

## ECE 291 ABET Course Syllabus

1. *Course number and name* **ECE 291 Electrical Engineering Laboratory I**

2. *Credits and contact hours* 1 credits, 3 contact hours

3. *Course coordinator's name* Marek Sosnowski

4. *Text book, title, author and year*

Laboratory Manual for ECE 291 (on ECE laboratory website)

4a. *other supplemental materials*

Nilsson, J.W. and Riedel, S.A., *Electric Circuits, 9<sup>th</sup> 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 the areas covered in ECE 231, ECE 232. Emphasizes the construction, testing and analysis of analog circuits. Emphasizes basic measurement techniques and instrumentation. Use of Multisim/PSpice for solving dc, ac and transient problems on the personal computer.

5b. *prerequisites* ECE 231, HSS 101, *co-requisites:* ECE 232

5c. Course required in EE and COE programs

6. *Specific goals for the course*

6a. *specific outcomes of instruction*

Students will be able to:

- (1) Use basic electronic instruments (DC power supply, waveform generator, multimeter, and analog and digital oscilloscopes)
- (2) Wire circuits on a protoboard and test their performance using instruments in (1).
- (3) Verify experimentally basic circuits laws (Ohm's, Kirchhoff's') and explain differences between theoretical and measured values.
- (4) Measure amplitude and phase of sinusoidal signals on components of RC and RLC circuits.
- (5) Measure parameters of passive resonance circuits and filters.
- (6) Measure characteristics of semiconductor diodes, including Zener diode with forward and reverse bias.
- (7) Demonstrate DC and switching operation of bipolar and MOS transistors.
- (8) Wire and test inverting and noninverting operational amplifiers.

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

(3) an ability to communicate effectively with a range of audiences

(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

*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 291 COURSE POLICY

**Instructor:** Hieu Pham Trung Nguyen, [hieu.p.nguyen@njit.edu](mailto:hieu.p.nguyen@njit.edu)

**Office hours:** Monday :3:00PM - 4:00PM, Room ECEC 309  
Thursday :3:00PM - 4:00PM, Room ECEC 309  
and by appointment

**Class meetings:** Thursday :8:30AM – 11:25AM, Room FMH 204

**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 each 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 Quiz or *Prelab* 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.

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