

EE 111 Introduction to Electrical and Computer Engineering – (4 credits)
Fall 2008
Klipsch School of Electrical and Computer Engineering
College of Engineering
New Mexico State University

Instructor and Class Information: This is the last semester EE 111 will be offered

Date, time: Section 1: 10:30 – 11:20 AM MWF T&B 204

Labs: Laboratory class (150 minutes/week) is required
Labs are held in T&B 102. Labs will begin the week of August 25.
Sec. M1B 1:10 PM – 3:40 PM Tuesday
Sec. M1C 2:30 PM – 5:00 PM Wednesday

Instructor: Dr. Sheila Horan; Office: Thomas and Brown T&B 107
(inside the main EE office)

Office Hours: Mondays 1:00 – 4:00 PM
Wednesdays 1:00 – 2:00 PM
Thursdays 1:30 – 3:00 PM
Fridays 8:30 – 10:00 AM
Or by appointment. Drops ins are welcome when door is open
For appointment times, see the instructor's schedule

Phone: NMSU – Las Cruces (505) 646-6288; fax: (505) 646-1435

E-Mail: sheila@nmsu.edu

Course Description from the Undergraduate Course Catalog:

Electric component descriptions and equations. Kirchoff's voltage and current laws, formulation and solution of DC network equations. Computer building blocks and electronics projects. (4 credits)

Co requisite: Math 191. Students need algebra skills including matrices and determinants.

Textbook and other Required Materials:

Engineering Circuit Analysis, W.H. Hayt, J.E. Kemmerly, S.M. Durbin, 7th edition, McGraw Hill, 2007.
Web link www.mhhe.com/hayt6e This will give access to chapter outlines, overviews, tutorials, and virtual professor.

The laboratory will require several materials (see list later in the syllabus). All materials will be provided except for 2 protoboards and what you need for your project. Materials can be purchased from online sources (see course website), or from Radio Shack but are only needed for the project. The protoboards can be purchased from the EE office (T&B 106) (afternoons 1-5 PM).

There is a class web site consisting of a summary of what was done in class (calendar), tutorials, current grades and course syllabus, practice tests, and a bulletin board. The web address is:

<http://salsa.nmsu.edu>

WebCT longon: user id: webct431 and password: trainme or with your own id & pswd

To use the online materials you will need: Microsoft Word, Power Point, Adobe Acrobat, Java, and an NMSU email account

Communication with students: All NMSU students are required to have an NMSU email. NMSU has made it a policy that official notification will be made via email. I will also contact you via your email account and/or webct account. You can have your email forwarded to a different address if you want – but that will be your responsibility. ITC can be of assistance with technical matters.

Course Objectives:

1. To use Ohm's Law, Kirchoff's voltage and current laws to analyze circuits.
2. To solve basic circuit problems using nodal and mesh analysis, superposition, and equivalent circuits (using circuit reductions, source transforms and Thevenin equivalence techniques).
3. To apply the basic tools used in electrical engineering, and show how to use these tools consisting of O-scopes, multi-meters, power supplies, function generators, breadboards, soldering irons, and electronic components to make measurements of voltage, current, resistance, and frequency
4. To use Op Amps in a circuit and be able to analyze the circuit using the ideal Op Amp model.
5. To expose students to the code of engineering ethics.
6. To offer the student an opportunity to display his/her competency in both course work, laboratory procedures and problem solving skills by doing in-lab demonstrations and presentations.

Contribution of EE 111 to Meeting the Professional Component:

This course lays the foundation for the electrical engineering curriculum. In this class, students will experience applications of concepts learned in the classroom. They will learn through hands on experience how to build circuits, analyze them, and do basic design. These basic concepts lay the groundwork for more advanced circuit and system analysis techniques that they will explore in later classes and use in their workplace. The basic design problems encountered here help pave the way toward their ultimate design class – the capstone course. By forming teams in the lab, students begin their preparation to work in inter-disciplinary teams. This course consists of four credits of engineering topics.

Relationship of the course to program objectives:

The educational program objectives of the Department of Electrical and Computer Engineering are to provide students the broad educational background and skills necessary for a successful, fulfilling and life long career in electrical and computer engineering. To assist in supporting these objectives, EE 111 provides the students a solid introduction into circuit analysis, which forms the basis for their continued development as electrical engineers. Through the use of our laboratory, students will be exposed to the theory and applications of the circuits they analyze and build. The students learn to work together and learn from each other as they work on various homework and lab problems.

Grading:

Grades will be based on 100 points, where points are given for class exams, homework, quizzes, laboratory exercises and the lab project. The exams will be graded on a scale of 0-100. **No electronic** devices will be allowed on the tests. Each homework problem, quiz and lab will be graded on a scale of 0-10. The lab project will count 20 points toward the lab grade, and will include a presentation and a written report (10 points each). The lab will also include at least one quiz counting 10 points each toward your lab grade, and pre-labs which count 5 points each.

Failure to pass the voltage division design and measurement quiz by the project presentation dates will result in Failing the course.

Each form of evaluation will be averaged and then will contribute the following number of points to your total grade:

20	In-class tests	$A \geq 90$
20	Final Exam	$80 \leq B < 90$
15	Homework	$70 \leq C < 80$
15	Quizzes	$60 \leq D < 70$
30	Laboratory	

In addition, you will be expected to:

1. Attend one engineering related student meeting (IEEE, SWE, SHPE, etc), or a capstone or thesis presentation by December 12, 2008
2. Participate in one service activity – preferably an on campus one by December 12, 2008
3. Come to my office at least twice during the semester.
 - a. The first time needs to be by September 5, so I can take your picture.
 - b. The second visit will be to work a homework problem (of my choice) on the blackboard in my office. (Students may start coming in for this after September 10, and must have this completed by December 5, 2008)

Failure to do the above will result in the lowering of your final grade by one letter grade.

If you require different ways of evaluating your knowledge, the student must discuss this with the instructor by the last day to add classes.

The tests/exam will be given on the following dates (approximately):

Test 1:	Friday, September 26, 2008
Test 2:	Monday, October 27, 2008
Final Exam:	December 8, 2008 from 10:30 AM- 12:30 PM

Each exam will emphasize the areas indicated on the next page, but will also be cumulative. The material in EE 111 builds on what we have already discussed. No calculators or any electronic devices will be allowed in the classroom during the exams. Student standing will be available on the WebCT.

Homework will be given out weekly. It will be assigned on Fridays and turned in the following Friday at the beginning of class. Homework grades will be based on how well you communicate (i.e. state the problem, explain your steps, verify the soundness of your solution – see the enclosed Rubric), and how accurate your answers are. If you set up a problem well, explain the steps toward your solution, and defend it, then you will receive half credit even if the answer is wrong. Neatness does count. It is important that you write so that others can understand your work. If your work is not legible, your work will not be graded and will be returned to you.

Late Work:

No late homework will be accepted without prior consent from the instructor, or a signed medical excuse.

No late quizzes will be given. If you miss the quiz, (medical excuse excepted) you will receive a zero for that quiz. The only exception to this is the first quiz, but this needs to be made up by the second week of school.

Student Conduct:

Students are expected to come to class prepared, on time, and are expected to participate in the class; however, attendance will not contribute directly to your grade. Any work missed is the responsibility of the student. If work is missed, make-up work will only be accepted with a medical excuse, under extreme circumstances, or if arrangements are made ahead of time. Students will not automatically be dropped from the class. It is the students' responsibility to handle their schedule and withdraw from class if they need to do so. I will not hesitate to give an F if a student has earned it. The last day to drop with a W is October 15, 2008.

For information regarding Academic misconduct, and incomplete grades, refer to the catalog and the NMSU student handbook. Incomplete grades can only be given under extreme circumstances.

Students with Disabilities:

If you have (or believe you have) a disability and would benefit from classroom accommodation(s), please contact the Services for Students with Disabilities (SSD) Office located at Garcia Annex [Phone: 646-6840; TTY: 646-1918].

If you have a condition that may affect your ability to exit safely from the premises in an emergency or that may cause an emergency during class, you are encouraged to discuss any concerns with the Instructor.

Student Responsibilities:

1. Register with SSD and obtain accommodation documents early in the semester;
2. Deliver the completed accommodation and testing form(s) to the instructor(s) within the first two weeks of beginning of classes (or within one week of the date services are to commence);
3. Retrieve the signed form(s) from faculty and return to SSD within five (5) days of receipt from faculty and at least one week before any scheduled exam; and,
4. Contact the SSD Office if the services/accommodations requested are not being provided, not meeting your needs, or if additional accommodations are needed. Do not wait until you receive a failing grade. Retroactive accommodations cannot be considered.

Faculty Responsibilities:

1. Sign the *ACCOMMODATION REQUEST FORM* and *TESTING ACCOMMODATION FORM* (when presented), retain a copy, and return the original to the student within five (5) working days of receipt;
2. Contact SSD immediately if there are any questions or disputes regarding accommodation(s), disruptive behavior, etc.; and,
3. Refer the student to SSD for any additional accommodations.

Feel free to call Jerry Nevarez, Director of Institutional Equity, at 505-646-3635 with any questions you may have about NMSU's Non-Discrimination Policy and complaints of discrimination, including sexual harassment.

Feel free to call Michael Armendariz, Coordinator of Services for Students with Disabilities, at 505-646-6840 with any questions you may have on student issues related to the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially.

Topics Covered in EE 111

Chapters 1, 2, 3:

- Current and Voltage
- Voltmeters and Ammeters
- Power Absorbed by elements
- Ohm's Law
- KVL and KCL (also need to be able to solve algebraic equations)
- Circuit components: resistors, voltage and current sources, dependent sources, inductors, capacitors, switches
- Voltage and Current dividers
- Equivalent resistance (combining resistors in parallel and series)

Chapter 4, appendix (matrices and Gauss elimination):

- Nodal analysis
- Loop (Mesh) analysis
- Op Amps

Chapters part of 4, 5:

- Thevenin and Norton equivalents
- Source Transforms
- Solving for Open circuit voltage, short circuit current
- Max Power
- Superposition

Homework:

1. State the problem (you don't have to copy the problem word for word but there should be enough there so that someone not doing that homework would be able to know what the problem is.)
2. Write down any diagrams that you need or that would be helpful. Label it!
3. Solve the problem. Start with a formula or equation, or explain what you are going to do, then logically go from start to end explaining what you are doing as you go along (if it is not obvious)
4. Underline or box in the correct answer.
5. Check to see if it makes sense. Do you need units? Are you using the correct units? Is the answer reasonable?

Example:

$$3X + 2Y = 10 \quad \text{and} \quad 2X - 3Y = 2$$

Solve for X in the second equation : $X = (3Y + 2)/2$

Substitute this value for X into the first equation : $\frac{3(3Y + 2)}{2} + 2Y = 10$

clearing the denominator by multiplying through by 2

and distributing the 3 gives : $9Y + 6 + 4Y = 20$

combine the Y terms and the constants : $13Y = 14$ $Y = 14/13 = 1.08$

Substitute for Y in the first equation : $3X + 2(14/13) = 10$

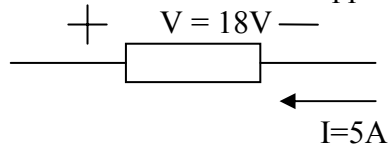
Solve for X : $X = \left(\frac{130 - 28}{13}\right)(1/3) = \frac{102}{39} = 2.62$

Check the answer :

$$3X + 2Y = 3(2.62) + 2(1.08) = 10.02 \quad (\text{very close})$$

$$2X - 3Y = 2(2.62) - 3(1.08) = 2.00 \quad (\text{checks}) \quad \text{The } 0.02 \text{ is due to round off.}$$

Find the Power Absorbed or Supplied by the element and state whether Power is Absorbed or Supplied.



Sign convention is Active (current enters the negative of the voltage), therefore Power Supplied = $V I = (18V)(5A) = 90W$.

Therefore 90W is Supplied by the element.

(Mentally check units, and does this make sense? – positive current enters at a lower potential and exits at a higher potential, so energy is added to the system, so power is supplied – yes that makes sense)

Items needed for Lab (all except for protoboards and project materials are provided for you) Lab will begin Tuesday August 26.

Lab Book – online - WebCT

Digital Multimeter (DMM), Volt/Amp/ohm meter (\$31.00)

Needs to read resistance from 100 ohms to 20M ohms; voltage milli volts to 20 volts

And current from micro amps up to 1 A. (most will be in the milli amp range)

Tool kit (helpful but not required) consisting of:

Small screwdriver

wirestrippers

Needle nose pliers

EE 111 electronic components consisting of:

2 - 9 volt batteries

2 battery connectors (to connect into breadboard)

Resistors: 2 each of (10 ohm, 47 ohm, 100 ohm, 180 ohm, 510 ohm, 1K ohm,
2K ohm, 4.7K ohm, 5.1K ohm, 10K ohm, 15K ohm, 18K ohm, 100K ohm,
1M ohm, 10 M ohm)

Potentiometer (1M ohm, 100K ohm, 10K ohm, 100 ohm)

4 - leds

Operational Amplifier (IC LM 741 A)

Diode, 1N 34

capacitors (0.1 micro farad ceramic, and a 1 and 10 micro farad electrolytic)

4 alligator clip leads

22 gauge wire (6' of red, black, white, and blue)

Printed circuit board (one large, one small)

Breadboard

Project (to be selected by last day to drop) Price varies depending on parts needed.

You can also use any of your own equipment instead of purchasing what will be provided.

Lab Schedule:

<u>Nth Week of lab</u>	<u>topic</u>
1	Intro to lab, Ethics, Measurements, lab equipment
2	KVL, KCL, Ohm's Law
3	Voltage and Current Division
4	Equivalent Resistance
5	Soldering and Equivalent Resistance
6	Nodal Analysis
7	Mesh Analysis
8	Superposition, LED's, Diodes, Capacitors
9	Op Amps
10	Thevenin Equivalents
11-12	Project
13 (week before finals)	Lab project presentations (Dec 2 and 3 in your lab section)

Some labs will be verification labs, and some will be or will contain discovery concepts.

Grading Rubric