Rutgers University, Department of Electrical and Computer Engineering
ABET COURSE SYLLABUS
COURSE: 14:332:223

Course Catalog Description: 14:332:223 - Principles of Electrical Engineering I Laboratory (1) Experimental exercises in use of laboratory instruments. Voltage, current, impedance, frequency, and waveform measurements. Rudiments of circuit modeling and design.

Pre-Requisite Courses: 01:640:152

Co-Requisite Courses: 01:640:251 and 14:332:221

Pre-Requisite by Topic:
1. Electricity and Magnetism
2. Solution of linear algebraic equations
3. Matrix operations and inverse of a matrix
4. Complex variables
5. Differential calculus
6. Integral calculus

Textbook & Materials: Laboratory Manual supplied by the instructor

References: *MatLab: Student Version*, Current Edition, The MathWorks, Inc..

Overall Educational Objective:
1. To develop skills in using electric equipment, meters, multi-meters, power supplies, oscilloscopes and counters
2. To study the behavior of some specified circuits
3. To use computers in order to obtain the solution of some specified circuits
4. Tutorial study of circuit analysis methods (self study based on computer software)

Course Learning Outcomes: A student who successfully fulfills the course requirements will have demonstrated:

1. an ability to operate basic laboratory equipment.
2. an ability to make voltage, current, impedance, transient, and frequency response measurements.
3. an ability to layout, wire, and troubleshoot electrical circuits.
4. an ability to design operational amplifier circuits from a set of specifications.
5. an ability to keep a laboratory notebook and prepare a formal laboratory report.

How Course Outcomes are Assessed:
Presence in laboratory (35 %)
Laboratory experimental reports (65 %)

N = none S = Supportive H = highly related

Outcome	Level	Proficiency assessed by

(a) an ability to apply knowledge of Mathematics, science, and engineering	H	Laboratory reports
(b) an ability to design and conduct experiments and interpret data	H	Laboratory reports
(c) an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	S	Setting up experiments
(d) an ability to function as part of a multi-disciplinary team	H	Each Experiment done by a team
(e) an ability to identify, formulate, and solve ECE problems	S	Performing laboratory experiments
(f) an understanding of professional and ethical responsibility	S	Conducting the experiments and reporting the results
(g) an ability to communicate in written and oral form	H	Laboratory reports
(h) the broad education necessary to understand the impact of electrical and computer engineering solutions in a global, economic, environmental, and societal context	N	
(i) a recognition of the need for, and an ability to engage in life-long learning	S	Reports written at home
(j) a knowledge of contemporary issues	N	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for electrical and computer engineering practice	H	Laboratory reports
Basic disciplines in Electrical Engineering	H	Laboratory reports
Depth in Electrical Engineering	S	Laboratory reports
Basic disciplines in Computer Engineering	N	
Depth in Computer Engineering	N	
Laboratory equipment and software tools	H	Performing laboratory experiments
Variety of instruction formats	S	office hour discussions

Topics covered week by week: **Experiments**

Weeks 1, 2, and 3: Introduction to (a) Multisim, (b) P-Spice, and (c) Matlab
Weeks 4 and 5: Study of Power Supplies, and Simple circuit experiments
Weeks 6 and 7: Study of function generators, and oscilloscopes
Weeks 8 and 9: Proportionality, Superposition, Thévenin, and Maximum Power Transfer theorems
Weeks 10 and 11: Study of operational amplifier circuits
Weeks 12 and 13: Sinusoidal steady state analysis: Integrating and differentiating amplifiers, and operational amplifiers in AC Steady state analysis
Weeks 14- 16: Review and preparation for final exams

Computer Usage: Students use the computer circuit-simulation program P-*Spice* and Matlab to prepare laboratory reports.

Design Experiences: Moderate design experience in arriving at circuits on which experiments are conducted.

Independent Learning Experiences: 1. Writing laboratory reports

Contribution to the Professional Component:
(a) College-level mathematics and basic sciences: 0.25 credit hours
(b) Engineering Topics (Science and/or Design): 0.75 credit hours
(c) General Education: 0 credit hours
Total credits: 1
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