EE 202 Circuit Analysis I (Required)

Course Description:
A systematic development of network analysis methods. Topics include Kirchhoff's laws; loop and nodal analysis;
Laplace transform analysis of circuits; AC steady state analysis and phasor diagrams.

Prerequisite(s):
PHY 108

Corequisite(s):
MTH 242

Textbook(s):
D. E. Johnson, J. R. Johnson, J. L. Hilburn, P. D. Scott, Electric Circuit Analysis, John Wiley, 3rd Edition, 1999.

Course objectives:
The course reviews fundamentals from physics and then introduces students to the analysis and design of electric circuits. Although the emphasis is on analysis, circuit design is also discussed and a computer project is assigned that requires circuit design using PSPICE or Electronics Workbench software.

Topics covered:
- Introduction and review of basic physics (2 lectures)
- Resistive circuits, Kirchhoff's laws, equivalent subcircuits (4 lectures).
- Dependent sources and OP AMPS (4 lectures).
- Nodal analysis, mesh analysis, duality (7 lectures).
- Energy-storage elements (2 lectures).
- First-order circuits (4 lectures).
- Second-order circuits (4 lectures)

Laboratory Topics:
Software used: PSPICE or Electronics Workbench
A computer project is assigned which is due on the last week of classes. The students are asked to adjust the parameters of a second order circuit so that it exhibits a desired transient response.

Lecture/laboratory schedule:
Tuesday and Thursday 12:30pm - 1:50pm
TA recitation, Monday, Wednsday and Friday 12:00pm - 12:50pm
The EE Computer Lab is also reserved towards the end of the semester for the students to work on the computer project.

Professional Significance:
Circuit analysis is a fundamental topic in electrical engineering. The basic principles of circuit analysis taught in EE 202 find application on a wide range of real-life situations. Also, EE 202 students are exposed to the use of electronic circuit analysis and design software (PSPICE or Electronics Workbench) which is an important skill in the industry.

Course Role in Overall Program:
Circuit analysis I provides the students with the fundamental background necessary to continue to Circuit Analysis II and courses in electronics, electromagnetics and power systems.

Furthermore, the fundamental ideas of circuit theory help students better understand courses on signals and systems, communications and signal processing.

Relationship of Course to Program Outcomes

(a)	2	The course through the lectures, homework and computer project, serves as an effective platform for students to apply their knowledge of mathematics (especially calculus, linear algebra and differential equations) and basic physics. Calculus is required throughout the course, especially when discussing electrical charge and current, energy and power and the element laws of the capacitor and inductor. Linear algebra is used in solving linear systems of equations in nodal analysis and mesh analysis. Differential equations are employed in the calculation of the transient response of first order and second order circuits. Finally, basic physics is used throughout the course.
(b)	2	The computer project involves the design of a first order circuit with a particular time constant and the use of PSPICE or Electronics Workbench to obtain its transient response. The students are asked to analyze the plots obtained by the software and compare them with
(c)	2	The computer project requires the students to design a first order circuit with a certain time constant. The students are also required to use circuit elements with practical values.
(d)	2	The students come from all branches of engineering and work on the computer project in groups of three or four.
(e)	1	Homework assignments, the computer project and exams, all demonstrate the engineering problem solving process.
(f)	1	Interactions with the instructor and teaching assistant, including lectures, office hours, individual meetings and grading procedures, adhere to the highest level of academic integrity. However, no specific professional ethics lectures are given.
(g)	1	The homework assignments and computer project in addition to class participation measure not only technical knowledge, but also the ability to communicate effectively with the instructor and within the student project group.
(h)	1	Proposed solutions as well as their merits and societal implications are discussed in recitation.
(i)	1	The application of topics taught in the courses on modern technology is discussed, when appropriate, and the fact that an engineer needs to keep up with the technological advances is stressed.
(j)	1	Although circuit analysis is a classic topic, the application of its basic ideas on modern issues is pointed out, when appropriate.
(k)	2	Students acquire the knowledge of PSPICE or Electronics Workbench, two widely used electronic circuit analysis and design tools.
(ee1)	1	This is an introductory course in circuits and the material taught is deterministic. However, when appropriate, topics such as thermal noise are briefly discussed.
(ee2)	2	The students are required to use calculus, linear algebra and differential equations as well as basic physics, as explained in (a). The students are also exposed to engineering design methodologies through the computer project as well as selected design homework problems.
(ee3)	2	The students learn to solve first and second order ordinary differential equations in order to obtain the transient response of first order and second order circuits.
(ee4)	1	This is an introductory course and most of the material consists of basic electric circuit concepts. However, it is pointed out to the students that this material is required for the understanding of analog and digital electronic circuits. Students are also familiarized with electronic analysis and design software (PSPICE and Electronics Workbench) which can also be used for digital circuits. However, programming of microprocessors and embedded systems is not explicitly taught in this course.

Prepared by:
Lisimachos P. Kondi, Asst.. Prof. (February 5, 2002)