Course Code:	1005ENG
Course Name:	Electronics for Engineers
Semester:	Trimester 2, 2017
Program:	Diploma of Engineering
Credit Points:	10
Course Coordinator:	Dr James Kirkup
Document modified:	12th June 2017

Teaching Team

Your lecturer/tutor can be contacted via the email system on the portal.

Dr James Kirkup: james.kirkup@staff.griffithcollege.edu.au

Staff Consultation

Your lecturer/tutor is available each week for consultation outside of normal class times. Times that your lecturer/tutor will be available for consultation will be given in the first week of lectures. A list of times and rooms will be published on the Griffith College Portal under the “myTimetable” link.

Prerequisites

It is recommended that students have prior knowledge of 1018ENG Engineering Science and 1010ENG Engineering Maths 1.

Brief Course Description

Electronics for Engineers is a 10 credit point course within the Diploma of Engineering. The course is situated within the second semester of the program. The Diploma of Engineering is designed to provide students with a pathway to:

* further university studies in Engineering and related degrees; or
* direct employment.

Electronics for Engineers introduces students to the basic concepts of electrical and electronic engineering. In the process the course will cover: the fundamentals of DC and AC circuits, the behaviour of various basic electronic components and semiconductors, the use of semiconductors in integrated circuits, the amplification of signals, the measurement of physical processes using electronic circuits, electrical power generation, distribution and safety, and electrical and electronic systems engineering.

Rationale

Electronics for Engineers, within the Diploma of Engineering, is an important foundation course for degree programs in Engineering. The course is also an important foundation for graduates wishing to commence employment in relevant fields.

Aims

The aim of this course is to introduce students to the principles and practice of electrical and electronic engineering. In the process the course will cover the basic concepts of DC and AC circuits, the behaviour of various electronic components including semiconductor devices, systems for electronic measurement of engineering processes, electrical generation, distribution and safety, and electrical and electronic systems and circuits.

Much of engineering practice involves the detection and measurement of various engineering and physical properties (like force and deflection). As most detection and measurement systems are currently electronic in nature, knowledge of the fundamental principles of electronics is essential for all engineers.

To enable students to develop an understanding of measurement systems and their applications, the course will cover concepts of DC and AC electric circuits, semiconductor devices, analogue and digital integrated circuits, amplification and the processing of signals. As the application of these systems often involves mains power, electrical power generation, distribution and safety will be covered.

Learning Outcomes

After successfully completing this course students will be able to:

1. Describe the purpose and use of common electrical and electronic components, devices and signal sources;
2. Analyse and apply established theoretical laws and frameworks on simple electrical and electronic circuits;
3. Design, construct and test simple circuits;
4. Use typical electronic laboratory instruments utilized in various engineering disciplines for the measurement of electrical quantities including, voltage, current, resistance and power.
5. Produce written technical reports, both individually and in groups, from practical activities that display and analyse results while providing logical and comprehensive conclusions.
6. Understand the principles of generation, distribution and safety systems of electrical power.

Texts and Supporting Materials

Learning Resources

Hambley, A.R., (2013) Electrical Engineering: Principles & Applications, 6/E (5th Edition Acceptable) Pearson Education, United States.

Boylestad, Robert, L., 2016 Introductory Circuit Analysis, Global Edition, 13/E, Pearson Education, ISBN-10: 1292098953, ISBN-13: 9781292098951.

Organisation and Teaching Strategies

The weekly class contact consists of 4 contact hours per week and a 3 hour fortnightly laboratory session (5 laboratory sessions in total). The 4 hours will be made up of one 2 hour lecture and a 2 hour tutorial/workshop.

The lectures will provide theoretical and practical understandings of the content areas. Where possible the development of course material will be problem based. Problem solving exercises, elaborating the lecture material, will be introduced during the lecture time. During lecture sessions the relationships between content segments will be highlighted.

The tutorials will provide students with the opportunity to clarify their own ideas on the content material, and to develop necessary problem solving skills. Problem solving techniques will be emphasised. The sessions also provide students with the opportunity to seek further explanation of concepts introduced in lecture sessions. The workshop provides you with practical questions to be completed in class to demonstrate your level of competency. The tutor will guide you through the process as needed.

There will be a weekly online or in-class multiple choice quiz to promote some independent (blended) learning.

The laboratory sessions, where students work in groups, will provide students with the opportunity to clarify their own ideas on the content material, to develop teamwork and necessary problem solving skills, and to develop written communication skills. In addition to demonstrating physical concepts, the sessions will assist students to develop competency in engineering measurement skills. The laboratory sessions will incorporate experiential learning concepts where students will learn through refection on doing.

You are expected to commit, on average, 1 hour per credit point per week on course related activities. Attendance at lectures, tutorials and workshops is a requirement. In independent study time you are expected to read the prescribed text, complete weekly exercises in your workbook and prepare for summative assessment. It is not expected that the workload should exceed normal expectations for a 10 credit point course.

Failure to attend contact sessions and participate in tutorials and workshops may be taken into consideration if you request out of hours assistance or special consideration.

WARNING: If you arrive 15 minutes late to laboratory classes you will be turned away. You cannot change lab groups without permission of the Course Convenor.

Class Contact Summary

Attendance

You will greatly advance your chances of success in the course by fully using the contact time you have available with your lecturers and tutors. The contact time provided in lectures, tutorials, workshops and consultation is for your benefit; it is your opportunity to have any questions about course content or requirements clarified.

Participation in Class

You are expected to actively participate in classes each week.

Consultant Times

Attendance during consultation times is optional but you are encouraged to use this extra help to improve your learning outcomes.

Course Materials

Lecture notes will be made available to you on the Learning@Griffith College site on the student portal and you are advised to print these out and bring them to each class so that extra notes can be added.

Active Learning

You are expected to reinforce your learning gained during contact time by undertaking sufficient independent study. For this 10 CP course, you will need to spend at least 10 hours per week engaged in activities that will help your learning and fulfill the course objectives. Thus, provided you have well used the class contact hours per week, you would then complete addition hours (at least up to 10 hours) per week of independent study.

Program Progression

You are reminded that satisfactory Program Progression requires that attendance in classes is maintained at equal to or greater than 80%, and that GPA is maintained at equal to or greater than 3.5 [please see Griffith College Policy Library - Program Progression Policy - for more information].

Content Schedule

Weekly Teaching Schedule

Week	Topic	Activity	Readings
1	Module 1: Introductory Circuits	Lecture	Boylestad Chapters 1 - 4 Hambley Chapter 1
	Introduction to the course and content. Current & Voltage, measurements, conductors, resistance, and Ohms Law. Introductory Electricity	Tutorial	
	No Laboratory this week	Laboratory	
2	MODULE 1: Electrical Concepts	Lecture	Boylestad Chapters 5 - 9 Hambley Sections 1.4-1.7 (KVL & KCL & Circuits) Sections 2.1-2.3 (Resistive Circuits)
	Resistivity, series and parallel resistors, potentiometers, voltage dividers and loading effects. Kirchhoff's voltage and current laws, power dissipation.	Tutorial	
	Project 1	Project	
3	MODULE 1: Circuit Theory	Lecture	Boylestad Chapter 9 Hambley Sections 2.6 - 2.7, pp. 106 – 122.
	Circuit analysis using: Thevenin's & Norton's theorems and Superposition Theorems.	Tutorial	
4	MODULE 2: Electrostatics	Lecture	

	Electric charge, Coulomb's law, electric field, electric potential. Capacitors, dielectrics, and piezoelectricity	Tutorial	Boylestad Chapter 10 Hambley Sections 3.1 - 3.3, pp. 142 - 156.
5	MODULE 2: Electromagnetics	Lecture	Boylestad Chapter 11-12, 23 Hambley Sections 3.4 - 3.7, pp. 156 - 166, Chapter 15.
	Magnetism, Magnetic field, Magnetic induction, Faraday's law, Lenz's law, Hall Effect, Inductance, Inductors, Transformers, Electric motors	Tutorial	
	Introduction to Circuits (Group 1)	Laboratory	
6	MODULE 2: RCL Circuits	Lecture	Boylestad Chapter 10-12 Hambley Sections 4.1 - 4.3, pp. 180 – 191.
	DC Charge/Discharge Response of Capacitors and Inductors. DC Circuits with capacitors & inductors. Time constants.	Tutorial	
	Introduction to Circuits (Group 2)	Laboratory	
7	MODULE 3: AC Introduction	Lecture	Boylestad Chapter 13 Hambley Sections 2.8, 5.1 - 5.2, pp. 227 – 240.
	Sinusoidal signal representation, Phasors, Average and Effective Values (RMS), AC meters and Instruments	Tutorial	
	DC Circuits (Group 1)	Laboratory	
	Project 2	Project	
	MODULE 1 & 2: Test	Examination	
8	MODULE 3: AC RLC Circuits	Lecture	Boylestad Chapter 13-20 Hambley Sections 5.3 - 5.4, pp. 240 - 249
	AC Response of Capacitors and Inductors. Reactance & Impedance. RLC Circuits, filters, and Resonance	Tutorial	
	DC Circuits (Group 2)	Laboratory	
9	MODULE 3: AC Electrical Circuits	Lecture	Boylestad Chapters 13-20, Hambley Sections 5.5, pp. 249 - 262, Appendix A: pp. 863 - 871
	AC Voltage, Current, and Power. Solving AC circuits with Complex Numbers and Phasor Analysis	Tutorial	
	AC Circuits (Group 1)	Laboratory	

10	MODULE 4: Electronic Devices	Lecture	Boylestad Chapter 7 Hambley Chapter 10, Chapter 13: Sections 13.1 - 13.6, pp. 625 – 648.
	A basic introduction to diodes, transistors and operational amplifiers and their use in rectification, wave shaping, amplification and measurement systems.	Tutorial	
	AC Circuits (Group 2)	Laboratory	
	MODULE 3: Mid Semester Exam	Examination	
11	MODULE 4: OP-AMPS	Lecture	Hambley Chapter 14.
	Negative feedback & Operational Amplifiers, Non-Inverting Op-Amp, Inverting Op-Amp, Summing Amp, Difference Amp, and Wave Shapping	Tutorial	
	AC - DC Conversion (Group 1)	Laboratory	
12	MODULE 4: Electrical Power and Safety	Lecture	Boylestad Chapters 4, 20, 24 Hambley Section 5.7, pp. 267 - 279, Chapter 15.
	Principle of operation single and three phase generators and motors. Power generation, distribution, and usage. Electrical safety: Fuses, Circuit Breakers, Earth Leakage, Earthing Systems.	Tutorial	
	Revision: MODULE 4		
	AC - DC Conversion (Group 2)	Laboratory	
13	Make-Up Laboratory		
	MODULE 4: Final Exam (time and venue to be advised)	Examination	

Assessment

This section sets out the assessment requirements for this course.

Summary of Assessment

Item	Assessment Task	Weighting	Relevant Learning Outcomes	Due Date
1	Module 1&2 Test	15%	1,2	7
2	Module 3 - Mid-semester Exam	15%	1,2	10
3	Module 4 - Final Exam	20%	1,2,6	TBA
4	Laboratory Worksheet 1	4%	1,4	Every Lab
5	Laboratory Worksheet 2	4%	1,2,3,4	Every Lab
7	Laboratory Worksheet 3	4%	1,2,3,4	Every Lab
8	Laboratory Worksheet 4	4%	1,2,3,4	Every Lab
9	Laboratory Worksheet 5	4%	1,2,3,4	Every Lab
10	Project 1	10%	2,3,5	Every Lab
11	Project 2	10%	2,3,5,6	Every Lab
12	Test or quiz (12 x 1 per week)	10%	1,2,6	Every Lab

Assessment Details

Weekly Quizzes

Each week there will be an online or in-class multiple choice quiz to promote some independent (blended) learning. Out of the 12 quizzes for the course the student's top five Quiz marks will be counted towards a maximum of 10% where each quiz is worth 2%. There is no deferment or repeat of a quiz no matter what reason.

Module Tests

There is a 1hr closed book test at the end of modules 1 & 2, a 1hr mid semester exam covering module 3 and a final 1hr exam covering module 4 giving a total worth of 50%; Module exams are of 1 hour duration in a separate period. There is no in-class revision prior to the Module 1&2 test.

The module test, mid and final semester exams are designed to assess the students analytical and problem solving skills. They are both knowledge based and problem solving. The Module 1&2 Test will be run during a scheduled lecture theatre session (large enough for students to space out). The mid-semester and final exams will be conducted by the college and students will be advised on the time and location during the course. Students must achieve an overall passing mark (50%) for all module tests and exams, when all test marks are summed, to be eligible for a passing grade in the course.

Laboratory Worksheets

During the semester there are five (5) different laboratory sessions the student is expected to complete. Completion is determined by having the laboratory demonstrator "sign off" the student worksheets, during the laboratory class. Each laboratory worksheet is worth 4% (5 x 4% = 20%). Each laboratory has a preliminary section to be completed prior to the laboratory that is a necessary part of the laboratory. Each laboratory and preliminary will therefore be marked out of a total of four (4) for fully completed and correctly recorded lab work, including all questions answered and graphs correctly recorded and labelled.

There is only one (1) make-up lab available regardless of circumstances. This generally occurs in week 13, however, the time and location will be advised during the course. Attendance to this make-up lab requires a deferred assessment application form to be submitted. Please refer to deferred assessment policy on the Griffith College website (Griffith College Policy Library).

Projects

Students are required to complete two projects during the course using circuit simulation software (Lushprojects). Project 1 is a group based project based on the content covered in the lectures and laboratories. Project 1 is due in week 6. Project 2 is an individual based project based on the content covered in the lectures, laboratories and Project 1. Project 2 is due in week 12. Both projects are worth 10%. Details of the task for each project will be provided on an assignment sheet that will be available from the course website.

Rationale for Assessment

The Examinations are both knowledge based and problem solving. They are designed to assess the ability of the student to bring together the topics covered in lectures and experience from the workshops, and to develop the ability to apply that knowledge to the solution of practical problems.

The laboratory worksheets are designed to encourage students to develop a solid understanding of the concepts being covered in the laboratory sessions and their electronics skills. Students are required to demonstrate to the laboratory demonstrator, in laboratory classes, that they have completed and understood all the requirements of each activity.

Submission and Return of Assessment Items

Submitted laboratory worksheets and documentation are not returned.

Retention of Originals

You must be able to produce a copy of all work, except laboratory worksheets submitted if so requested. Copies should be retained until after the release of final results for the course.

Extensions

To apply for an extension of time for an assignment, you must submit an Application for Extension of Assignment form to your teacher at least 24 hours before the date the assignment is due. Grounds for extensions are usually: serious illness, accident, disability, bereavement or other compassionate circumstances and must be able to be substantiated with relevant documentation [e.g. Griffith College Medical Certificate]. Please refer to the Griffith College website - Policy Library - for guidelines regarding extensions and deferred assessment.

Assessment Feedback

Marks awarded for assessment items will also be available on the on-line grades system on the Student Website within fourteen [14] days of the due date.

Generic Skills

Griffith College aims to develop graduates who have an open and critical approach to learning and a capacity for lifelong learning. Through engagement in their studies, students are provided with opportunities to begin the development of these and other generic skills.

Studies in this course will give you opportunities to begin to develop the following skills:

Generic Skills	Taught	Practiced	Assessed
Written Communication	Yes	Yes	Yes
Oral Communication		Yes	
Information Literacy	Yes	Yes	Yes
Secondary Research			
Critical and Innovative Thinking	Yes	Yes	Yes
Academic Integrity		Yes	Yes
Self Directed Learning		Yes	
Team Work		Yes	
Cultural Intelligence		Yes	
English Language Proficiency		Yes	

Additional Course Generic Skills

Specific Skills	Taught	Practiced	Assessed
Ethical behaviour in social/professional/work environments	Yes	Yes	Yes
Work autonomously	Yes	Yes	Yes

Additional Course Information

Teacher and Course Evaluations

Your feedback is respected and valued by your lecturers and tutors. You are encouraged to provide your thoughts on the course and teaching, both positive and critical, directly to your lecturer and tutor or by completing course and lecturer evaluations via Griffith College's online evaluation tool whenever these are available.

Academic Integrity

Griffith College is committed to maintaining high academic standards to protect the value of its qualifications. Academic integrity means acting with the values of honesty, trust, fairness, respect and responsibility in learning, teaching and research. It is important for students, teachers, researchers and all staff to act in an honest way, be responsible for their actions, and show fairness in every part of their work. Academic integrity is important for an individual’s

and the College's reputation.

All staff and students of the College are responsible for academic integrity. As a student, you are expected to conduct your studies honestly, ethically and in accordance with accepted standards of academic conduct. Any form of academic conduct that is contrary to these standards is considered a breach of academic integrity and is unacceptable.

Some students deliberately breach academic integrity standards with intent to deceive. This conscious, pre-meditated form of cheating is considered to be one of the most serious forms of fraudulent academic behaviour, for which the College has zero tolerance and for which penalties, including exclusion from the College, will be applied.

However, Griffith College also recognises many students breach academic integrity standards without intent to deceive. In these cases, students may be required to undertake additional educational activities to remediate their behaviour and may also be provided appropriate advice by academic staff.

As you undertake your studies at Griffith College, your lecturers, tutors and academic advisors will provide you with guidance to understand and maintain academic integrity; however, it is also your responsibility to seek out guidance if and when you are unsure about appropriate academic conduct.

In the case of a breach of academic integrity made against a student he or she may request the guidance and support of a Griffith College Student Learning Advisor or Student Counsellor.

Please ensure that you are familiar with the Griffith College Academic Integrity Policy; this policy provides an overview of some of the behaviours that are considered breaches of academic integrity, as well as the penalties and processes involved when a breach is identified.

For further information please refer to the Academic Integrity Policy on the Griffith College website – Policy Library.

Risk Assessment Statement

There are no out of the ordinary risks associated with this course.

Note: For all Diploma level programs, Griffith College acknowledges content derived from Griffith University.