Fall 2018

ECE 392 - Electrical Engineering Laboratory II

Marek Sosnowski

ECE 392 ABET Course Syllabus

1. Course number and name **ECE 392 Electrical Engineering Laboratory II**

2. Credits and contact hours
2 credits, 3 contact hours

3. Course coordinator's name Marek Sosnowski

4. Text book, title, author and year
Laboratory Manual for ECE 392 (on ECE laboratory website)

4a. other supplemental materials
Nilsson, J.W. and Riedel, S.A., *Electric Circuits, 9th Edition*, Pearson Prentice Hall, Upper Saddle River, NJ, 2011

5. Specific course information

5a. brief description of the content of the course
Laboratory work in some of the areas covered in ECE 271 and ECE 372. Covers the practical design and testing of electrical and electronic circuits. Introduces engineering design and measurement concepts by the use of selected design projects. Design, construct and test electronic circuits using semiconductor components. Use of Multisim/PSpice for solving dc, ac and transient problems on the personal computer.

5b. prerequisites ECE 291, ECE 271

5c. Course required in EE program

6. Specific goals for the course

6a. specific outcomes of instruction

Students are able to:

(1) Use FET transistor to build a constant current source and a variable resistor.
(2) Build Emitter Follower circuit with a BJT transistor
(3) Design the Common Emitter Amplifier with specific gain.
(4) Design and build active low pass and high pass filters using operational amplifiers.
(5) Design and build sine wave oscillator using an operational amplifier with positive feedback. Distinguish operational characteristics of logic TTL and CMOS gates.
(6) Complete a circuit project based on own design and methods learned in this laboratory.

6b. ABET Criterion 3 student outcomes addressed by the course

(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(g) an ability to communicate effectively
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

ABET Criterion 3 student outcomes	Course learning outcomes
b	1 – 6
g	1 – 6 (laboratory reports)
k	1 – 6 (experiments)

7. Topics to be covered

The course follows Laboratory Manual, which describes the following experiments:

1. Experiments I Basic Electronic Instruments; The Oscilloscope
2. Experiments II Basic circuit laws; dc
3. Experiments III Internal impedance of instruments; influence of instruments on circuits
4. Experiments IV Digital oscilloscope; oscilloscope input impedance and the scope probe
5. Experiments V AC measurements; amplitude and phase
6. Experiments VI Resonance circuits
7. Experiments VII RC circuits. Passive filters.
8. Experiments VIII The diode and diode circuits
9. Experiments IX The bipolar transistor; DC Operation and Switching.
10. Experiments X Transistor; Emitter Follower.
11. Experiments XI Operational amplifiers.

ECE 392 COURSE POLICY

Instructor: *Kenneth S. Sohn, Professor, sohn@njit.edu*

Office hours: *1:30 pm to 2:30 pm*

Text: *Manual for electrical engineering laboratory 1- ECE 291* by M. Sosnowski available on the ECE Department Laboratory web page (http://coefs2.njit.edu)

Students in the laboratory work in teams of with maximum three students.

Attendance

A laboratory is a practical experience requiring proper equipment and involving teamwork. Therefore, attendance at all laboratory sessions is required. Students who miss a laboratory session must make up for it at the first opportunity and arrange it with the instructor. It is easiest to arrange a make-up session during regular meetings of other laboratory sections. A student absent at a regular lab session has to make his or her measurements and not use the data obtained by the group partner.

Laboratory Notebook

Students are required to have a Laboratory Notebook which should have current record of laboratory procedures, schematics and data. Prior to every lab session you should enter in the notebook a brief plan of experimental tasks, including schematic and other relevant information. Each entry in the notebook must be dated.
The Laboratory Notebook provides documentation of your experimental work and will be reviewed by the instructor and used for evaluating your performance. Show your notebook to the instructor at the end of every lab session before leaving.

Deliverables

Pre-laboratory assignments precede **e**ach set of experiments, which prepares you for work in the laboratory. *Prelabs* are completed at home by each student individually and are to be handed to the instructor prior to doing the experimental work. Besides entry of the experimental plan in the notebook the *prelabs* usually consist of simulations and schematics of the experimental design.

Laboratory Reports are prepared by each group of students, who have worked together on experiments, after all measurements and analysis are completed.
Professional style reports are expected at this upper level laboratory. Reports should be typed and have the standard properly filled cover page. All pages must be numbered and all figures and graphs must have captions and numbers. The axes of the graphs must be labeled and the units indicated. Schematics of all circuits should be included and the conditions under which data were obtained (such as input voltage, frequency etc.) must be clearly indicated.

Divide report in numbered sections starting with *Introduction*, which states briefly the objectives of the experiment. Follow with *Experimental Procedures*, describing the experimental setup. Next is *Experimental Data*, followed by *Discussion*, which includes data analysis, derivation of parameters and comparison with simulations. You may include a separate *Simulations* section if it is justified by its size. Finally, a very important section *Conclusions*, in which you should briefly comment on the results and their agreement (or not) with your expectations or modeling.

Simulation software: PSPICE or MULTISIM **(preferred**), graphing: MS EXCEL, MATLAB or other.

GRADING POLICY:

The course grade is based on the average grade of all experiments. Each experiment grade consist of the following elements:

1. Preparation for the experiments including P*relab* assignment 15 %
2. Laboratory Report:
    a) Quality of presentation and format 15 %
    b) Experimental data 40 %
    c) Analysis simulations and discussion 30 %

The grade of an individual student may be lower than for the rest of the team based on poor attendance or participation in the laboratory.

The instructor may modify the above as he or she sees fit.

NJIT Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students.