



# **ENEE12016 *Signals and Systems***

## **Term 2 - 2019**

Profile information current as at 26/04/2024 03:20 am

All details in this unit profile for ENEE12016 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

## General Information

### Overview

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. Students enrolled in distance mode are required to attend a compulsory Residential School.

### 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: ENEE 12014 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 - 2019

- 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: 15%

#### 2. **Written Assessment**

Weighting: 15%

#### 3. **Practical and Written Assessment**

Weighting: 20%

#### 4. **Examination**

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 survey

**Feedback**

Learning resources did not fully support student learning.

**Recommendation**

A new textbook will be specified which is Matlab centred.

#### Feedback from student survey

**Feedback**

Turnaround time on assignments was too long.

**Recommendation**

Marking will be organised well in advance with markers ready to mark as of the due dates of assignments.

#### Feedback from student survey

**Feedback**

Matlab tutorials were too advanced and difficult.

**Recommendation**

A matlab centred textbook will be adopted.

## 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

Learning outcomes are linked to Engineers Australia Stage 1 Competencies and also discipline capabilities. You can find the mapping for this on the [Engineering Undergraduate Course website](#).

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



### Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
<b>1 - Written Assessment - 15%</b>	•	•				•	•

Assessment Tasks	Learning Outcomes						
	1	2	3	4	5	6	7
2 - Written Assessment - 15%	•		•	•		•	•
3 - Practical and Written Assessment - 20%	•	•	•	•	•	•	•
4 - Examination - 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 - Examination - 40%	•	•	•	•		•				
5 - Online Quiz(zes) - 10%		•	•	•		•				

## Textbooks and Resources

### Textbooks

ENEE12016

#### Prescribed

##### **SIGNALS & SYSTEMS**

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

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#### Supplementary

##### **Matlab/SIMULINK Software**

Edition: R2019b (R2019b)

Mathworks

Binding: Other

#### Additional Textbook Information

1. **SIGNALS & SYSTEMS:** This book maybe out of print from the publisher. However, eBook maybe downloaded from various sources.
2. **Matlab/SIMULINK Software:** This unit has several tutorial and assignment exercises that require Matlab/SIMULINK Software. The university no longer provides access to the software through remote servers. The software will be made available on all CQUniversity student computers. Any student would like to use the software on their personnel laptops/computers require to purchase a student licence. The following components are strongly recommended for students purchasing student licenses:

##### **Basic package and toolboxes**

- Matlab
- Simulink
- Communication System toolbox
- Control System toolbox
- DSP System toolbox
- Optimization toolbox
- Signal Processing toolbox
- Symbolic Math toolbox
- Simulink Control Design toolbox
- SimScape toolbox
- SimScape Power Systems toolbox

**NOTE:** If any student has an older version of Matlab/SIMULINK, he/she may be able to manage with such a version. Please contact the unit coordinator for more 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)
- 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

**Lam Bui** Unit Coordinator  
[l.bui@cqu.edu.au](mailto:l.bui@cqu.edu.au)

## Schedule

### Week 1 - 15 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Linear Time Invariant Systems	12	

### Week 2 - 22 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
Laplace Transforms	12	

### Week 3 - 29 Jul 2019

Module/Topic	Chapter	Events and Submissions/Topic
s Domain Circuit Analysis	13	

### Week 4 - 05 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Transfer Functions	13	

### Week 5 - 12 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Response of LTI Systems	13	<b>Assignment 1</b> Due: Week 5 Friday (16 Aug 2019) 11:55 pm AEST

### Vacation Week - 19 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
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### Week 6 - 26 Aug 2019

Module/Topic	Chapter	Events and Submissions/Topic
Stability of LTI Systems	13	

### Week 7 - 02 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Frequency Response of LTI Systems	14	Residential School: 2-4 September 2019, North Rockhampton Campus

### Week 8 - 09 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Frequency Selective Circuits	14	

### Week 9 - 16 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fourier Series and Periodic Signals	16	

### Week 10 - 23 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
Fourier Transform	17	<b>Laboratory Activities and Report</b> Due: Week 10 Friday (27 Sept 2019) 11:55 pm AEST

### Week 11 - 30 Sep 2019

Module/Topic	Chapter	Events and Submissions/Topic
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Power and Energy Spectrum 17

### Week 12 - 07 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
Exam Review		<b>Assignment 2</b> Due: Week 12 Friday (11 Oct 2019) 11:55 pm AEST

### Review/Exam Week - 14 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
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### Exam Week - 21 Oct 2019

Module/Topic	Chapter	Events and Submissions/Topic
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## Term Specific Information

Matlab will not be available on AnyDesk so it highly recommended, especially for those students enrolled in distance mode, that the student edition of Matlab be purchased as well as the following toolboxes:

Simulink

Control System toolbox

Signal Processing toolbox

Symbolic Math toolbox

DSP System toolbox

Simulink Control Design toolbox

SimScape toolbox

SimScape Power Systems toolbox

The estimated cost is a little over \$100 and may be purchased online from

[https://au.mathworks.com/academia/student\\_version.html?s\\_tid=acport\\_sv\\_sp\\_cta1](https://au.mathworks.com/academia/student_version.html?s_tid=acport_sv_sp_cta1)

## 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

Week 5 Friday (16 Aug 2019) 11:55 pm AEST

PDF is the preferred submission format

#### Return Date to Students

Week 7 Friday (6 Sept 2019)

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 (11 Oct 2019) 11:55 pm AEST

PDF is the preferred submission format

### Return Date to Students

Exam Week Friday (25 Oct 2019)

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.

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 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**

Week 10 Friday (27 Sept 2019) 11:55 pm AEST

PDF is the preferred submission format

#### **Return Date to Students**

Week 12 Friday (11 Oct 2019)

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 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**

6

### **Frequency of Quizzes**

Fortnightly

### **Assessment Due Date**

Friday weeks 3,5,7,9,11,13 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

## 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**

Restricted.

**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