Course number
ENGR3499

Course title
Special Topics in Electrical and Computer Engineering: Nonlinear Circuit Analysis

Semester(s) covered
Fall 2009

Instructor
José Oscar Mur-Miranda, jomm@olin.edu, (781)292-2544

Designation as ‘required’ or ‘elective’ course
Elective electrical and computer engineering concentration

Course (catalog) description
Nonlinear circuits are commonly used in the design of electrical systems. Examples include sinusoidal generators, relaxation oscillators, power supplies, DC-DC converters, and signal transducers. Students will characterize the behavior of several of these circuits using state-space tools together with linear circuit theory. The results will be used to design physical implementations. Emphasis will be placed on the validation of theory using empirical data.

Prerequisites
ENGR 2420 (Introduction to Microelectronic Circuits) or permission from the instructor.

Textbook(s) and/or other required material
The course does not require any textbook. The books below are optional. All books are available in the library.


Course website
http://faculty.olin.edu/jmurmiranda/nonlincktssf09.htm

Course objectives
By the end of the course, the students should be able to:

- Model and analyze nonlinear circuit elements.
- Analyze networks containing nonlinear elements.
- Validate circuit models using empirical data.
Topics covered
See the separate document detailing the topics covered.

Class/laboratory schedule and location
MR 3 pm-4:50 pm in AC304

Relationship of course to program outcomes (Olin competencies) and method of assessment
Extensive development (5) of Quantitative Analysis and Diagnosis at an advanced level will be assessed through in and out of class problems and/or laboratories.

Policies
- Laptops cannot be open during class unless explicitly allowed.
- Students are responsible for any material that they miss.
- Students are responsible for seeking the instructor in case of any need.
- The final grade will be based on the assigned deliverables, and the student’s professionalism. Professionalism includes handing work on time, being an active participant in class, and maintaining a positive attitude conducive to learning. In particular, the burden of clarity is on the communicator. If a deliverable is unintelligible, it will be assessed as incorrect. Visual communication will be emphasized. Neat, handwritten graphs and illustrations are allowed, but a generic library of circuit diagrams for the free, open source vector graphics program Inkscape (www.inkscape.org) is available in the course website.
- Students are encouraged to work together but the final deliverable is individual and must represent the student’s own understanding. Furthermore, each student must construct his or her own circuit.
- The format for circuit assignments includes: Analysis, Experimentation, and Validation. Quantitative analysis is required, and debugging circuits are integral parts of the course experience. Students working together with multiple copies of the same circuit will help to minimize debugging time.
- Students are expected to work with the instructor to insure that they have the necessary materials to do the experimental work.

Person(s) who prepared this description
José Oscar Mur-Miranda

Date of preparation
August 24, 2009