

ELEC1310: Introduction to Electrical Engineering

Callaghan

Semester 2 - 2023



THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

OVERVIEW

Course Description	This course introduces students to fundamental electrical elements including voltage, current, resistance, inductance, capacitance and ideal operational amplifier. It provides students with an understanding and appreciation of techniques for analysing and designing simple dc and ac circuits including balanced 3 phase circuits. It also introduces the principles behind simple electrical machines, and provides hands on experience in using a microcomputer to control a simple electrical device.
Requisites	Students who have successfully completed FNEG1005 cannot enrol in this course.
Assumed Knowledge	MATH1110 Mathematics 1
Contact Hours	Callaghan Laboratory * Face to Face On Campus 2 hour(s) per Week for Full Term * This contact type has a compulsory requirement. Lecture Face to Face On Campus 3 hour(s) per Week for Full Term Tutorial * Face to Face On Campus 1 hour(s) per Week for Full Term
Unit Weighting	10
Workload	Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

COURSE OUTLINE

www.newcastle.edu.au

CRICOS Provider 00109J

CONTACTS

Course Coordinator	Callaghan Prof Galina Mirzaeva Galina.Mirzaeva@newcastle.edu.au (02) 4921 6083 Consultation: Wednesday 1pm to 3pm Engineering A Building, EAG30
Teaching Staff	Other teaching staff will be advised on the course Canvas site.
School Office	School of Engineering EAG03 EA Building Callaghan +61 2 4921 5798 9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

SYLLABUS

Course Content	<ul style="list-style-type: none">• Voltage, current, reference point, Ohm's law, resistivity• DC Circuits: Kirchoff's laws, series circuits, parallel circuits• Capacitors and inductors: definition, characteristics, analogies, response to sinusoidal excitation• AC circuits: Complex numbers, phasors, impedance, series circuits, parallel circuits, complex power• Balanced 3-phase circuits: Star, Neutral, Delta• Principles of electromechanical energy conversion: laws of electromagnetism and their application in explaining the basics of electrical machines• Common component limitations• Notation and units. Circuit topologies• Operational amplifiers• Superposition for DC and AC• Simple design project using an Arduino Uno board
Course Learning Outcomes	<p>On successful completion of this course, students will be able to:</p> <ol style="list-style-type: none">1. Demonstrate safe working practices in laboratories2. Demonstrate familiarity with the problems and theoretical tools to be further developed in the electrical engineering degree3. Analyse and design ac and dc circuits using fundamental techniques4. Explain the operating principles of electrical machines5. Apply knowledge and gain practical 'hands on' experience through a design exercise in the laboratory
Course Materials	<p>Recommended Reading:</p> <ul style="list-style-type: none">- Allan R. Hambley, "Electrical Engineering Principles and Applications", 7th Edition, Pearson <p>Recommended Text:</p> <ul style="list-style-type: none">- William Hayt, Jack Kemmerly, Jamie Phillips and Steven Durbin, "Engineering Circuit Analysis", 9th Edition, McGraw Hill Education

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

- Laboratory There is a compulsory attendance requirement in this course. Attendance/participation will be recorded in the following components:
 - Lab (Method of recording: All students' attendance will be recorded using the myUON app.)
All students must attend at least 80% of the Labs. You can check in using the app or advise the academic staff member at the commencement of the session if you need them to check in on your behalf. All students' attendance will be recorded using the my UON app.
- Tutorial There is a compulsory attendance requirement in this course. Attendance/participation will be recorded in the following components:
 - Tutorial (Method of recording: All students' attendance will be recorded using the myUON app.)
All students must attend at least 80% of the Tutorials. You can check in using the app or advise the academic staff member at the commencement of the session if you need them to check in on your behalf. All students' attendance will be recorded using the my UON app.

Course Assessment Requirements:

- Assessment 1 - Online Learning Activity: Pass Requirement - Students must pass this assessment item to pass the course.
- Assessment 2 - Tutorial / Laboratory Exercises: Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course. Students must obtain $\geq 50\%$ on average across the laboratory exercises. Students who score $< 50\%$ will be offered the opportunity to reattempt the assessment.

ASSESSMENTS

This course has 5 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Lab Induction*	Week 1 - Friday 21st July	Individual	Formative	1
2	Laboratory exercises x 3*	Weeks 2, 3, 6 and 9	Group	15%	5
3	In class quizzes x 3	Quizzes will occur in weeks 4, 7 and 10	Individual	15%	2, 3, 4
4	Group project	Report: Week 12 - Friday 20th October Presentation: Week 13 - during scheduled laboratory class	Group	20%	2, 5
5	Final examination		Individual	50%	2, 3, 4

* This assessment has a compulsory requirement.

Late Submissions

The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Lab Induction

Assessment Type	Online Learning Activity
Purpose	This is a safety requirement to enter and work in the electrical engineering laboratories (building EE)
Description	An online "EE and ES Laboratory Induction" accessed through the Canvas "CESE Work Health and Safety" site.
Weighting	This is a formative assessment and will not contribute to your final grade.
Compulsory Requirements	Pass Requirement - Students must pass this assessment item to pass the course..
Due Date	Week 1 - Friday 21st July
Submission Method	Online
Assessment Criteria	
Return Method	Online
Feedback Provided	
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment. Refer to course outline for details.

Assessment 2 - Laboratory exercises x 3

Assessment Type	Tutorial / Laboratory Exercises
Purpose	To give students hands on experience with standard laboratory equipment. To give students the opportunity to build, test and develop a practical understanding of simple circuits.
Description	Laboratory exercises to be completed during scheduled laboratory classes.
Weighting	15%
Compulsory Requirements	Minimum Grade / Mark Requirement - Students must obtain a specified minimum grade / mark in this assessment item to pass the course..
Due Date	Weeks 2, 3, 6 and 9
Submission Method	In Class
Assessment Criteria	
Return Method	In Class
Feedback Provided	
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment. Students may reattempt each assessment only once

Assessment 3 - In class quizzes x 3

Assessment Type	Quiz
Purpose	To test theoretical understanding of principles taught in classes
Description	On-line quizzes
Weighting	15%
Length	1 hour
Due Date	Quizzes will occur in weeks 4, 7 and 10
Submission Method	Online
Assessment Criteria	
Return Method	Online
Feedback Provided	

Assessment 4 - Group project

Assessment Type	Project
Purpose	Practical application of the taught design and analysis principle.
Description	Small design project including a report (submitted online) and a presentation (in class)
Weighting	20%
Due Date	Report: Week 12 - Friday 20th October Presentation: Week 13 - during scheduled laboratory class
Submission Method	Online
Assessment Criteria	
Return Method	Online
Feedback Provided	

Assessment 5 - Final examination

Assessment Type	Formal Examination
Purpose	Demonstrate the theoretical understanding and application of taught principles
Description	Formal exam during the exam period
Weighting	50%
Due Date	
Submission Method	Formal Exam
Assessment Criteria	
Return Method	Not Returned
Feedback Provided	

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the [Oral Examination \(viva\) Procedure](#). In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the [Student Conduct Rule](#).

Academic Misconduct	All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35 .
Adverse Circumstances	<p>The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the online Adverse Circumstances system where:</p> <ol style="list-style-type: none">1. the assessment item is a major assessment item; or2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;3. you are requesting a change of placement; or4. the course has a compulsory attendance requirement. <p>Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at: https://policies.newcastle.edu.au/document/view-current.php?id=236</p>
Important Policy Information	<p>The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/no-room-for/policies-and-procedures that support a safe and respectful environment at the University.</p>

This course outline was approved by the Head of School on 30.06.2023. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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Graduate Profile Statements – ELEC1310 – Semester 2 2023

This course builds students' capacity in the following University of Newcastle Bachelor of Engineering Graduate Profile Statements (based on 2011 Engineers Australia revised Stage 1 Competency Standards for Professional Engineers):

UON Att.	University of Newcastle Bachelor of Engineering Graduate Profile Statements/ Engineers Australia Stage 1 competency statements	Taught	Practised	Assessed	Skill Level (1-4)
	Professional Attributes				
11	3.1. Ethical conduct and professional accountability				
12	3.2. Effective oral and written communication in professional and lay domains.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1&2
13	3.3. Creative, innovative and pro-active demeanour.				
14	3.4. Professional use and management of information.				
15	3.5. Orderly management of self, and professional conduct.				
16	3.6. Effective team membership and team leadership.				
	Engineering Ability				
7	2.1. Application of established engineering methods to complex engineering problem solving.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1&2
8	2.2. Fluent application of engineering techniques, tools and resources.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1&2
9	2.3. Application of systematic engineering synthesis and design processes.				
10	2.4. Application of systematic approaches to the conduct and management of engineering projects.				
	Knowledge Base				
1	1.1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		1&2
2	1.2. Conceptual understanding of the, mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		1&2
3	1.3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1&2
4	1.4. Discernment of knowledge development and research directions within the engineering discipline.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1&2
5	1.5. Knowledge of contextual factors impacting the engineering discipline.				
6	1.6. Understanding of the scope, principles, norms, accountabilities and bounds of contemporary engineering practice in the specific discipline.				