



Prince Mohammad Bin Fahd University

Electrical Engineering Department

Syllabus & Report Format

EEEN 3422 - Electronics II Lab

Spring 2013

Version 2.0

February 2013

Course Overview:

In Electronics II Lab students investigate amplifier frequency response and bandwidth, feedback amplifier, opamp characteristics and applications, analog filters, signal generators and data converters (A/D, D/A). In addition, to experimental measurement procedures and use of hardware instrumentation, students learn important circuit design skills, data analysis, team work and communication skills.

Course Objectives:

- Use lab instruments to measure and investigate amplifier frequency response
- Measure operational amplifier properties and application circuits.
- Measure and investigate filter, oscillator, A/D and D/A circuit characteristics.
- Design, build and analyze different analog circuits including filter, oscillator, and converter (A/D, D/A) circuits.
- Use Software tools to simulate electronic circuits, analyze experimental data and prepare Laboratory reports.

Pre-requisites: EEEN3421

Lab Manual:

Electronic Devices and Circuit Theory, R. L. Boylestad, L. Nashelsky and F. J. Monssen, 11th Ed., Pearson Education Inc. 2013.

Grading Policy:

Attendance	10%	Quizzes*	10%
Lab Work	20%	Midterm Exam	20%
Lab Report	20%	Lab Final	20%

* - There will be a quiz at the beginning of each lab session. These quizzes will be based on the lab experiment to be conducted on the day.

Schedule of Experiments

Week		Laboratory Experiments	Manual Ref.
2	L0	INTRODUCTORY LAB: Lab Policy, Instruments and Simulation Tools	Handout
3	L1	FREQUENCY RESPONSE: Simulation: BJT CE, BJT Cascade (CC+CE)	E25 pp. 329-
4	L2	FREQUENCY RESPONSE: Amplifier Frequency response measurement	E25 pp. 329-
5	L3	OPAMP BIASING AND INPUT STAGE: Current Mirrors and Differential Amplifier (BJT), (Meas+ Sim)	E24 pp. 321- E27 pp. 351-
6	L4	OPAMP OUTPUT STAGE: Power Amplifier and output stages: BJT Class A, B, AB (Meas+ Sim)	E26 pp. 339-
7	L5	OPAMP CHARACTERISTICS Opamp offset, bandwidth, slew rate, CMRR (Meas. + Sim)	E28 pp. 369
8		MIDTERM EXAM	
9	L6	OPAMP APPLICATIONS/ Inverting, noninv, Summing, Integrator, comparator (Meas. + Sim)	E29 pp. 377 E31 pp. 401
10	L7	FEEDBACK: Feedback Amplifier, application to audio distortion reduction	Handout
11	L8	FILTERS: Active filter transfer characteristics (Meas. + Sim)	E30 pp. 389-
12	L9	SIGNAL GENERATORS: Wein bridge, phase shift oscillators, timer, (Meas. + Sim)	E32 pp. 411- E33 pp. 419-
13	L10	CONVERTERS: Analog to Digital (A/D) and Digital to Analog (D/A) conversion	Handout
14		FREE LAB: Practice for Final, project testing	
15		LAB FINAL	

Lab Rules & Policies

- You must attend and complete all experiments. Be on time.
- Read the lab manual carefully to understand the objectives of the experiment and the procedure to perform the experiment beforehand.
- Complete any required pre-lab exercises before you come to the lab.
 - Prepare a pre-lab report and bring a hardcopy to the lab.
- If you come prepared to the lab, it will also take you less time to complete an experiment.
- Always bring a hard copy of the lab manual with you.

- If you are absent for an experiment without an official excuse, you will not get any grade for that experiment.
- There is no makeup for any experiment you miss unless you have an official excuse.
- After you complete an experiment, you must disconnect the circuit and put components, measuring instruments, etc. back in their original places. Not doing so may result in grade penalties.
- Lab report must be prepared according to the required format.
- Lab report must be submitted no later than one week after the experiment.
- Experiments are performed in a group of not more than 2 students.
- Each student will take turns in writing lab reports.
- Any groups involved in **copying** lab report and/or lab results will receive **zero grade**. Those **sharing** their results or report with other groups will also receive **zero grade**.

Report Format:

The lab reports are intended to serve two equally important objectives. They demonstrate not only your technical comprehension of the topics addressed in the experiment, but also your ability to present and discuss your results in a clear and concise manner. Your report will be graded on these two aspects.

The required format for your lab report is given below.

1. **Cover page:** include a cover page (see sample)
2. **Objectives:** State clearly the objectives of the experiment. Do not copy the objectives word-for-word from the lab manual.
3. **Equipment and components:** List all the equipment and components used in the experiment.
4. **Introduction:** Provide the necessary background to the lab including the overall lab objectives, design specifications and approach.
5. **Theoretical Results/Simulations:** For *each subsection* of the lab, you should obtain the expected results theoretically or through simulations. This will guide you as you perform the experiment and help you to avoid mistakes. During the experiment, you can compare your theoretical/calculated values with the measured values. If these values are very different then you might have done something wrong, not followed the procedure correctly or there may be a problem with the hardware/circuit.
6. **Procedure:** For *each subsection* of the lab, explain the following:

- (a) Step-by-step description of what you did. Include as many details as possible (in your own words; do not copy from the lab manual).
- (b) All necessary calculations as well as design/circuit diagrams. Please make sure your figures are clear and well labeled.

7. **Results and Analysis:** For *each subsection* of the lab:

- (a) State the principal results and discuss them. Compare all measured results with what was theoretically expected/estimated from pre-lab exercise and explain any differences.
- (b) Tabulate your data and produce necessary plots. Analyze the data and/or plots and make comments. **Answer all questions given in the lab manual.**
- (c) Conclude each subsection by commenting on whether the objectives of that section were met or not.

8. **Conclusions:** Restate the main objectives and to what degree they were achieved. What principles, laws and/or theory were validated by the experiment? Also discuss things that went wrong (if any) and how they can be improved upon. Describe some applications of your results.

Cover Page: Your lab report must have a cover page with the following information:

- Name of department and university
- Course name and title
- Experiment number and title
- Names and IDs of group members
- Lab section number, day and time
- Date of submission
- Instructor name

See next page for a sample cover page.

Department of Electrical Engineering

Prince Mohammad University

EEEN3422 Electronics I Lab

LABORATORY REPORT

Experiment #1: Semiconductor Diodes

Prepared by:

Abdullah - 201010101

Osama - 201010102

Date Experiment Performed: 15/4/2012

Date Report Submitted: 22/4/2012

Lab Section 2, Monday 9 AM to 11:50 AM

Instructor: Mr. Muhammad Omer