Course Description

1010 - Electrical and Electronic Engineering 1B

Course Code:	1010
Course Title	Electrical and Electronic Engineering 1B
Academic Year:	2008
Semester:	2
Lecturers:	Dr. M. Sorell (Sinusoidal Network Analysis and Coordinator) Mr. D. Bosch (Practical) Mr. P. Ramsey (Communication & Professional Practice) Prof. Z. Michalewicz (Puzzle-Based Learning)
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Aims:
Electrical and Electronic Engineering 1B builds on the technical foundation laid by Electrical and Electronic Engineering 1A and extends it by :

- describing the importance of AC signals in communications and power
- extending the DC circuit analysis methods learnt previously to AC circuit analysis
- introducing more powerful methods to analyse electric circuits
- demonstrating the above concepts by the construction of an AM radio receiver.

In addition to the technical part of the course, EEE1B also has :

- a communication skills and professional engineering component
- a puzzle-based learning component

Outcomes:
After successfully completing this course students will have an understanding of the importance of AC signals in communications and the analysis of AC circuits. The course also seeks to improve students' verbal and written communication skills as well as their lateral thinking and problem solving skills.

Previous Studies:
It is assumed that students have completed Electrical and Electronic Engineering 1A in a previous semester.

Further Studies:
This course introduces basic knowledge and skills that will be required in many courses at higher levels that are concerned with electrical circuits and communication systems.

Delivery Methods:
Sinusoidal Network Analysis Component: 16 lectures, 4 small-group tutorials, 2 full-class tutorials, 1 Quiz
Practical component: 11 practical sessions (3 hours each)
Communications & Professional Practice: 4 lectures and 8 small-group tutorials
Puzzle Based-Learning Component: 12 lectures with weekly homework

Assessment :

Section	Continuous Assessment	Exam
Sinuisoidal Network Analysis	10% (quiz - optional if this improves overall mark)	20-30% (30% if quiz not counted) - 3 questions
Practical	20%	
Communications and Professional Practice	20%	
Puzzle Based Learning	20%	10% - 1 question

The exam is worth up to 40% of the overall mark and will include 4 questions (2 hours). The quiz mark will be counted only if it improves your overall grade.

It is a requirement to achieve at least 40% in each of the four components in order to pass overall.

COURSE OUTLINE: 1010, ELECTRICAL AND ELECTRONIC ENGINEERING IB

Week	Lecture 1 (Monday 11-12)	Lecture 2 (Tuesday 11-12)	Lecture 3 (Thursday 11-12)	Small group tutorial (various times)	Practical (various times)
	Bragg	Napier G04	Napier G04	Annex 308	N126
1	PBL 1	SNA 1	SNA 2	C&PP	-
2	PBL 2	SNA 3	C&PP	SNA Tute	Practical
3	PBL 3	SNA 4	SNA 5	C&PP	Practical
4	PBL 4	SNA 6	C&PP	SNA Tute	Practical
5	PBL 5	SNA 7	SNA 8	C&PP	Practical
6	PBL 6	SNA 9	C&PP	SNA Tute	Practical
7	PBL 7	SNA 10	PBL 8	C&PP	Practical
8	PBL 9	SNA Quiz	C&PP	SNA Tute	Practical
9	*public holiday*	SNA 11	SNA 12	C&PP	Practical
10	PBL 10	SNA 13	SNA Tute	C&PP	Practical
11	PBL 11	SNA 14	SNA 15	C&PP	Practical
12	PBL 12	SNA 16	SNA Tute	C&PP	Practical
13	-	-	-	-	Practical (Monday group only)

PBL= Puzzle Based Learning
SNA= Sinuisoidal Network Analysis
C&PP= Communications and Professional Practice

Sinusoidal Network Analysis:
1. Resistor/Capacitor circuit as a differential equation
2. Resistor/Inductor circuit as a differential equation
3. Inductor/Capacitor resonator (DE approach)
4. Amplitude Modulation, envelope detection and the crystal set
5. Amplitude Modulation - mathematical treatment
6. Other types of modulation
7. Compound filters
8. Complex numbers in review
9. Phasors
10. Complex Impedance
Review Quiz
11. Filters using complex impedance
12. Power in AC Circuits
13. Power Factor
14. Three-Phase Power
15. Analogue <-> Digital Conversion
16. Introduction to Digital Signal Processing
Each lecture will also allow time for open "how does that work?" discussion

Practical
Module 1: Safety review
Module 2: Audio Amplifier
Module 3: Audio Filter
Module 4: Air-core Inductor
Module 5: Crystal Set
Module 6: AM Radio System

Communications and Professional Practice
This unit will survey and explore the role of the engineer and his/her interaction with colleagues, employees and the broader community through texts and exercises which will also:

- enable and encourage students to understand why effective communication is essential for practising engineers.
- enable and encourage students to practise and improve their communication skills (including written, oral and presentation skills).
- enable students to interpret information in written texts, relevant to electronic and electrical engineering.

In addition, we will explore aspects of professional practice such as mentoring and teamwork, and consider the wider social implications of an engineer's work.

Puzzle Based Learning
The focus of this unit is on getting students to think about framing and solving unstructured problems (those that are not encountered at the end of some textbook chapter). The general objective is to increase the student's mathematical awareness and problem-solving skills by discussing a variety of puzzles. The puzzle-based learning approach has a long tradition as the first mathematical puzzles were found in Sumerian texts that date back to around 2,500 BC The puzzles selected for the course satisfy most of the following criteria:

1. Generality: Educational puzzles explain some universal mathematical problem-solving principles.
2. Simplicity: Educational puzzles are easy to state and easy to remember.
3. Eureka factor: Educational puzzles often frustrate the problem-solver! Eventually a Eureka! moment is reached… The Eureka factor also implies that educational puzzles have often elementary solutions that are not obvious.
4. Entertainment factor: Educational puzzles are very entertaining!

Such educational puzzles are used to illustrate basic concepts of critical thinking, mathematics, and problem-solving. The course presents some problem-solving rules and covers issues of understanding the problem and the role of intuition in problem-solving activities. Further, some mathematical problem-solving principles are discussed and elements of modeling, constraint-processing, optimization, probability, statistics, simulation, pattern recognition, and strategy are introduced.

Reference books:

A.R. Hambley: Electrical Engineering - Principles and Applications, 4th Edition, Pearson.

Z. Michalewicz and M. Michalewicz: Puzzle-Based Learning: An introduction to critical thinking, mathematics, and problem-solving, Hybrid Publishers, 2008.

Graduate Attributes - Coverage

	Description	SNA	PBL	C&PP	Prac
GA1	An advanced level of knowledge and understanding of the theory and practice of Electrical and Electronic, Computer Systems or IT&T Engineering and the fundamentals of science and mathematics that underpin these disciplines.	Yes			Yes
GA2	A commitment to maintain an advanced level of knowledge throughout a lifetime of engineering practice and the skills to do so.	Yes	Yes	Yes	Yes
GA3	The ability to apply knowledge in a systematic and creative fashion to the solution of practical problems.	Yes	Yes		Yes
GA4	A commitment to the ethical practice of engineering and the ability to practice in a responsible manner that is sensitive to social, cultural, global, legal, professional and environmental issues.			Yes	
GA5	Interpersonal and communication skills for effective interaction with colleagues and the wider community.			Yes	Yes
GA7	An ability to identify, formalise, model and analyse problems.	Yes	Yes		Yes
GA8	The capacity to design, optimise, implement, test and evaluate solutions.				Yes
GA10	Personal attributes including: perseverance in the face of difficulties; initiative in identifying problems or opportunities; resourcefulness in seeking solutions; and a capacity for critical thought.	Yes	Yes		Yes
GA13	An ability to utilise a systems approach to design and operational performance.				Yes

These programs also foster the graduate attributes of the University of Adelaide and the Institution of Engineers Australia. These should be read in conjunction with the list above.