Engineering 2211: Electronic Circuits & Devices

Department of Engineering, ANU

Semester 1, 2002

You should read this document as soon as possible carefully and retain it for the duration of the course. It contains important information about the content and structure of the course, the assessment methods and timetable, as well as a number of things that are expected of you.

1 Staff

Lecturer Dr Matt James (`Matthew.James@anu.edu.au`), (6125-3378)
Office: Main Engineering Office or Ian Ross R217
Office Hours: I will be available in R217 on Fridays for drop-in questions (except for when I am teaching or in a meeting). If you can't see me on a Friday, please make an appointment via the main ENGN office. Thank you.

Tutors Daniel Macdonald
Evan Franklin
Matthew Smith

2 Web Page

There is a web page for ENGN2211. The URL is:

http://spigot.anu.edu.au/courses/engn2211/

Please *regularly* consult this page for additional information, announcements, software, and copies of handouts. This page will be updated regularly.

3 Introduction

Electronic Circuits & Devices is a 6 credit point unit offered by the Department of Engineering. Features of the course:

- Two lectures per week (26 hours).

- Eight computer labs/tutorials over the semester (16 hours).

- Eight hardware labs over the semester (20 hours).

- Lecture notes and lab/tut notes in printed and electronic form.

The course will cover basic circuit theory, analog electronics and introductory digital electronics. It will build on what you did in 1st year, and prepare you for later units in electronics, systems and signals, etc. This is an important unit in the electrical sequence of the BE degree.

Needless to say, electronic devices surround us in the modern world and engineers are responsible for their design. This course is intended to provide you with some of the basic knowledge and skills you will need in your career.

Objectives. On completion of this course you will have the ability to describe and analyse the operation of basic electronic circuits and devices such as amplifiers, filters, rectifiers, RLC networks, and combinational logic circuits:

- Use PSpice software tools to simulate the behaviour of electronic circuits.

- Use analytical methods to carry out elementary calculations for circuit analysis and design.

- Laboratory construction, testing, measurement and debugging operations for electronic hardware.

4   Course Overview & Schedule

An overview of the course is shown in Table 1 and the schedule is given in Table2.

	device physics Ohm's Law, Kirchoff's laws nodal, mesh analysis network theorems	dynamic/transient s-domain AC steady state	feedback two port networks transfer functions frequency response
	Devices	**Modules**	**Example Systems**
Analog	sources R, L, C diode BJT transistor FET transistor opamp transformer	amplifiers filters integrated circuits - 741 digital	hi fi audio amplifiers speakers analog phones AM and FM radio
Digital	TTL and CMOS gates NAND, NOR, INV, AND, OR, XOR, etc	MSI chips MUX, DECODER, ALU, etc FPGA	computers microcontrollers
Mixed	all above	all above ADC/DAC converters	many modern electronic systems digital phones CD players
	logic Boolean algebra K-maps binary arithmetic *Foundations - underlying theory*		

Table 1: ENGN2211 course overview.

Week	Tests	Computer Labs/Tuts	Hardware Labs
1	-	-	-
2	-	CLAB1	HLAB1
3	-	CLAB2	HLAB2
4	Test 1	-	-
5	-	CLAB3	HLAB3
6	-	CLAB4	-
7	-	CLAB5	HLAB4
8	Test 2	-	-
9	-	CLAB6	HLAB5
10	-	CLAB7	HLAB6
11	-	CLAB8	HLAB7
12	-	-	HLAB8
13	-	-	-

Table 2: Schedule for ENGN2211.

5   Textbooks

The nominated texts are:

S.G. Burns and P.R. Bond, Principles of Electronic Circuits, 2nd Ed., PWS Publishing, 1996.
(Burns & Bond will also be used in ENGN2224 Electronics in second semester.)
R.C. Dorf and J.A. Svoboda, Introduction to Electric Circuits, 5th Ed., Wiley, 2000.

You should purchase a copy of the following items from the engineering office:

ENGN2211 Lecture Notes
ENGN2211 Labs and Tutorials
ENGN2211 Electronics Kit

6   Assessment

The assessment for this course is shown in the Table 3.

Item	Description	Marks
Test 1	1 hour written test	15
Test 2	1 hour written test	15
CLAB/HLAB	satisfactory preparation/participation/completion	30
Exam	comprehensive 2 hour written	40
Total		100

Table 3: Assessment for ENGN2211.

Notes:

- Each CLAB/HLAB will be marked out of 10, as per the grading schedule in the Labs and Tutorial Notes. The total score will be scaled as indicated in Table 3.

- The 1 hours written tests will be held in scheduled lecture times to be announced.

- All tests/exams are closed book, except *students may bring in one (1) size A4 two (2) sided summary sheet, handwritten.*

- It is the students responsibility to ensure that their marks are correctly recorded. The tutor will maintain a roll.

7 Course Organisation

7.1 Lectures

The lectures will present an overview of the main material for the course and offer you the opportunity for asking questions and keeping up to date with what is happening in the course.

7.2 Computer Labs/Tutorials

The tutorials will be held in the PC labs and each two hour session will have a sequence of exercises for you to complete. A tutor will be available to help you. You will often have to complete the exercises in your own time. Additional exercises from the textbooks will also be given (see web page). Each CLAB will be marked out of 10. See Lab/tutorial notes for details.

7.3 Hardware Labs

A sequence of hardware lab sessions will be held in the Engineering Electronics Labs. Each two hour session will have a sequence of exercises for you to complete. A tutor will be available to help you. Each lab session has some mandatory **preparation** which *must be done before coming to the lab.*

Each HLAB will be marked out of 10. See Lab/tutorial notes for details.

7.4 Lab/Tut Operation

The labs and tuts are the main parts of the course. You are expected to attend, and perform the exercises as indicated. You must do the PREPARATION as indicated in your own time before coming to the lab/tut session. Also, in your own time you are expected to read the lecture notes and sections from the textbooks, do prescribed textbook/tut exercises, and study for tests/exams.

You are encouraged to ask questions.

The best way to pass this course is to DO IT! **You learn by doing.**

There are 64 contact hours for this course. This means you are expected to do around 120 hours on this course as a minimum requirement.

8 Notebooks

All students *must* keep a notebook for this subject (the notebook must be for this course only, and not shared with other courses). This notebook should be a bound pad into which you enter *all* your rough working and preparation for the experiments as well as laboratory notes (your record of testing your

designs and performing set experiments) and computer printouts where appropriate. *Loose sheets of paper are not acceptable.*

Your notebook does not have to be neat, but should be of a professional standard in the level of detail and quality. Detailed calculations, measurements and graphs should be included. If you get something wrong, that's OK, don't tear out the pages - simply cross it out and do it again elsewhere in your notebook.

Your notebooks should be a complete and detailed account of everything you do in this course.

The tutor may request to see this book at any time. **The notebook may be examined during the lab exams.**

You should record such information as notes on how to use pieces of equipment and software in here also. You should date each page of the notebook.

Note that it is standard engineering practice to keep such workbooks. Such a book can serve as a record of intellectual property for commercial reasons.

See Lab/tutorial notes for further details.

9   Software

This course will make use of software for circuit analysis and design. Details will be discussed in class and information will be available on the ENGN2211 web page.

10   Electronics Kit

Your electronics kit will include a breadboard and a range of electronic components. The breadboard can be used in ENGN2224 *Electronics* in semester 2. The kit will enable you to construct your circuits before you arrive at the lab.