuits	Chapter 14 of the textbook: Electric Circuits, 11th Edition by Nilsson and Riedel	**Online Quiz 5**: Due on Friday of Week 11 at 11:59 pm AEST **Simulation Laboratories** Due: Week 11 Monday (23 Sept 2024) 11:59 pm AEST

Week 12 - 30 Sep 2024

Module/Topic	Chapter	Events and Submissions/Topic
Active Filter Circuits	Chapter 15 of the textbook: Electric Circuits, 11th Edition by Nilsson and Riedel	

Review/Exam Week - 07 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Online Quiz 6: Due on Friday of Week 13 at 11:59 pm AEST

Exam Week - 14 Oct 2024

Module/Topic	Chapter	Events and Submissions/Topic
		Final Assignment Due: Exam Week Monday (14 Oct 2024) 11:59 pm AEST

Term Specific Information

The majority of the unit contents is from the prescribed textbook. However, there are some specialised materials are provided from the Course Resource Online which comes from the book, Signals and Systems, 2nd Edition by Oppenheim and Willsky, with Hamid. Please ensure that you thoroughly study the materials from the suggested weekly reading as the compliment to the lecture materials.

Assessment Tasks

1 Online Quizzes

Assessment Type
Online Quiz(zes)

Task Description
The assessment is a set of six online fortnightly quizzes which can be accessed via the unit Moodle. A set of multiple choice and calculation questions is assigned to provide students with the means for self-testing of their understanding of the materials taught in the period preceding to the quiz. The quizzes are an integrated part of the unit study to assess understanding of key concepts for various topics. The details of the quizzes will be provided with the quizzes in the unit Moodle.
Each quiz has a set time to complete and once a student starts a quiz, it will close after the set time. Once started, a quiz cannot be paused in the middle. Students are strongly advised to allow sufficient time for doing the quiz as indicated in the quiz's instructions before starting the quiz. Each quiz will be available up to 1 week after the relevant fortnight to give students ample of time to complete the quiz. For example, the quiz for weeks 11 and 12 materials will close on Friday of week 13.
Each quiz can be attempted multiple times, but the score for the quiz will be the average score of all attempts. In your different attempts, you will receive different problems as the system select the problems randomly from a set of problems. The correct answers for the quiz questions will be available after you submit your answers.
If you encounter any network access issues during the quiz, the unit coordinator should be notified at your earliest convenience.

Number of Quizzes
6

Frequency of Quizzes
Other

Assessment Due Date

Due on Friday of Weeks 3, 5, 7, 9, 11 and 13 (Review/Exam Week) at 11:59 AEST

Return Date to Students

Results are available immediately after the attempt is finalised and submitted.

Weighting
30%

Minimum mark or grade
50%

Assessment Criteria
Correct numerical answers or choose the best answer among the available multiple choices.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Do the quizzes online. The quizzes will be available in the unit Moodle website. Quizzes must be completed by their respective due date.

Learning Outcomes Assessed

- Explain the concept of linear time-invariant systems, signal convolution, and special functions
- Apply signal analysis techniques in time and frequency domains using the Laplace transform
- Identify and design frequency response systems
- Perform signal analysis in time and frequency domains using the Fourier transform

2 Simulation Laboratories

Assessment Type
Practical and Written Assessment

Task Description
This assessment covers all topics.
The simulation laboratories are distributed throughout the term as depicted in the unit Moodle. Students are encouraged to attempt the simulation laboratories on their own. However, a residential school will be conducted during Week 9 of the term to provide students with guidance for doing the simulation laboratories. The residential school will be conducted online, and attendance will be recorded. The attendance score will contribute to the laboratory's mark. All information regarding the laboratories will be provided in the unit Moodle at the start of the term.
Students must pass the simulation laboratories to pass the unit.

Assessment Due Date
Week 11 Monday (23 Sept 2024) 11:59 pm AEST

Submit to the link in the unit Moodle two files: 1) a PDF report file and 2) the Matlab file. If you have more than one Matlab files, put them in a single folder, zip the folder and submit the zipped file.

Return Date to Students
Review/Exam Week Monday (7 Oct 2024)

Marked lab report with feedback will be returned to students within two weeks of the submission date.

Weighting
30%

Minimum mark or grade
50%

Assessment Criteria
Simulation Laboratories will be graded using the following criteria:

- Correct answers and units.
- Correct format.
- Correct description of the laboratory procedures.
- Discussion of the laboratory results.
- All working must be shown.
- Proper use of references.
- Report must be neat, tidy and legible.
- All laboratory exercises must be attempted.
- Attendance of the residential school.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit to the link in the unit Moodle two files: 1) a PDF report file and 2) the Matlab file. If you have more than one Matlab files, put them in a single folder, zip the folder and submit the zipped file.

Learning Outcomes Assessed

- Explain the concept of linear time-invariant systems, signal convolution, and special functions
- Apply signal analysis techniques in time and frequency domains using the Laplace transform
- Perform signal analysis in time and frequency domains using the Fourier transform
- Use simulation software to validate signal and system analysis techniques
- Develop technical documentation to present analysis processes, solutions, and designs using appropriate diagrams, symbols, and terminology that conform to Australian and international standards.

3 Final Assignment

Assessment Type
Written Assessment

Task Description
This written assessment covers all topics from Weeks 1 to 12 including the simulation laboratories materials. The assignment questions will be released on the unit Moodle three weeks prior to the submission due date. It is not expected that students must type up equations and calculations. Instead, students can scan clear and legible handwritten calculations for inclusions in the assignment report.
The assignment's mark and feedback will be returned to students after the grade moderation date.

Assessment Due Date
Exam Week Monday (14 Oct 2024) 11:59 pm AEST

Submit to the link in the unit Moodle as a SINGLE PDF file before the due date.

Return Date to Students

The assignment's mark and feedback will be returned to students after the grade moderation date.

Weighting
40%

Minimum mark or grade
50%

Assessment Criteria
The assignments will be graded using the following criteria:

- Correct answers and units.
- Correct format.
- All working must be shown to obtain marks.
- Demonstration of ability to use Matlab to perform computation and visualisation.
- Proper use of references.
- Report must be neat, tidy and legible.
- All questions must be attempted.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit to the link in the unit Moodle as a SINGLE PDF file before the due date.

Learning Outcomes Assessed

- Identify and design frequency response systems
- Develop technical documentation to present analysis processes, solutions, and designs using appropriate diagrams, symbols, and terminology that conform to Australian and international standards.

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