EE222 CIRCUIT THEORY II Spring 2015

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Instructor's office hours: Tue 11am-12pm, Thu 10am-11am and by appointment.

Class Website: Announcements regarding the course and any supplementary material will be posted on the instructor's website <u>www.isikun.edu.tr/~onurkaya</u>, and Course Online. You are strongly encouraged to check the class website frequently to get updated information such as new problem sets, exam dates etc.

Class hours: Tue 1pm-3pm, Thu 3pm-5pm @ DMF-102, Problem Session: Tue 12pm-1pm @ DMF-102.

Course Synopsis:

Curcuit Theory II is the second part of a sequel of sophomore level courses dealing with the fundamentals of electric circuits. Unlike Circuit Theory I, which deals mostly with the response of basic electric circuits to DC sources, it consists of the treatment of circuits with time varying sources. Circuit Theory II generalizes the circuit analysis techniques which have been developed for DC circuits to circuits with time varying sources, by introducing appropriate mathematical tools such as phasor representations, Laplace and Fourier transforms, which yield complex or frequency domain representation of electrical signals. The concepts and techniques we will develop in this course will constitute a foundation for many disciplines in electrical engineering.

Prerequisite: Circuit Theory I.
Textbook: J. M. Nilsson and S. A. Riedel. *Electric Circuits, 9th Edition,* Pearson Prentice Hall.
Supplementary Material: L. O. Chua, C. A. Desoer, E. S. Kuo. *Linear and Nonlinear Circuits.* McGraw Hill, 1987.

CLASS POLICIES

Attendance: The attendance to lectures and the problem sessions is automatically assumed, and not formally recorded. However, be advised that your attendance to the class will be indirectly assessed by frequent pop-up quizzes. Also, please note that your attendance to the lectures and problem sessions, and your participation in the in-class discussions may be taken into account in determining your overall letter grade in situations involving borderline decisions.

Homeworks: There will be quasi-weekly homework sets consisting of problems which target the timely practice of the covered course material. Solutions to homework problems will be provided for feedback, but the homeworks will not directly contribute to the final grade. However, each student's attempt on homework problems will be tested by frequent quizzes on homework problems.

Quizzes: There will be five (5) unannounced quizzes throughout the semester The quizzes will test either the topics recently covered in class, or your work on the homework problems that have already been turned in, or your understanding of the reading materials that will be regularly assigned before each class. **Please note that some of the quizzes may and most likely will be conducted during problem sessions**.

Problem Sessions: The problem sessions are an essential part of the course, where sample problems regarding the topics covered in class, and selected homework problems will be solved. You will also receive some basic instructions on how to use Pspice in your projects, during problem sessions. Note that may take place in the problem sessions, followed by their solutions.

Projects: There will be one project, worth 10% of your overall grade, in which you will design and analyze circuits using PSpice. The projects should be entirely your work, academic dishonesty will be harshly penalized.

Exams: There will be two midterms (%20 each) and one final (%25) exam. Some of the exams may be open book, in which case you will only be allowed to bring an **original** copy of the mandatory text book. Attempt to use any other document will be considered as academic dishonesty (see below). In case an open book exam is

administered, writing problem solutions, formulas, or notes on the textbook will not be allowed, and will also be treated as cheating. Your books will be checked before open book examinations. Use of cellular phones is strictly prohibited in any of the examinations.

Exam Dates and Grading Policy:

Quizzes	25%	: Pop-quizzes, 5% each, dates will not be announced.
Midterm I	20%	: Thursday, March 26th, during class.
Midterm II	20%	: Tuesday, Apr 28th, during class.
Project	10%	: Dates to be announced.
Final	25%	: To be announced.

Your letter grade will be determined by fitting the overall class performance to a 'curve'. However, **the passing grade will be no lower than 30/100**, and may actually be set to be higher depending on the class average, at the instructor's discretion.

Course Evaluation:

Course evaluation will be conducted in May. Please make sure you attend the class on this date. Your opinions and feedback about the course and the instructor are very valuable for the continuous improvement of our program.

Make-up Policy:

There will not be any make-ups for the quizzes. In the event of failure to attend <u>at most one</u> of the quizzes due to emergency situations, formally documented medical excuses or other exceptional circumstances may be accepted, in which case your final grade will be determined by suitably projecting of all of your remaining quiz grades. Excuses for more than one quiz will not be accepted.

There will not be a make-up for the midterms. If you are able to formally document your excuse, and it is accepted, your final exam grade will be projected to constitute %45 (or %65, if you miss both midterms) of your overall grade.

Note that, in case of illness, medical reports should be taken from, or approved by a state hospital, and should be valid for **at least three** days.

Make-up policy for the final exam will follow the university rules and regulations.

Academic Dishonesty: Cheating, attempting to cheat, facilitation of cheating, fabrication of information, plagiarism and illegal use of copyrighted material are considered acts of academic dishonesty. Students conducting any of these acts will receive an automatic F from this course, and will face suspension/expulsion from the program, according to university rules and regulations.

Topics:

Below is the list of topics that will be covered in the course, along with a tentative schedule.

Week 1	Sinusoidal sources, phasor representations, characteristics of circuit elements in
	frequency domain, impedance and reactance. Kirchoff's laws. Techniques of
	circuit analysis in the frequency domain.
Week 2	Transformers. Power calculations for circuits with sinusoidal sources.
Week 3	Three phase circuits
Week 4	Laplace transform, its properties, inverse Laplace transform.
Week 5	Analysis of time varying circuits using Laplace transform, s-domain
	representation of circuit elements, the transfer function.
Week 6	The convolution integral, using the transfer function to find steady state
	sinusoidal responses, impulse functions in circuit analysis.
Week 7	Frequency selective circuits, frequency response plots. Review.
Mar 26 th	MIDTERM I, in class.
Week 8	Concept of filtering, lowpass and highpass filters.
Week 9	Bandpass and bandstop filters, active filter circuits.
Week 10	Active filter and higher order filter design.
Week 11	Butterworth and Chebyshev filter design.
Apr 28 th	MIDTERM II, in class.
Week 12	Fourier series representation of periodic functions.
Week 13	The Fourier transform.
Week 14	Two port analysis.