ENEE12016 *Signals and Systems*
Term 2 - 2021

Profile information current as at 14/12/2025 04:08 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 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 hands-on experience in circuit construction and performance analysis in laboratory sessions and through the use of circuit simulation software. 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 - 2021

- 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. **Written Assessment**
Weighting: 15%
2. **Written Assessment**
Weighting: 15%
3. **Practical and Written Assessment**
Weighting: 20%
4. **Take Home Exam**
Weighting: 40%
5. **Online Quiz(zes)**
Weighting: 10%

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 Evaluation

Feedback
A clear explanation was provided for each topic and

Recommendation
This good practice will be continued.

Feedback from Student Evaluation

Feedback
The assessments were engaging and well designed. Also, the feedback was formative and returned timely.

Recommendation
This good practice will be continued.

Feedback from Student Evaluation

Feedback
The teaching team supportive and attended to all queries raised by the students.

Recommendation
This good practice will be continued.

Feedback from Student Evaluation

Feedback
The back-to-back lecture and tutorial sessions were too long.

Recommendation
The lecture and tutorial will be scheduled on two different days.

Feedback from Student Evaluation

Feedback
Scan notes from the lecture and tutorial would be helpful.

Recommendation
Scan notes from the lecture and tutorial will be provided.

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 laboratory procedures and appropriate simulation tools to validate the 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 - 15%	•	•				•	•
2 - Written Assessment - 15%	•		•	•		•	•
3 - Practical and Written Assessment - 20%	•	•	•	•	•	•	•

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
4 - Take Home Exam - 40%	•	•	•	•		•	•
5 - Online Quiz(zes) - 10%	•	•	•	•			

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 - Written Assessment - 15%	•	•	•	•		•				
2 - Written Assessment - 15%	•	•	•	•		•				
3 - Practical and Written Assessment - 20%	•	•	•	•	•	•	•	•		
4 - Take Home Exam - 40%	•	•	•	•		•				
5 - Online Quiz(zes) - 10%		•	•	•		•				

Textbooks and Resources

Textbooks

ENEE12016

Prescribed

Signals and Systems : Pearson New International Edition
Edition: 2nd edn (1983)
Authors: ALAN V. OPPENHEIM, ALAN S. WILLSKY & S. HAMID NAWAB
Prentice-Hall
Upper Saddle River , NJ , USA
ISBN: 0-13–814757–4
Binding: Paperback
ENEE12016

Supplementary

Matlab/SIMULINK Software
Edition: R2019b (R2019b)
Mathworks
Binding: Other

Additional Textbook Information
If you prefer to study with a paper text, you can purchase one at the CQUni Bookshop here: http://bookshop.cqu.edu.au (search on the Unit code). See your Moodle site for software requirements.

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- MATLAB and Simulink Suite Software

Referencing Style

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

Teaching Contacts

Sanath Alahakoon Unit Coordinator
s.alahakoon@cqu.edu.au

Schedule

Week 1 - 12 Jul 2021

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

Week 2 - 19 Jul 2021

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

Week 3 - 26 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic

Laplace Transforms	Chapter 9	

Week 4 - 02 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
s Domain Circuit Analysis	Chapter 9	**Online Quiz 1** Due: Week 4 Friday (6-Aug-2021) 11:55 pm AEST

Week 5 - 09 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Transfer Functions	Chapter 9	**Online Quiz 2** Due: Week 5 Friday (13-Aug-2021) 11:55 pm AEST

Vacation Week - 16 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
		Assignment 1 Due: Vacation Week Monday (16 Aug 2021) 11:45 pm AEST

Week 6 - 23 Aug 2021

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

Week 7 - 30 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Fourier Series Representation of Periodic Signals	Chapter 3	**Online Quiz 3** Due: Week 7 Friday (3-Sept-2021) 11:55 pm AEST

Week 8 - 06 Sep 2021

Module/Topic	Chapter	Events and Submissions/Topic
Fourier Transform	Chapter 4	

Week 9 - 13 Sep 2021

Module/Topic	Chapter	Events and Submissions/Topic
Residential School		**Residential School**: Week 9 (13-14 September 2021, 9 am-5 pm), **Online via ZOOM**

Week 10 - 20 Sep 2021

Module/Topic	Chapter	Events and Submissions/Topic
Frequency Characteristics of LTI Systems	Chapter 6	**Online Quiz 4** Due: Week 10 Friday (24-Sept-2021) 11:55 pm AEST

Week 11 - 27 Sep 2021

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

Week 12 - 04 Oct 2021

Module/Topic	Chapter	Events and Submissions/Topic
Exam Review		**Online Quiz 5** Due: Week 12 Friday (8-Oct-2021) 11:55 pm AEST **Assignment 2** Due: Week 12 Friday (8 Oct 2021) 11:45 pm AEST

Review/Exam Week - 11 Oct 2021

Module/Topic	Chapter	Events and Submissions/Topic
		Laboratory Activities and Report Due: Review/Exam Week Monday (11 Oct 2021) 11:45 pm AEST

Exam Week - 18 Oct 2021

Module/Topic	Chapter	Events and Submissions/Topic
		Take home examination Due: During the exam week

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. More details about the relevant textbook content will be included in the lecture material.
Some lecture contents will 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 Assignment 1

Assessment Type
Written Assessment

Task Description
This assessment item covers the topics 1-4. 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 hand written calculations for online submission.

Assessment Due Date
Vacation Week Monday (16 Aug 2021) 11:45 pm AEST

PDF is the preferred submission format

Return Date to Students

Within 2 working weeks after due date

Weighting
15%

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;
- All questions must be attempted.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
PDF is the preferred submission format

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

- 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.

Graduate Attributes

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

2 Assignment 2

Assessment Type
Written Assessment

Task Description
This assessment item covers the topics 5-10. 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 hand written calculations for online submission.

Assessment Due Date
Week 12 Friday (8 Oct 2021) 11:45 pm AEST

PDF is the preferred submission format

Return Date to Students

Within 2 weeks after due date

Weighting
15%

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;
- All questions must be attempted.

Referencing Style

- Harvard (author-date)

Submission
Online

Submission Instructions
PDF is the preferred submission format

Learning Outcomes Assessed

- Explain the concepts of a linear time invariant system, unit impulse and step functions, convolution integral and convolution sum
- 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.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking

- Information Literacy
- Information Technology Competence

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 all 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 (11 Oct 2021) 11:45 pm AEST

PDF is the preferred submission format

Return Date to Students

Within 2 weeks after due date

Weighting
20%

Minimum mark or grade
50% of the marks allocated for this assignment

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
PDF is the preferred submission format

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 laboratory procedures and appropriate simulation tools to validate the 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.

Graduate Attributes

- Communication
- Problem Solving

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

4 TAKE HOME EXAM

Assessment Type
Take Home Exam

Task Description
This take home examination will be monitored through a ZOOM session and students will have to provide written answers to some questions.
1. Examination will be time scheduled and will take place for everyone at the same time.
2. Each student stays home with a device (preferably a laptop) essentially having a camera through which we can watch the student in a ZOOM session during the examination (please make sure you have a device with these requirements functioning).
3. That ZOOM link needs to be open throughout the exam.
4. The examination paper will be loaded to the Moodle so that students only can access it during examination period.
5. The student uses blank A4 papers (single side) to write answers.
6. At the end of the examination, he/she first takes photos of all written pages and email invigilator.
7. Later he/she scan the pages and upload to Moodle within a specified time at the end of examination.
8. Examination date and time will be within the standard examination period for Term 2-2021.

Assessment Due Date

During the exam week

Return Date to Students

Weighting
40%

Minimum mark or grade
50% of the marks allocated for this assignment

Assessment Criteria
No Assessment Criteria

Referencing Style

- Harvard (author-date)

Submission
Online

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.

Graduate Attributes

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

5 Online Quiz(zes)

Assessment Type
Online Quiz(zes)

Task Description
The assessment is a set of online fortnightly quizzes which can be accessed via the unit Moodle site. A set of multiple choice and calculation questions is assigned each week. 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 start 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 week 1 and 2 material will close at the end of week 3 and quiz on week 3 and 4 material will close at the end of 5 etc.
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 be 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 immediately 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

Friday weeks 4,5,7,10,12 at 11:45 pm

Return Date to Students

Results are available immediately after the completion of each quiz.

Weighting
10%

Assessment Criteria
No Assessment Criteria

Referencing Style

- Harvard (author-date)

Submission
Online

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

Graduate Attributes

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

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the **Student Academic Integrity Policy and Procedure**. This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?
A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?
A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?
For academic advice and guidance, the Academic Learning Centre (ALC) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?

Be Honest
If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

Seek Help
If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

Produce Original Work
Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem