ECE 206L
Instrumentation

Overview

Course Catalog Description: Introduction to laboratory practices and the use of test equipment. Measurements on basic electrical components, dc and ac circuits using ohmmeters, voltmeters, ammeters and oscilloscopes. Circuit simulation. Prerequisites: 203L and ENGL 102.

Prerequisites: C- or better in ECE 203 and C or better in English 102.

Textbook: Student Reference Manual – S. Wolf and R.F.M. Smith
ISBN: 0-13-042182-0 Second Edition

Class Goals: This Instrumentation Lab will introduce students to basic electrical elements and sources and provide practical applications for the circuit theory learned during the lecture. Students will learn and use physical laws, such as Ohm's and Kirchhoff's, to create and test the variables of simple circuits in a controlled lab setting. The dynamics of first-order and three-phase circuits, resistive networks, node, and loop analysis, sinusoidal sources, and network theorems are some of the points covered during this course.

Course Coordinator: Professor Chaouki T. Abdallah

Table I: Objectives, Implementation, and Assessment

Objectives		Implementation	Assessment	A	B	C	D	E	F	G	H	I	J	K
O_1	Understand basic AC steady state circuit analysis	2-1/2 hrs. lecture in first week (review)	HW 1, Exam I	X				X						
O_2	Understand AC steady state power (single phase)	2.5 hrs. lecture in 2nd week	HW 2, Exam I	X				X						
O_3	Understand three phase power circuit analysis with balanced loads	5 hrs. lecture in weeks 3,4	HW 3 Exam II	X				X						X
O_4	Understand variable frequency performance of linear networks, Bode plots, linear scaling	5 hrs lecture in weeks 5,6	HW 4,5 Exams II, III	X				X						X
O_5	Understand linear frequency filter networks	2.5 hrs lecture in week 7, term paper assignment	HW 5, Term paper Exam III	X				X		X				X

O_6	Understand Laplace transforms and their applications to linear circuit analysis	7.5 hrs lecture in weeks 8,9,10	HW 5,6, Exam III	X				X						X
O_7	Understand Fourier series, Fourier transform, and their application to linear circuits	7.5 hrs lecture weeks 12,13,14	HW 7, Exam III	X						X				X
O_8	Understand basics of state variable analysis	2.5 hrs lecture weeks 15, 16	HW 8,Final Exam	X						X				X

Table II: Expectation and Assessment Outcome
Fall 2008, Mike S. Majedi

Contents: **ECE 206L-Instrumentation (2 credits)**

Laboratory experiments in basic electrical measurements, D.C., A.C., circuits, and simple transients.

Practical Experience and Skills: (Electronics Laboratory Safety and Procedures, Standard Laboratory Instrumentation, Circuit Simulation Tools, Breadboarding, Automated Testing and LabView Applications, Technical Report Writing)

1 lecture, 3 hrs. Lab. {fall, spring}

1- Lectures: Chapters 1 – 15, Textbook

2- Lab. Experiments:

1) **Laboratory Safety and Orientation. (Starting 09/15/2008)**
2) **Introduction to LabVIEW**
3) **Introduction to Multisim**
4) **Introduction to ELVIS**
5) **Basic Electrical Measurements.**
6) **Oscilloscope and Signal Generator Use I**
7) **Oscilloscope and Signal Generator Use II**
8) **Introduction to Circuit Simulation with Multisim.**
9) **LM741 Operational Amplifier I &II.**
10) **RLC Circuits.**
11) **LM555 Timer/Oscillator Application Circuits.**
12) **Transistor Amplifier Design**

3- Lab Reports:

Lab Report Format

The reports need to be typed on standard 81/2X11 papers, double-sided, double –spaced and using fonts no larger than 12pts. The page limits for ECE 206 L labs. reports is 10 pages (Not including the attachments)

The final lab. reports need to be turned in to the student's assigned teaching assistant. The reports need to be submitted no later than five days after the completion of the respective lab. experiment.

The final reports should be prepared according to the following guidelines:

1 – Title Page: Course, Semester, Title of the Experiment or Project, Students' Names, Date the experiment was performed or the project demonstrated, Date of Report, Total number of pages

2 – Table of Contents

3 – List of Figures

4 – List of Tables

5 – Abstract – (200 words)

6 – Background: Theory and Literature Survey (Two pages Maximum)

7 – Theoretical Analysis and Calculations (Two pages maximum)

8 – Computer Simulation Results (Two pages maximum)

9 – Lab. Procedure and List of the Equipment and Parts List (Two pages maximum)

10 – Implementation, Measurement, and Verification Results

11 - Discussions – comparison of the theoretical analysis, computer simulation, and measurement and testing results.

12 – Attachments

4- Grading:

Assignment	Schedule	Points
Lab. Performance	**Weekly**	**30%**
Lab. Experiment Reports	**Weekly**	**50%**
Class Quiz	**Weekly**	**20%**

Academic Integrity: Academic dishonesty will not be tolerated. All cases of cheating and plagiarism will be reported to the Dean of Students office for disciplinary action. UNM academic policies are described in the section "General Academic Regulations" in the course catalogue: http://registrar.unm.edu/Catalogs/2008-09Catalog.pdf .

Also see the handout on academic integrity from the UNM English department: http://www.unm.edu/~english/Resources/pdf/Academic_Integrity_students.pdf. If you have any questions about academic practices that are and are not acceptable, come speak with me.

Holidays (no class): Thurs Oct 16 (Fall Break), Thurs Nov 27 (Thanksgiving)

Tips for Success in this (and any) Class:

1. Come to class! (In the worst case, it can't hurt!)
2. Do all the reading
3. Work problems beyond those given for homework (examples in the text and other books, problems online, etc)

Objectives		Outcome Assessment	Evaluation
O_1	Understand basic AC steady state circuit analysis	87.5 % of students completed HW 1 satisfactorily. Avg. on Exam I was 63.5%, with 37.5% scoring 70% or better	Some students did not grasp basic concepts adequately
O_2	Understand AC steady state power (single phase)	77 % of students completed 100% of exercise in HW 2. Avg. on Exam I was 63.5%, with 37.5% scoring 70% or better	Some students did not grasp basic concepts adequately.
O_3	Understand three phase power circuit analysis with balanced loads	88% of the students completed HW 3 satisfactorily. Avg. on Exam II was 72.4%, with 53.5% scoring 70% or better	More students appeared to grasp basic concepts. Fewer very low test scores.
O_4	Understand variable frequency performance of linear networks, Bode plots, linear scaling	93% of the students completed HW 4 satisfactorily.	
O_5	Understand linear frequency filter networks		
O_6	Understand Laplace transforms and their applications to linear circuit analysis		
O_7	Understand Fourier series, Fourier transform, and their application to linear circuits		

O_8	Understand basics of state variable analysis		