



# **ENEE13018 *Analogue Electronics***

## **Term 2 - 2021**

Profile information current as at 11/12/2023 04:14 pm

All details in this unit profile for ENEE13018 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

This unit introduces the operating principles of basic analogue electronic elements such as diodes, transistors, and op-amps. You will then use these basic elements to construct analogue circuits such as power supplies, amplifiers, filters, and oscillators. You will also apply analysis and design techniques together with spreadsheet and simulation software tools to virtually prototype and test analogue electronic circuits. You will use fundamental electrical engineering knowledge and language in context and document the process of design, modelling, and analysis. You will present information, communicate, work, and learn in a professional manner. On satisfactory completion, you should be able to research and discuss the application of analogue electronics devices in different contexts such as power electronics, signal processing, and communication. Students enrolled in distance mode are required to attend a compulsory Residential School.

### Details

Career Level: *Undergraduate*

Unit Level: *Level 3*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

### Pre-requisites or Co-requisites

Prerequisites: (ENEG11009 Fundamentals of Energy and Electricity OR PHYS11185 Engineering Physics B OR ENAG11002 Energy and Electricity ) AND (MATH11218 Applied Mathematics OR MATH11160 Technology Mathematics)

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).

### 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: Pass/Fail

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

Weighting: 15%

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

Weighting: 30%

#### 4. **Written Assessment**

Weighting: 15%

#### 5. **Take Home Exam**

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](#).



Assessment Tasks	Learning Outcomes							
	1	2	3	4	5	6	7	8
4 - Written Assessment - 15%	•	•	•	•	•	•	•	•
5 - Take Home Exam - 40%	•	•	•	•	•		•	•

### Alignment of Graduate Attributes to Learning Outcomes

Graduate Attributes	Learning Outcomes							
	1	2	3	4	5	6	7	8
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 - 0%	•	•	•	•	•	•				
2 - Written Assessment - 15%	•	•	•	•		•		•		
3 - Practical and Written Assessment - 30%	•	•	•	•	•	•	•	•		
4 - Written Assessment - 15%	•	•	•	•		•		•		
5 - Take Home Exam - 40%	•	•	•					•		

## Textbooks and Resources

### Textbooks

ENEE13018

#### Prescribed

##### Electronic Devices (Conventional Current Version)

9th edition (2014)

Authors: Floyd, Thomas L

Pearson

Harlow , Essex , UK

Binding: eBook

#### Additional Textbook Information

This 9th edition is not the latest version of the book.

Therefore the bookshop will not be able to order the book in and students have to source the book themselves.

Hardcopy or e-book is acceptable, e-books are widely available on the internet.

Discuss any queries directly with your lecturer.

### IT Resources

#### You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Microsoft Excel or Equivalent Spreadsheet Application
- Multisim 14.0 Software by National Instruments (Education Edition preferred). NB - CQU has an agreement with NI which allows students to use uni licenses from home.

## Referencing Style

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

For further information, see the Assessment Tasks.

## Teaching Contacts

**Piet Janse Van Rensburg** Unit Coordinator

[p.jansevanrensburg@cqu.edu.au](mailto:p.jansevanrensburg@cqu.edu.au)

## Schedule

### Week 1 - Semiconductors & Diode Applications - 12 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic
Semiconductors; Diode Applications	1 & 2	

### Week 2 - Diode Applications & Specialised Diodes - 19 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic
Diode Applications; Specialised Diodes	2 & 3	

### Week 3 - Introduction to the Bipolar Junction Transistor and Bias Circuits - 26 Jul 2021

Module/Topic	Chapter	Events and Submissions/Topic
Introduction to the BJT; BJT Bias Circuits	4 & 5	Workbook 1 - Due Wednesday 11:00 PM AEST

### Week 4 - Transistor Amplifiers - 02 Aug 2021

Module/Topic	Chapter	Events and Submissions/Topic
Transistor Amplifiers	6	
<b>Week 5 - Power Amplifiers - 09 Aug 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Power Amplifiers	7	Laboratory Report 1 - Due Wednesday 11:00 PM AEST
<b>Vacation Week - 16 Aug 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
<b>Week 6 - Field-Effect Transistors - 23 Aug 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Field-Effect Transistors	8	Assignment 1 - Due Wednesday 11:00 PM AEST
<b>Week 7 - FET Amplifiers - 30 Aug 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
FET Amplifiers	9	
<b>Week 8 - FET and BJT Amplifier Frequency Response - 06 Sep 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
FET and BJT Amplifier Frequency Response	10	Workbook 2 - Due Wednesday 11:00 PM AEST
<b>Week 9 - The Operational Amplifier - 13 Sep 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
The Operational Amplifier	12 & 13	
<b>Week 10 - Some Special Operational Amplifier Circuits (incl. Filters) - 20 Sep 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Some Special Operational Amplifier Circuits (incl. Filters)	Portions of Chapters 14,15 and 16	Assignment 2 - Due Wednesday 11:00 PM AEST
<b>Week 11 - Voltage Regulators - 27 Sep 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Voltage Regulators	17	
<b>Week 12 - Thermal Design - 04 Oct 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
Thermal Design	Supplementary Notes (Moodle)	Laboratory Report 2 - Due Wednesday 11:00 PM AEST
<b>Review/Exam Week - 11 Oct 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic
		Take-Home Exam - official exam timetable to be released in due course.
<b>Exam Week - 18 Oct 2021</b>		
Module/Topic	Chapter	Events and Submissions/Topic

## Assessment Tasks

### 1 WORKBOOK

**Assessment Type**  
Written Assessment

### Task Description

This assessment item covers all the topics. You need to **properly attempt** at least 80% of **each chapter's** workbook questions to pass the workbook.

**Teamwork is encouraged**, however only solutions that **you were directly involved in**, may be submitted (i.e. submission of solutions done by your team where you were not involved, equates to plagiarism).

Workbook questions will be available from the unit website three weeks before the due date. They consist of selected questions from the unit textbook and other sources.

Students are expected to attempt workbook questions as part of their weekly workload and students are to submit them periodically as specified on the unit website.

To prevent electronic plagiarism, **typed workbook submissions are not acceptable**. Students should scan clear and legible hand written workbook problems for online submission as a **PDF** file.

### Assessment Due Date

Please refer to unit profile schedule.

### Return Date to Students

We strive to return assessments to students within 2 weeks.

### Weighting

Pass/Fail

### Minimum mark or grade

Pass/Fail - You need to properly attempt at least 80% of each chapter's issued workbook problems in order to pass the unit.

### Assessment Criteria

The workbook will be graded Pass/Fail using the following criteria:

- Correct analysis and thinking;
- Drawings of circuits, graphs and waveforms;
- Correct answers and units - confirmation of answers by simulation with NI Multisim and/or Excel;
- All working and intermediate steps must be shown with justification of steps taken;
- Work must be neat, tidy and legible;

You need to **properly attempt** at least 80% of **each chapter's** workbook questions to pass the workbook.

### Referencing Style

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

### Submission

Online

### Submission Instructions

1) Plagiarism statement and 2) complete hand-written work scanned in together as one .pdf file

### Learning Outcomes Assessed

- Research the operation of semiconductor devices and identify their practical applications
- Analyse the operation and deployment of analogue electronics devices in various applications
- Design amplifiers and power supplies for typical electronic systems
- Construct electronic circuits virtually and/or with hardware to a given design and validate their operation
- Interpret and use electronic engineering terminology and symbols that conform to Australian Standards
- Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

### Graduate Attributes

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

## 2 ASSIGNMENT 1



## Assessment Type

Written Assessment

## Task Description

This assessment item covers Topics 1-4.

**Individual work is mandatory** - this is a take-home test. None of your steps or solutions may be discussed or divulged to a fellow student.

Please refer to the CQU plagiarism policy - a **signed cover page declaring individual work** is required.

The assignment questions will be released on the unit website at least 2 weeks before the assignment is due to be submitted.

To prevent electronic plagiarism, **typed submissions are not acceptable**. Students should scan clear and legible hand written work for online submission as a **PDF** file.

## Assessment Due Date

Please refer to unit profile schedule.

## Return Date to Students

We strive to return assessments to students within 2 weeks.

## Weighting

15%

## Minimum mark or grade

A minimum of 50% must be attained for Assignment 1 in order to pass the unit.

## Assessment Criteria

The assignments will be graded using the following criteria:

- Correct analysis and thinking;
- Drawings of circuits, graphs and waveforms;
- Correct answers and units - confirmation of answers by simulation with NI Multisim and/or Excel;
- All working and intermediate steps must be shown with justification of steps taken;
- Assignments must be tidy and legible;
- All questions must be attempted.

## Referencing Style

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

## Submission

Online

## Submission Instructions

1) Plagiarism statement and 2) complete hand-written assignment scanned in together as one .pdf file

## Learning Outcomes Assessed

- Research the operation of semiconductor devices and identify their practical applications
- Analyse the operation and deployment of analogue electronics devices in various applications
- Design amplifiers and power supplies for typical electronic systems
- Interpret and use electronic engineering terminology and symbols that conform to Australian Standards
- Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

## Graduate Attributes

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

## 3 LABORATORY EXERCISES

### Assessment Type

Practical and Written Assessment

## Task Description

In this unit, there will be **no Residential School** and no on-campus labs.

Instead, two 'Design and Simulate' computer laboratory tasks will be issued, and thus two professional reports need to capture all the work that was done.

Team work is encouraged (**only 2 persons per team**), and **only ONE combined report** needs to be submitted by BOTH students for a complete Moodle record.

A **plagiarism statement** and **declaration of how the team work was shared**, has to be signed by both team members.

It is expected that the 2 team members alternate tasks so that each student gets exposure to all types of tasks, including background research, spreadsheet development, circuit simulation and report writing.

**Team reports** must be **professional and typed**, including references. In cases where an individual student cannot conveniently join up to form a team, a slightly reduced report specification will be issued.

Photographic evidence is required to prove that circuits were simulated and spreadsheet calculations were obtained by both team members. For this reason it is required that photo's of each team member's fingers are shown in front of the active Multisim / Excel result windows.

(For national and international accreditation, we get audited by Engineers Australia, and this photographic proof makes it easy to satisfy the auditors that each student has fully participated in all the Labs - a very important item in their list of requirements.)

Laboratory work is compulsory and all students must pass the laboratory exercise assessments in order to pass the unit (again - a requirement for accreditation).

Details of the laboratory exercises will be posted on the unit website at least 2 weeks before submission is due.

## Assessment Due Date

Please refer to unit profile schedule.

## Return Date to Students

We strive to return assessments to students within 2 weeks.

## Weighting

30%

## Minimum mark or grade

A minimum of 50% must be attained for the laboratory exercises in order to pass the unit.

## Assessment Criteria

Design and Simulate exercises will be graded using the following criteria:

- Report style, language, uniformity, tidiness;
- Background research done and proven with mini literature review and proper referencing;
- Graphics content quality and usefulness;
- Technical content and correctness including calculations, analysis / design and thinking;
- Photographic and other evidence that circuits were simulated by the team;
- Photographic and other evidence that spreadsheet calculations were implemented by the team;
- Discussion and understanding of laboratory results;

## Referencing Style

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

## Submission

Online

## Submission Instructions

1) Plagiarism statement and complete typed report, combined as one .pdf file. 2) Multisim file/s and/or Excel files

## Learning Outcomes Assessed

- Research the operation of semiconductor devices and identify their practical applications
- Analyse the operation and deployment of analogue electronics devices in various applications
- Design amplifiers and power supplies for typical electronic systems
- Model and analyse the behaviour of electronic circuits using computer-aided tools
- Interpret function requirements, evaluate design options, and prepare project documents for typical applications
- Construct electronic circuits virtually and/or with hardware to a given design and validate their operation
- Interpret and use electronic engineering terminology and symbols that conform to Australian Standards
- Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

## Graduate Attributes

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

## 4 ASSIGNMENT 2

### Assessment Type

Written Assessment

### Task Description

This assessment item covers the weekly Topics 5-9.

**Individual work is mandatory** - this is a take-home test. None of your steps or solutions may be discussed or divulged to a fellow student.

Please refer to the CQU plagiarism policy - a **signed cover page declaring individual work** is required.

The assignment questions will be released on the unit website at least 2 weeks before the assignment is due to be submitted.

To prevent electronic plagiarism, **typed submissions are not acceptable**. Students should scan clear and legible hand written work for online submission as a **PDF** file.

### Assessment Due Date

Please refer to unit profile schedule.

### Return Date to Students

We strive to return assessments to students within 2 weeks.

### Weighting

15%

### Minimum mark or grade

A minimum of 50% must be attained for Assignment 2 in order to pass the unit.

### Assessment Criteria

The assignments will be graded using the following criteria:

- Correct analysis and thinking;
- Drawings of circuits, graphs and waveforms;
- Correct answers and units - confirmation of answers by simulation with NI Multisim and/or Excel;
- All working and intermediate steps must be shown with justification of steps taken;
- Assignments must be tidy and legible;
- All questions must be attempted.

### Referencing Style

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

### Submission

Online

### Submission Instructions

1) Plagiarism statement and 2) complete hand-written assignment scanned in together as one .pdf file

### Learning Outcomes Assessed

- Research the operation of semiconductor devices and identify their practical applications
- Analyse the operation and deployment of analogue electronics devices in various applications
- Design amplifiers and power supplies for typical electronic systems
- Model and analyse the behaviour of electronic circuits using computer-aided tools
- Interpret function requirements, evaluate design options, and prepare project documents for typical applications
- Construct electronic circuits virtually and/or with hardware to a given design and validate their operation
- Interpret and use electronic engineering terminology and symbols that conform to Australian Standards
- Work collaboratively and autonomously to solve problems and record and communicate clearly and

professionally the approach used to solve problems.

### **Graduate Attributes**

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

## **5 TAKE HOME EXAM**

### **Assessment Type**

Take Home Exam

### **Task Description**

This assessment item covers the weekly Topics 1 - 12

This will be an 'open resource' exam but you will be required to **sign a declaration** of individual work done and include this with your submission.

The take-home exam paper will be released on the unit website on the day of the exam. 5 Hours will be allowed, but this includes scanning and uploading. Late penalties will be deducted at 20% per hour (or proportional part).

To prevent electronic plagiarism, **typed submissions are not acceptable**. Students should scan clear and legible hand written work for online submission as a **PDF** file.

### **Assessment Due Date**

Official examination time table to be released in due course.

### **Return Date to Students**

We strive to return assessments to students within 2 weeks.

### **Weighting**

40%

### **Minimum mark or grade**

A minimum of 50% must be attained for the Take-Home Exam in order to pass the unit.

### **Assessment Criteria**

The exam will be graded using the following criteria:

- Correct analysis and thinking;
- Drawings of circuits, graphs and waveforms;
- Correct answers and units - confirmation of answers by simulation with NI Multisim and/or Excel;
- All working and intermediate steps must be shown with justification of steps taken;
- Assignments must be tidy and legible;
- All questions must be attempted.

### **Referencing Style**

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

### **Submission**

Online

### **Submission Instructions**

1) Signed declaration of individual work and 2) complete hand-written working, scanned in together as one .pdf file

### **Learning Outcomes Assessed**

- Research the operation of semiconductor devices and identify their practical applications
- Analyse the operation and deployment of analogue electronics devices in various applications
- Design amplifiers and power supplies for typical electronic systems
- Model and analyse the behaviour of electronic circuits using computer-aided tools
- Interpret function requirements, evaluate design options, and prepare project documents for typical applications
- Interpret and use electronic engineering terminology and symbols that conform to Australian Standards
- Work collaboratively and autonomously to solve problems and record and communicate clearly and professionally the approach used to solve problems.

## Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- Ethical practice

## 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