ENAE12013 *Electrical Components and Circuit Analysis*
Term 1 - 2022

Profile information current as at 23/04/2024 07:03 pm

General Information

Overview
This unit introduces you to modelling electrical components and systems. You will apply theorems and network reduction techniques to DC and AC circuits, and apply problem-solving techniques in the analysis of AC and DC circuits. You will also cover the concepts of transient response, and Laplace transform and transfer functions. You will apply laboratory techniques and appropriate software tools to the analysis of electrical circuits. Use fundamental electrical engineering language in context and document the process of modelling and analysis. You will present information, communicate, work and learn in a professional manner. Mix mode students must complete the practical activities by attending 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
Prereq: (ENAG11002 Energy & Electricity or ENEG11009 Fundamentals of Energy & Electricity) and 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 1 - 2022

- Mixed Mode

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. **In-class Test(s)**
Weighting: 25%
2. **Online Quiz(zes)**
Weighting: 10%
3. **Practical Assessment**
Weighting: 25%
4. **Examination**
Weighting: 40%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the University's Grades and Results Policy for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the CQUniversity Policy site.
You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the CQUniversity Policy site.

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from student evaluation

Feedback
The subject involved advanced mathematics.

Recommendation
Try to teach advanced mathematics in a simple and easy to understand way using scaffolding techniques.

Feedback from Forum posts

Feedback
Turnaround time for answering questions was appreciated.

Recommendation
Maintain similar practice.

Feedback from In-class

Feedback
Students were appreciative for providing individual attention, keeping frequent engagement, providing the tutorial solutions with appropriate scaffolding.

Recommendation
Maintain the same practice.

Unit Learning Outcomes

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

1. Solve electrical circuits using fundamental electrical theorems
2. Analyse and solve problems of Direct Current (DC) circuits using network reduction techniques
3. Model and analyse the transient behaviour of circuits with resistors, inductors and capacitors
4. Analyse and solve problems of Alternating Current (AC) circuits
5. Solve electrical circuit problems using S-domain circuit analysis techniques
6. Use appropriate software tools to simulate electrical circuits and verify the results by conducting laboratory experiments using safe work practices
7. Work individually and in a team to solve electrical circuit problems and produce professional laboratory documents.

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

Intermediate

1.1 Descriptive, formula-based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the practice area. (LO: 1I 2I 3I 4I)

1.3 In-depth practical knowledge and skills within specialist sub-disciplines of the practice area. (LO: 7I)

1.4 Discernment of engineering developments within the practice area. (LO: 1I 7I)

2.1 Application of established technical and practical methods to the solution of well-defined engineering problems. (LO: 1I 2I 3I 4I 5I 6I)

2.3 Application of systematic design processes to well-defined engineering problems. (LO: 6I)

3.2 Effective oral and written communication in professional and lay domains. (LO: 7I)

3.4 Professional use and management of information. (LO: 7I)

3.6 Effective team membership and team leadership. (LO: 7I)

Advanced

1.2 Procedural-level understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the practice area. (LO: 2A 3A 4A 5A 6I)

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	7
1 - In-class Test(s) - 25%	•	•	•				
2 - Online Quiz(zes) - 10%	•	•		•	•		
3 - Practical Assessment - 25%						•	•
4 - Examination - 40%			•	•	•		

Alignment of Graduate Attributes to Learning Outcomes

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

Textbooks and Resources

Textbooks

ENAE12013

Prescribed

COMPKIT_ENAE12013
Edition: 1 (2021)
CQU-SET
Binding: Other
ENAE12013

Prescribed

Introductory Circuit Analysis
13th (GLOBAL Edition) (2016)
Authors: Boylestad, RL
Pearson
Upper Saddle River , NJ , USA
ISBN: 9781292098951
Binding: Paperback
ENAE12013

Prescribed

TAMKIT
Edition: 1 (2021)
CQU-SET
Binding: Other
ENAE12013

Prescribed

TAMKITU
Edition: 1 (2021)
CQU-SET
Binding: Other

View textbooks at the CQUniversity Bookshop

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Multisim 14.0 Education Edition or later (CQU will provide the licence key to install it on student computers).

Referencing Style

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

Teaching Contacts

Shaminda De Silva Unit Coordinator
s.desilva@cqu.edu.au

Schedule

Week 1 - 07 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Electrical Components and Modelling their Electrical Characteristics	1-7	

Week 2 - 14 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Nodal Analysis	8	**Online Quiz 1 : (**Progressive Test 1): Due Sunday 11:45 pm AEST

Week 3 - 21 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Mesh Analysis	8	**Lab Quiz 1**: Due Sunday 11:45 pm AEST

Week 4 - 28 Mar 2022

Module/Topic	Chapter	Events and Submissions/Topic
Network Theorems	9	**Online Quiz 2:** (Progressive Test 2): Due Sunday 11:45pm AEST

Week 5 - 04 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Capacitors and Inductors	10-12	**Lab Quiz 2** : Due Sunday 11:45 pm AEST

Vacation Week - 11 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic

Week 6 - 18 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Transient Behaviour of Electrical Components	10-12	**In-class test** (Online) **starts** at **8:30 am (AEST**) on **Wednesday** (20 Apr 2022) **In-class test** Due: Week 6 Wednesday (20 Apr 2022) 11:45 am AEST

Week 7 - 25 Apr 2022

Module/Topic	Chapter	Events and Submissions/Topic
Complex Numbers and Phasors	13-14	**Online Quiz 3:** (Progressive Test 3) : Due Sunday 11:45 pm AEST

Week 8 - 02 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Steady State Sinusoidal Analysis I	15-17	**Lab Quiz 3:** Due Sunday 11:45 pm AEST

Week 9 - 09 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Steady State Sinusoidal Analysis II	17-19	**Lab Quiz 4** : Due Sunday 11:45 pm AEST

Week 10 - 16 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Power in AC circuits	20	**Online Quiz 4** : (Progressive Test 4) Due Sunday 11:45 pm AEST

Week 11 - 23 May 2022

Module/Topic	Chapter	Events and Submissions/Topic

Laplace Transforms	Unit Resource Online	

Week 12 - 30 May 2022

Module/Topic	Chapter	Events and Submissions/Topic
Circuit Analysis in s Domain	Unit Resource Online	

Review/Exam Week - 06 Jun 2022

Module/Topic	Chapter	Events and Submissions/Topic
Review	All	

Exam Week - 13 Jun 2022

Module/Topic	Chapter	Events and Submissions/Topic

Term Specific Information

TAMKIT1 or TAMKITU1, which has following items required to complete the labs of this unit from home.
1 12VAC Plug Pack Power Supply
1 3D Printed Component Box
4 4mm Banana Plug to Test Hook Clip Test Lead Cable
1 BNC Male Plug Q9 to Dual Hook Clip Test Probe Cable Leads (2 leads will come with scope)
1 Breadboard
1 A3 Box for Australia Post Tough Bag
1 Multimeter - True RMS, with Leads
1 Power Supply - 12VAC / 5VDC and -15V/0/15V
1 USB Cable for Oscilloscope (included with Pico Scope)
1 USB Oscilloscope (Pico will include two leads)

Assessment Tasks

1 In-class test

Assessment Type
In-class Test(s)

Task Description
This assessment covers weekly topics from Week 1 to Week 5. Students are required to answer analytical and numerical questions to demonstrate their theoretical knowledge and analytical problem solving skills.
Students will attend in-class test **during Week 6.**
This **in-class test** will be carried out as **an Online Quiz t**hrough the unit **Moodle** site.
Further information about In-class test will be provided in the unit Moodle site.

Assessment Due Date
Week 6 Wednesday (20 Apr 2022) 11:45 am AEST
Suggested date and time will be confirmed and notified via the unit Moodle site

Return Date to Students
Week 8 Wednesday (4 May 2022)
We strive to release the assessment marks in 2 weeks after due date

Weighting
25%

Minimum mark or grade
25% of allocated marks for this assessment

Assessment Criteria
In-class test will be graded using the following criteria:

- Correct answers
- All working must be shown
- Answers must be neat, tidy and legible

- Correct format
- Application of correct methods and procedures
- Discussion of answers
- All questions must be attempted
- Each question in the test will be assessed separately.
- Need to score more than 25% to PASS

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Solve electrical circuits using fundamental electrical theorems
- Analyse and solve problems of Direct Current (DC) circuits using network reduction techniques
- Model and analyse the transient behaviour of circuits with resistors, inductors and capacitors

Graduate Attributes

- Problem Solving
- Critical Thinking

2 Online Quizzes (Progressive Tests)

Assessment Type
Online Quiz(zes)

Task Description
The assessment is a set of online Progressive tests which can be accessed via the unit Moodle site. The progressive tests are an integrated part of the study to test on the key concepts f each week. Details of the assessment can be found on the unit Moodle site at the beginning of the term. Each Progressive test will be available up to 2 weeks after the relevant week to allow students who cannot find time each week for study. For example Progressive test one will close at the end of week 2 and Progressive test 2 will close at end of week 5. All progressive tests must be completed by the end of week 10.
Each progressive test can be attempted several times, but the score for the Progressive test will be score for your first attempt. Correct answer for the Progressive test questions will be available immediately after you submit your answers. If you encounter any network access issues during the Progressive test, the unit coordinator should be notified at your earliest convenient.

Number of Quizzes
4

Frequency of Quizzes

Assessment Due Date

Suggested date and time will be notified and confirmed via the unit Moodle site

Return Date to Students

Results are available immediately after completion of each Progressive test

Weighting
10%

Minimum mark or grade
50% of allocated marks for this assessment

Assessment Criteria
Students must need to satisfactorily score more than 50% for the Online quizzes (Progressive test) to pass this unit.

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Solve electrical circuits using fundamental electrical theorems
- Analyse and solve problems of Direct Current (DC) circuits using network reduction techniques
- Analyse and solve problems of Alternating Current (AC) circuits
- Solve electrical circuit problems using S-domain circuit analysis techniques

Graduate Attributes

- Problem Solving
- Critical Thinking

3 Practical and written assessment

Assessment Type
Practical Assessment

Task Description
This assessment item covers all topics.
All students **must pass** the laboratory exercise based assessment in order to pass the unit.
Students need to answer a set of online quizzes and submit laboratory exercise reports to complete this assessment task.
Students will be offered number of options to complete laboratory exercises at home or by physically attending one of our campuses. Please refer to the unit Moodle site for further information.
Each student must **submit an individual laboratory report** (not one report per laboratory group) by the due date although some students might be working in teams during the laboratory sessions in campuses.
Additional information regarding the laboratories will be provided to the students via the unit Moodle site at the start of the term progressively.

Assessment Due Date

Practical and written assessment Due: Week 11 Monday 7:00 am AEST

Return Date to Students

We strive to release the assessment marks in 2 weeks after due date

Weighting
25%

Minimum mark or grade
50% of allocated marks for this assessment

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

- Correct answers
- All working must be shown
- Report must be neat, tidy and legible
- Correct format
- Correct description of laboratory procedures
- Correct interpretation and discussion of laboratory results
- All laboratory exercises must be attempted
- Laboratory exercise based assessment marks need to be more than 50% to PASS

Referencing Style

- Harvard (author-date)

Submission
Online

Learning Outcomes Assessed

- Use appropriate software tools to simulate electrical circuits and verify the results by conducting laboratory experiments using safe work practices
- Work individually and in a team to solve electrical circuit problems and produce professional laboratory documents.

Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking
- 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% of allocated marks for this examination

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