ELEC 2300: Circuits and Electronic Systems 2

Staff:

Unit Coordinator, Lecturer, and Tutor
Dr. Defeng (David) Huang
Room: 3.24
Email: huangdf@ee.uwa.edu.au
Tel: 6488 1543

Lab Demonstrators:

Ms Meifang Lai
Email: meifang@mech.uwa.edu.au

Mr Hang Li
Email: hangli@ee.uwa.edu.au

Content:

This unit consists of two interrelated parts that will be taught in sequence:

Circuit Theory:

Conceptual models based on voltage and current, lumped models for components; passive elements—capacitor, single inductor, coupled inductors, resistor; active elements—controlled and uncontrolled; Kirchhoff’s laws, superposition, ordinary differential equations, state space, duality; time domain analysis—initial conditions, transient response, forced response, first and second order circuits with R, L, C elements; Laplace transform in the analysis of circuits, s domain characteristics of lumped elements, application of Kirchhoff’s laws in s domain; systematic analysis—Nodal and Mesh, definite and indefinite matrix representation. Thevenin, Norton equivalents; properties of impedance functions, L C networks, R L C networks; frequency and impedance scaling; instantaneous power, complex power, Tellegen’s theorem, maximum power transfer; two-port networks: voltage-current relations for two ports; matrix description of two ports, examples and applications, relationships between two-port matrices; properties of two-port functions for active and passive networks, pole and zero locations; cascaded two-port networks, constant resistance networks.

Electronic Circuits:

Transistors as digital switches, basic DC characteristics and applications; linear transistor amplifiers—basic single stage configurations, biasing, limits of operation; small signal modelling and analysis of single stage configurations, impedance and transfer frequency characteristics, Miller effect; signal referencing, input and output references; two-stage configurations, voltage to current, current to voltage pairs, cascode stage, differential amplifier stage, differential gain, common mode gain; analogue multipliers, analogue chopper, transconductance multipliers.

Outcomes:

Students will gain an understanding of fundamental aspects of electrical and electronic circuits. They gain practical experience in circuit problem solving. They also gain practical skills in electronic circuit construction and in reporting laboratory experiments.

Assessment:

The assessment will be made up of the following components:

- Assignment One 10% (due on Thursday, April 23, 2009)
- Assignment Two 10% (due on Thursday, May 21, 2009)
- Lab One 6% (lab report due on Thursday, March 26, 2009)
• Lab Two 7%  (lab report due on Thursday, April 23, 2009)
• Lab Three 7%  (lab report due on Thursday, May 21, 2009)
• Examination 60%

Contact Hours:

• 3hrs lectures per week (no lecture on Anzac Day, Monday, April 27, the lecture on PROSH Day (Wednesday, April 1) cancelled)
• 1hr tutorial per week (commencing second week of the semester)
• 3× 2-2 hours laboratories

Prerequisite:

GENG1002 (Engineering: Introduction to Electrical and Electronic Engineering). It is assumed that students have prior knowledge of the material covered in MATH1010 (Calculus and Linear Algebra) and MATH1020 (Calculus, Statistics and Probability).

Reference Books

• James W. Nisson and Susan A. Riedel, Electric Circuits, Prentice Hall.

Generic Skills:

Examination and tests:

- ability to apply knowledge of basic science and engineering fundamentals
- ability to undertake problem identification, formulation and solution
- to master subject matter and techniques of their chosen discipline at internationally-recognised levels and standards
- to think and reason logically and creatively

Tutorials

- ability to undertake problem identification, formulation and solution
- to master subject matter and techniques of their chosen discipline at internationally-recognised levels and standards

Laboratories

- ability to apply knowledge of basic science and engineering fundamentals
- ability to function effectively as an individual and in multi-disciplinary and multicultural teams with the capacity to be a leader or manager as well as an effective team member
- to think and reason logically and creatively

Policies:

Faculty of Engineering, Computing and Mathematics - Policy on Scaling of Marks:

Faculty of Engineering, Computing and Mathematics - Policy on Plagiarism:
http://www.ecm.uwa.edu.au/for/staff/pol/plagiarism
Faculty of Engineering, Computing and Mathematics - Policy on Appeals:

IMPORTANT:

1) EMAIL

Please read your email with title: ELEC2300:. You will be given important information about examinations, laboratories, lectures, assignments, etc., using email. If an email is sent to you, it will be assumed that you have read it.

2) FOOTWARE IN LABS

You must wear shoes that cover your feet for Laboratories 2 and 3. Failure to wear adequate footwear will mean exclusion from the laboratory and loss of marks for that lab.