# ENEX12002 *Introductory Electronics*
## Term 1 - 2024

All details in this unit profile for ENEX12002 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 will introduce you to the fundamentals of analog and digital electronics. You will learn basic fundamental laws of circuit analysis, and the working principles of commonly used active and passive electronic components such as resistor, capacitor, inductor, diode, transistor, operational amplifier, and their applications. This unit will provide you with sufficient knowledge of Boolean algebra necessary to understand digital electronics. You will learn logic gates, combinational logic circuit, logic minimisation, flip-flops, counter, and other basic digital logic circuits, and their applications. You will develop skills in analysing electronic circuits and modelling analog and digital circuits using industry-standard simulation software. You will design analog and digital systems for real-world applications and verify their functionality in simulations. You must also complete compulsory practical activities that involve building electronic circuits to strengthen your knowledge further. This unit promotes the UN sustainable development Goal 12 - Responsible Consumption and Production by developing electronic circuits to reduce wasteful consumption.

## 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: ENEG11009 Fundamentals of Sustainable Energy AND (MATH11160 Technology Mathematics OR MATH11218 Applied 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 1 - 2024
- Bundaberg
- Cairns
- Gladstone
- Mackay
- Mixed Mode
- Rockhampton

## Attendance Requirements
All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

## 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: 40%
2. **Practical and Written Assessment**
Weighting: 30%
3. **Project (applied)**
Weighting: 30%

## 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.

## 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 design project requirements can be specified more specifically.

**Recommendation**

The project task description should be revised to improve the clarity of design requirements.

### Feedback from Unit Survey

**Feedback**

Some tutorial problems are quite difficult and abstract. It is beneficial for learning to have questions start simple and then progressively become more complex.

**Recommendation**

Intermediate steps and questions should be added to tutorial problems to scaffold answering abstract and more difficult questions.

### Feedback from Unit Survey

**Feedback**

There were too many assessments in this unit. The design projects were big assessment tasks and required much time doing.

**Recommendation**

The unit assessment should be further consolidated and streamlined to reduce the number of assessment pieces and workload without compromising rigorousness.

## Unit Learning Outcomes

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

1. Determine the behaviour and operation of basic electronic devices by utilising fundamental circuit laws
2. Understand number systems and their hardware implementation in digital information processing systems
3. Analyse the operation of analog and digital electronic circuits using industry-standard simulation tools
4. Validate electronic circuit operations using simulation and measurement
5. Design analog and digital electronic circuits for real-world applications by interpreting functional requirements
6. Communicate professionally using electronic engineering terminology, symbol and diagram that conform to Australian and international standards.

**The Learning Outcomes for this unit are linked with the Engineers Australia Stage 1 Competency Standards for Professional Engineers in the areas of 1. Knowledge and Skill Base, 2. Engineering Application Ability and 3. Professional and Personal Attributes at the following levels:**

**Introductory 1.4 Discernment of knowledge development and research directions within the engineering discipline. (LO: 4N 5N ) 1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline. (LO: 4N 5N ) 1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline. (LO: 6N ) 3.1 Ethical conduct and professional accountability. (LO: 6N ) 3.3 Creative, innovative and pro-active demeanour. (LO: 6N ) 3.5 Orderly management of self, and professional conduct. (LO: 6N )**

**Intermediate 1.1 Comprehensive, theory-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline. (LO: 1I 2I ) 1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline. (LO: 1I 2I 3I ) 1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline. (LO: 1I 2I 3I 4N 5N ) 2.1 Application of established engineering methods to complex engineering problem solving. (LO: 3I 4I 5I ) 2.4 Application of systematic approaches to the conduct and management of engineering projects. (LO: 4N 5I ) 3.2 Effective oral and written communication in professional and lay domains. (LO: 6I ) 3.4 Professional use and management of information. (LO: 6I )**

**Advanced 2.2 Fluent application of engineering techniques, tools and resources. (LO: 3I 4I 5A ) 2.3 Application of systematic engineering synthesis and design processes. (LO: 4I 5A )**

*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 information**

https://moodle.cqu.edu.au/course/view.php?id=1511

# Alignment of Learning Outcomes, Assessment and Graduate Attributes

| — | N/A Level | ∘ | Introductory Level | • | Intermediate Level | • | Graduate Level | ∘ | Professional Level | ∘ | Advanced Level |

## Alignment of Assessment Tasks to Learning Outcomes

| Assessment Tasks | Learning Outcomes | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 - Online Quiz(zes) - 40% | • | • | | | | |
| 2 - Practical and Written Assessment - 30% | • | | • | • | | • |
| 3 - Project (applied) - 30% | | | • | • | • | • |

## Alignment of Graduate Attributes to Learning Outcomes

| Graduate Attributes | Learning Outcomes | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 - Communication | | | | | • | • |
| 2 - Problem Solving | • | • | • | • | • | |
| 3 - Critical Thinking | | | • | • | • | |
| 4 - Information Literacy | • | • | | | | • |
| 5 - Team Work | | | | • | | |
| 6 - Information Technology Competence | | | • | | • | |
| 7 - Cross Cultural Competence | | | | | | |
| 8 - Ethical practice | | | | | | • |
| 9 - Social Innovation | | | | | | |
| 10 - Aboriginal and Torres Strait Islander Cultures | | | | | | |

# Textbooks and Resources

## Textbooks
ENEX12002

**Prescribed**

**Digital Fundamentals, Global Edition VitalSource eBook**
11th Global Edition (2015)
Authors: Thomas L Floyd
Pearson
NJ , USA
ISBN: 9781292075990
Binding: eBook
ENEX12002

**Prescribed**

**Electronic Devices, Conventional Current Version**
Global Edition, 10th Edition (2018)
Authors: Thomas L. Floyd
Pearson
NJ , USA
ISBN: 9781292223018
Binding: eBook

**Additional Textbook Information**
Both textbooks are available online as electronic books (ebooks) in the CQUniversity library for three concurrent users.
Students are however recommended to obtain personal copies of the textbooks for regular reading and reference
purposes during the study term.

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

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Pdf creator/scanner
- MS Office (mainly Word and Powerpoint)
- Zoom Video Conference Application
- Windows 8 or later PC with admin rights to install software and USB port to operate USB Oscilloscope
- NI Multisim Software (license provided by CQU)
- Microsoft Teams - camera and microphone

# 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 - 04 Mar 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
| --- | --- | --- |

| | Basic analog concepts and circuit theory | Course Resource Online (CRO) | |

**Week 2 - 11 Mar 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Diode and diode applications | Electronic Devices Conventional Current Version<br>Chapters 1 and 2 | |

**Week 3 - 18 Mar 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Special purpose diodes and bipolar junction transistor | Electronic Devices Conventional Current Version<br>Chapters 3 and 4 | Online Quiz 1 Due: Week 3 Friday (22 Mar 2024) 11:59 pm AEST (covering materials for Weeks 1 and 2) |

**Week 4 - 25 Mar 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Transistor bias circuits and BJT amplifiers | Electronic Devices Conventional Current Version<br>Chapters 5 and 6 | |

**Week 5 - 01 Apr 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Operational amplifiers and operational amplifiers with feedback | Electronic Devices Conventional Current Version<br>Chapters 12 | Online Quiz 2 Due: Week 5 Friday (5 Apr 2024) 11:59 pm AEST (covering materials for Weeks 3 and 4) |

**Vacation Week - 08 Apr 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| No class | | |

**Week 6 - 15 Apr 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Basic op-amp circuits and special-purpose op-amp circuits | Electronic Devices Conventional Current Version<br>Chapters 13 and 14 | |

**Week 7 - 22 Apr 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Number systems, operations, codes and logic gates | Digital Fundamentals<br>Chapters 2 and 3 | Online Quiz 3 Due: Week 7 Friday (26 Apr 2024) 11:59 pm AEST (covering materials for Weeks 5 and 6) |

**Week 8 - 29 Apr 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Boolean algebra and logic simplification | Digital Fundamentals<br>Chapter 4 | **Practical, Laboratory Exercise, and Report** Due: Week 8 Monday (29 Apr 2024) 11:59 pm AEST |

**Week 9 - 06 May 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Combinational logic analysis | Digital Fundamentals<br>Chapter 5 | Online Quiz 4 Due: Week 9 Friday (10 May 2024) 11:59 pm AEST (covering materials for Weeks 7 and 8) |

**Week 10 - 13 May 2024**

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Functions of combinational logic | Digital Fundamentals<br>Chapter 6 | |

### Week 11 - 20 May 2024

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Latches, flip-flops and timers | Digital Fundamentals Chapter 7 | Online Quiz 5 Due: Week 11 Friday (24 May 2024) 11:59 pm AEST (covering materials for Weeks 9 and 10) |

### Week 12 - 27 May 2024

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| Counters | Digital Fundamentals Chapter 9 | |

### Review/Exam Week - 03 Jun 2024

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| | | Online Quiz 6 Due: Week 13 Friday (7 Jun 2024) 11:59 pm AEST (covering materials for Weeks 11 and 12) |

### Exam Week - 10 Jun 2024

| Module/Topic | Chapter | Events and Submissions/Topic |
|---|---|---|
| | | **Electronics Design Assignment** Due: Exam Week Monday (10 June 2024) 11:59 pm AEST |

## Term Specific Information

The two prescribed textbooks used for this unit are available as online electronic books in the CQUniversity library for **three concurrent readers**. Students are recommended to read the relevant parts of the textbooks as learning activities. Students, therefore, must have reliable access to the textbook throughout the study term for regular reading and reference purposes.

The residential school is compulsory. Students must elect a campus location where they wish to do laboratory activities or attend the residential school. Alternatively, students also have the option to purchase the electronic lab kit for introductory electronics and complete the laboratory experiments at home **without supervision**. This latter option requires approval from the unit coordinator. If you wish to proceed with the home experiment option, please contact the unit coordinator before week 3 of the study term to discuss your situation and skills level before the approval can be made.

## Assessment Tasks

## 1 Online quizzes

**Assessment Type**
Online Quiz(zes)

**Task Description**
Six online quizzes aim to test students understanding and application of the learning concepts in the immediate weeks leading up to the quiz. The quiz comprises a combination of several multiple-choice and short-calculation questions and it is timed for 60 minutes. The quiz questions are automatically generated from the question banks. Different attempts will, therefore, receive different questions. There is no limit on the number of attempts for a quiz. However, the quiz mark is taken as the average mark of the attempts. Students are also encouraged to review the relevant materials before they do the quiz to achieve the best possible mark. Together, the six online quizzes contribute 40% to the unit's final mark. The six quizzes are distributed throughout the term and they are due on **Friday** of Weeks 3, 5, 7, 9, 11, and 13 (review/exam week) respectively.

**Number of Quizzes**
6

**Frequency of Quizzes**
Other

**Assessment Due Date**

Students must complete the quiz by its relevant due date (Friday of the relevant week, please refer to teaching schedule and assessment information). Please refer to the quiz for specific instruction and submission deadline.

**Return Date to Students**

Quiz result will be available to students after the quiz is closed.

**Weighting**
40%

**Minimum mark or grade**
50%

**Assessment Criteria**
Correct numerical answers or choose the best answer among the available multiple-choice options.

**Referencing Style**

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

**Submission**
Online

**Submission Instructions**
Students do the quizzes online in Moodle and follow the instructions given in the quiz.

**Learning Outcomes Assessed**

- Determine the behaviour and operation of basic electronic devices by utilising fundamental circuit laws
- Understand number systems and their hardware implementation in digital information processing systems

# 2 Practical, Laboratory Exercise, and Report

**Assessment Type**
Practical and Written Assessment

**Task Description**
This assessment corresponds to the lab experiments and collectively covers topics from the analog electronics domain. The laboratory consists of several sections covering the following topics: diodes, rectifiers, bipolar transistors and operational amplifiers. Mark is distributed among these topics as per the lab documents. The details and modalities of the lab experiments are given in the lab document which is available on the unit Moodle website. The laboratory is a compulsory learning and assessment activity. Students are, therefore, required to submit a lab report that includes results from the lab experiments by the respective due date.

The laboratory session, i.e., the residential school, will be run at several campus locations around the middle of the term. Students must choose a campus location where they wish to attend the lab and register their choice on the unit Moodle website by the end of Week 3. Please refer to the unit Moodle and timetable for the available venue locations and time options at the start of the term. Alternatively, students will also have the option to purchase the introductory electronics lab kit and complete the lab at home, however, **without supervision**. This latter option requires good electronic skills and knowledge and thus approval from the unit coordinator in advance is required. If you wish to proceed with this option, please contact the unit coordinator before the end of week 3 to discuss your electronic skills and abilities.

**Assessment Due Date**
Week 8 Monday (29 Apr 2024) 11:59 pm AEST
Submission of a single lab report in a PDF format with a single zip file containing only necessary and relevant Multisim simulation files as per the instructions in the lab document.

**Return Date to Students**
Week 10 Monday (13 May 2024)
Marked lab report with feedback will be returned to students within two weeks of the submission date.

**Weighting**
30%

**Minimum mark or grade**
50%

**Assessment Criteria**

1. Correctly connect various electronic components by referring to pin diagrams, power requirements and connection procedures.
2. Test the operation of electronic devices by using various laboratory test equipment.
3. Use laboratory test equipment to troubleshoot electronic circuits.
4. Configure simulation software to analyse various electronic circuits.

5. Report the results concisely, neatly and to a professional standard by including all necessary technical information and diagrams.

**Referencing Style**

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

**Submission**
Online

**Submission Instructions**
Submission of a single lab report in a PDF format with a single zip file containing only necessary and relevant Multisim simulation files as per the instructions in the lab document.

**Learning Outcomes Assessed**

- Determine the behaviour and operation of basic electronic devices by utilising fundamental circuit laws
- Analyse the operation of analog and digital electronic circuits using industry-standard simulation tools
- Validate electronic circuit operations using simulation and measurement
- Communicate professionally using electronic engineering terminology, symbol and diagram that conform to Australian and international standards.

# 3 Electronics Design Assignment

**Assessment Type**
Project (applied)

**Task Description**
This assessment relates to the design of a circuit to solve a real-world problem by applying the materials covered in the unit, i.e., including material topics from both analogue and digital electronics. It's mainly a simulation-based design that will be submitted individually as a single design report that details the analysis of the system requirements, the design of individual sub-circuit components and the integration of the entire circuit. The details of this assessment are given in the design task description document which is available on the unit Moodle website.

**Assessment Due Date**
Exam Week Monday (10 June 2024) 11:59 pm AEST
Submission of a single design report in a PDF format with a single zip file containing only necessary and relevant Multisim simulation files as per the instructions in the design description document.

**Return Date to Students**

Marked design report with feedback will be returned to students after the grade moderation process.

**Weighting**
30%

**Minimum mark or grade**
50%

**Assessment Criteria**

1. Conceive circuit solutions that meet real-world operations.
2. Identify the most suitable electronic components that can be used for designing the relevant circuits.
3. Justify the selection of different circuit components by using the relevant analysis.
4. Explore different electronic circuit options by using calculations and simulations.
5. Design the final circuit by using standard symbols and correct connection methods.
6. Simulate the operation of the designed circuits to verify their functional requirements.
7. Report the results concisely, neatly and to a professional standard by including all necessary technical information and diagrams.

**Referencing Style**

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

**Submission**
Online

**Submission Instructions**
Submission of a single design report in a PDF format with a single zip file containing only necessary and relevant Multisim simulation files as per the instructions in the design description document.

**Learning Outcomes Assessed**

- Analyse the operation of analog and digital electronic circuits using industry-standard simulation tools
- Validate electronic circuit operations using simulation and measurement
- Design analog and digital electronic circuits for real-world applications by interpreting functional requirements
- Communicate professionally using electronic engineering terminology, symbol and diagram that conform to Australian and international standards.

## Academic Integrity Statement

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

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

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

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

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

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

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

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

**What can you do to act with integrity?**

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

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

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