SCHOOL OF ENGINEERING
UNIVERSITY OF GUELPH
ENGG*2450 NETWORK THEORY
COURSE DESCRIPTION - WINTER 2004

Instructor R.B.Brown, P.Eng Room 2340, Thornbrough Building Ext. 53922
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Description

Course content is typical of an introductory undergraduate electrical engineering course, but examples are drawn from biological and environmental engineering applications. Characteristics of basic passive circuit elements (resistance, capacitance, inductance), ideal sources and operational amplifiers are studied. Techniques for analyzing linear dc and ac circuits are presented with emphasis on solutions to steady-state problems, but transient response of simple circuits is examined. *PSpice* circuit simulation is used to investigate the response characteristics of more complex circuits. Steady-state ac power analysis and electrical wiring and safety are introduced. Principles of operation and design of sensors and practical electro-mechanical devices are discussed as well as magnetically coupled networks and filter networks.

Prerequisites PHYS*1130 Introductory Physics with Applications II
MATH*2270 Applied Differential Equations
ENGG*2400 Engineering Systems Analysis

Text **Basic Engineering Circuit Analysis**, 7th Edition
J. David Irwin. John Wiley and Sons, Inc.

Objectives: After successfully completing the course the student will be able to:

1. understand terminology and conceptual models used in electrical engineering for analysis of simple circuits and devices,

2. obtain the steady-state current, voltage and power in multi-loop circuits of dc sources and passive elements,

3. determine the transient response of first and second order linear electrical circuits,

4. use phasor techniques to analyze multi-loop circuits consisting of ac sources and linear passive elements to find the steady-state current, voltage and/or power at any point,

5. apply the techniques of ac and dc circuit analysis to the design of components and devices for specific general engineering applications, and,

6. analyze simple magnetically coupled networks and determine current- magnetic flux relationships.

Course Content

1. Basic electrical quantities - electric charge, current, electric field, voltage and power.

2. The elements of linear circuits - resistors, capacitors, inductors and sources.

3. Kirchhoff's voltage and current laws; loop-current and node-voltage analysis methods.

4. Thévenin's theorem, Norton's theorem and superposition.

5. * Circuits containing a nonlinear element - load line analysis.

6. * PSPICE simulation for circuit analysis.

7. Response of 1st and 2nd order systems - natural, forced and complete response patterns.

8. Time-varying signals; exponential and sinusoidal functions.

9. Average and effective values of periodic signals.

10. Impedance and admittance; phasor relationships

11. Steady-state ac analysis; power calculations, maximum average power transfer.

12. Variable-frequency performance; series and parallel resonance, quality factor, filter networks.

13. * Magnetically coupled circuits, the ideal transformer, magnetic flux and design of transformers.

14. * Special topics in applied electricity - electrical safety, domestic wiring.

* Material supplemental to textbook presented.

Method of Evaluation	Midterm examination	30%
	Quizzes	20%
	Final Examination	50%

Notes:

1. The midterm examination will be held Thursday, February 26, 2004, time and location TBA.

2. A list of recommended problems from the text will be given weekly. Students are expected to work on these problems independently and discuss difficulties in their assigned tutorial period. Quizzes based upon the problems will be written in the tutorial periods; the schedule of quizzes will be announced in class.

3. The final examination will cover **all course material** for the semester.

4. Preprogramed features of calculators **may not be used in examinations or quizzes** and no course material is to be stored in memory of such calculators. Personal computers (including notebook, palmtop or handheld) cell phones or any other electronic aides will not be allowed in examinations or quizzes.

5. A single 22 x 28 cm (8 ½ x 11 inch) formula sheet may be used in both examinations but **will not be allowed** in the tutorial quizzes.

6. Requests for academic consideration due to illness or compassionate reasons must be made in writing and accompanied by certification.

7. Major Holy Days: The student must contact the instructor within the first two weeks of class if academic consideration is to be requested due to religious reasons.