ENEE12016 *Signals and Systems*

Term 2 - 2023

Profile information current as at 28/04/2024 12:11 am

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 these electrical systems, such as electrical power distribution and transmission networks and control systems. You will be introduced to the concept of linear time invariant systems and a range of mathematical tools used in electrical circuit analysis such as forward and inverse Laplace transforms, s-domain circuit analysis and transfer functions. You will be also introduced to the frequency response of a system and you will identify different types of filters and design analogue filters for given specifications. Through this unit, you will gain programming experience in using MATLAB or equivalent software to analyse signals and linear systems. This unit will also provide you with opportunities to further develop communication skills through preparation of professional documentation and team communications. All students are required to have access to a computer and to make frequent use of the internet. In this unit, you must complete compulsory practical activities. Refer to the Engineering Undergraduate Course Moodle site for proposed dates.

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 - 2023

- 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. **Online Quiz(zes)**
Weighting: 15%
2. **Written Assessment**
Weighting: 20%
3. **Practical and Written Assessment**
Weighting: 25%
4. **Online Test**
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 labs were really great and they really helped students to understand the concepts much better.

Recommendation
Continue this good practice.

Feedback from Unit survey

Feedback
The assignments on this unit were effective in assisting learning the unit content.

Recommendation
Continue this good practice.

Feedback from Unit survey

Feedback
The mix and match of old and new resources was good but there were two different teaching methods which made some things confusing.

Recommendation
Ensure consistency in unit delivery.

Unit Learning Outcomes

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

1. Explain the concepts of a linear time invariant system, unit impulse and step functions, convolution integral and convolution sum
2. Apply forward and inverse Laplace transforms and analyse electrical circuits in the s-domain
3. Identify and design different analogue filters
4. Perform Fourier transforms to find frequency domain representations of time domain functions
5. Use appropriate simulation tools to validate the signal and systems analysis techniques
6. Create professional documentation of the solutions, designs and analysis process using electrical terminology, diagrams and symbols that conform to Australian Standards
7. Work individually and collaboratively in a team to produce high-quality outputs.

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	7
1 - Written Assessment - 20%	•	•	•	•		•	•
2 - Practical and Written Assessment - 25%	•	•	•	•	•	•	•
3 - Online Test - 40%	•	•	•	•		•	
4 - Online Quiz(zes) - 15%	•	•	•	•			

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							

Textbooks and Resources

Textbooks

ENEE12016

Prescribed

Signals and Systems : Pearson New International Edition
2nd Edition - Pearson New International Edition (2013)
Authors: ALAN V. OPPENHEIM, ALAN S. WILLSKY & S. HAMID NAWAB
Pearson
Upper Saddle River , NJ , USA
ISBN: 9781292025902
Binding: Paperback
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Supplementary

Matlab/SIMULINK Software
Edition: R2021a
Mathworks
Binding: Other

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 - 10 Jul 2023

Module/Topic	Chapter	Events and Submissions/Topic
Signals and Systems	Chapter 1	

Week 2 - 17 Jul 2023

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

Week 3 - 24 Jul 2023

Module/Topic	Chapter	Events and Submissions/Topic
Laplace Transforms	Chapter 9	

Week 4 - 31 Jul 2023

Module/Topic	Chapter	Events and Submissions/Topic
s Domain Circuit Analysis	Chapter 9	

Week 5 - 07 Aug 2023

Module/Topic	Chapter	Events and Submissions/Topic
Transfer Functions	Chapter 9	

Vacation Week - 14 Aug 2023

Module/Topic	Chapter	Events and Submissions/Topic
		Online Quiz 1: Due on Monday of the study break week at 11:59 pm AEST

Week 6 - 21 Aug 2023

Module/Topic	Chapter	Events and Submissions/Topic
Stability of LTI Systems	Chapter 9	

Week 7 - 28 Aug 2023

Module/Topic	Chapter	Events and Submissions/Topic
Fourier Series Representation of Periodic Signals	Chapter 3	**Assignment** Due: Week 7 Monday (28 Aug 2023) 11:59 pm AEST

Week 8 - 04 Sep 2023

Module/Topic	Chapter	Events and Submissions/Topic
Fourier Transform	Chapter 4	**Online Quiz 2:** Due on Monday of Week 8 at 11:59 pm AEST

Week 9 - 11 Sep 2023

Module/Topic	Chapter	Events and Submissions/Topic
Residential School		**Residential School**: Week 9, **Online via ZOOM**

Week 10 - 18 Sep 2023

Module/Topic	Chapter	Events and Submissions/Topic
Frequency Characteristics of LTI Systems	Chapter 6	**Online Quiz 3:** Due on Monday of Week 10 at 11:59 pm AEST

Week 11 - 25 Sep 2023

Module/Topic	Chapter	Events and Submissions/Topic
Active Filter Design	Chapter 6	

Week 12 - 02 Oct 2023

Module/Topic	Chapter	Events and Submissions/Topic
Exam Review		**Online Quiz 4:** Due on Monday of Week 12 at 11:59 pm AEST

Review/Exam Week - 09 Oct 2023

Module/Topic	Chapter	Events and Submissions/Topic
		End of Term Online Test may be scheduled in either Week 13 (REVIEW/EXAM WEEK) or Week 14 (EXAM WEEK). **Laboratory Activities and Report** Due: Review/Exam Week Monday (9 Oct 2023) 11:59 pm AEST

Exam Week - 16 Oct 2023

Module/Topic	Chapter	Events and Submissions/Topic

Online Quiz 5: Due on Monday of Week 14 at 11:59 pm AEST

Term Specific Information

The whole chapter from the prescribed textbook (Signals and Systems by Oppenheim) specified in the schedule is not relevant for some topics. Additional details about the relevant textbook content will be included in the lecture material. Alternatively, a more contemporary textbook that can be used for this unit is Signals, Systems, & Transforms, Global Edition, 5th edition by Charles L. Phillips, John Parr and Eve A. Riskin. Some lecture contents will also be covered from the following book:
Electric Circuits10th edition (Global Edition) (2015)
Authors: Nilsson J. W. and Riedel S, A.
This is the same textbook used in the ENEE12014 Electrical Circuit Analysis unit.

Assessment Tasks

1 Online Quizzes

Assessment Type
Online Quiz(zes)

Task Description
The assessment is a set of five online fortnightly quizzes which can be accessed via the unit Moodle site. A set of multiple choice and calculation questions is assigned to provide students with means for self-testing of their understanding of the materials taught in the period prior to the quiz. The quizzes are an integrated part of the study to test on the key concepts of each topic. Details of the assessment will be available on the unit Moodle site at the beginning of the team. 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 sufficiently cover the material related to each quiz before starting the quiz. Each quiz will be available up to 1 week after the relevant fortnight to allow students who cannot find time each week for study. For example, quiz on weeks 11 and 12 material will close on Monday of week 14.
Each quiz can be attempted several times, but the score for the quiz will be the score for your first attempt. In your different attempts you will receive different problems as the system randomly select the problems from a set of problems specified for each question. Correct answer 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 convenient.

Number of Quizzes
5

Frequency of Quizzes
Other

Assessment Due Date

Due on Monday of the study break Week, Weeks 8, 10,12 and 14 at 11:59 pm

Return Date to Students

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

Weighting
15%

Minimum mark or grade
Students must score at least 50% of the allocated total marks for the quizzes.

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.

Learning Outcomes Assessed

- Explain the concepts of a linear time invariant system, unit impulse and step functions, convolution integral and convolution sum
- Apply forward and inverse Laplace transforms and analyse electrical circuits in the s-domain
- Identify and design different analogue filters
- Perform Fourier transforms to find frequency domain representations of time domain functions

2 Assignment

Assessment Type
Written Assessment

Task Description
This assessment item covers the topics learned from Week 1 to Week 6. The assignment questions will be released on the unit website three weeks prior to the submission due date. It is not expected that students will type up equations and calculations. Students can scan clear and legible handwritten calculations for online submission.

Assessment Due Date
Week 7 Monday (28 Aug 2023) 11:59 pm AEST
Submitted through unit Moodle site as a single PDF file.

Return Date to Students
Week 9 Monday (11 Sept 2023)
Feedback given around 2 weeks after submission due date through the unit website in Moodle.

Weighting
20%

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

- Correct Answers;
- Correct format;
- All working must be shown to obtain marks;
- Assignments must be neat, tidy and legible;
- Proper use of references;
- All questions must be attempted.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit to the link in the unit website in Moodle as a SINGLE PDF file.

Learning Outcomes Assessed

- Explain the concepts of a linear time invariant system, unit impulse and step functions, convolution integral and convolution sum
- Apply forward and inverse Laplace transforms and analyse electrical circuits in the s-domain
- Identify and design different analogue filters
- Perform Fourier transforms to find frequency domain representations of time domain functions
- Create professional documentation of the solutions, designs and analysis process using electrical terminology, diagrams and symbols that conform to Australian Standards
- Work individually and collaboratively in a team to produce high-quality outputs.

3 Laboratory Activities and Report

Assessment Type
Practical and Written Assessment

Task Description
This assessment item covers all topics.
Simulation Laboratory sessions will be held at various times, as directed by the unit website, through the term or in the case of distance students at the online residential school. All information regarding the laboratories will be provided to the students via the unit website. Laboratories are compulsory and students must pass the laboratory exercise assessment in order to pass the unit.
Details of the laboratory exercises will be posted on the unit website at the start of the term.

Assessment Due Date
Review/Exam Week Monday (9 Oct 2023) 11:59 pm AEST
Submit to the link in the unit website in Moodle as a SINGLE PDF file.

Return Date to Students

Feedback given around 2 weeks after submission due date through unit website in Moodle.

Weighting
25%

Minimum mark or grade
Students must score at least 50% of the allocated marks to pass this assessment.

Assessment Criteria
Laboratory exercises will be graded using the following criteria:

- Correct Answers;
- Correct format;
- Correct description of laboratory procedures;
- Discussion of laboratory results;
- All working must be shown;
- Proper use of references;
- Report must be neat, tidy and legible;
- All laboratory exercises must be attempted.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submit to the link in the unit website in Moodle as a SINGLE PDF file.

Learning Outcomes Assessed

- Explain the concepts of a linear time invariant system, unit impulse and step functions, convolution integral and convolution sum
- Apply forward and inverse Laplace transforms and analyse electrical circuits in the s-domain
- Identify and design different analogue filters
- Perform Fourier transforms to find frequency domain representations of time domain functions
- Use appropriate simulation tools to validate the signal and systems analysis techniques
- Create professional documentation of the solutions, designs and analysis process using electrical terminology, diagrams and symbols that conform to Australian Standards
- Work individually and collaboratively in a team to produce high-quality outputs.

4 End of Term Online Test

Assessment Type
Online Test

Task Description
This online test may cover all topics from Weeks 1 to 12 and may consist of a mix of 4-6 numerical as well as descriptive answer questions.
This online test will be held during the University exam period (Week 13 or 14). The exact date and time will be confirmed by the end of week 9 of term. This online test has a duration of 3 hrs. You will be provided with an additional 30 minutes to read the paper and to scan and upload the answer scripts. The Moodle submission link will become inactive 3.5 hours after the test start time. You are encouraged to sit the test from a location with a good Internet connection and where you have access to a scanner. If you are unable to find a scanner, you can use your mobile phone

to scan and upload the answer scripts. Please find a list of Camera Scan apps below that is suitable for this.
1. Adobe Scan (DC) https://adobescan.app.link/d/1n1NntFHTkb
2. Microsoft Lens https://apps.apple.com/au/app/microsoft-lens-pdf-scanner/id975925059
3. SwiftScan https://swiftscan.app/en/index.html
4. CamScanner https://www.camscanner.com/
5. ClearScan https://clearscanapp.com/

Assessment Due Date

Submitted through unit Moodle site as a SINGLE PDF file.

Return Date to Students

The test result will be released to students after grade moderation at the end of the term.

Weighting
40%

Minimum mark or grade
Students must score at least 50% of the allocated marks.

Assessment Criteria
No Assessment Criteria

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
Submitted through unit Moodle site as a SINGLE PDF file.

Learning Outcomes Assessed

- Explain the concepts of a linear time invariant system, unit impulse and step functions, convolution integral and convolution sum
- Apply forward and inverse Laplace transforms and analyse electrical circuits in the s-domain
- Identify and design different analogue filters
- Perform Fourier transforms to find frequency domain representations of time domain functions
- Create professional documentation of the solutions, designs and analysis process using electrical terminology, diagrams and symbols that conform to Australian 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