

EET 130

FUNDAMENTALS OF ELECTRICITY

COURSE DESCRIPTION

Introduction to DC and AC circuits, electromagnetic devices, electronic components and analog and digital circuits for non-electronics majors.

Text(s): **Introductory DC/AC Electronics** by Nigel P. Cook
 Publisher: Prentice Hall; Sixth Edition

Prerequisites: **Completion of all remedial courses**
Co-requisites:

Credits: **3** Lecture Hours: **2** Studio/Lab Hours: **2**

Coordinator: **Professor DeFino, P.E.** **Latest Review: Summer 2009**

Attendance Policy:

Mercer County Community College does not have a “cut system.” Students are expected to attend all classes of every course on their schedules. Only illness or serious personal matters may be considered adequate reasons for absence.

It is the prerogative of the instructor to excuse absences for valid reasons, provided the student will be able to fulfill all course requirements.

IF YOU MISS A CLASS IT IS YOUR RESPONSIBILITY TO GET NOTES FROM SOMEONE IN THE CLASS

Student performance in classes is formally verified at the middle of each full semester. If a student’s attendance has been infrequent or performance unsatisfactory, he or she may receive notification in the mail. At any time, the instructor may withdraw the student from class for insufficient attendance.

Academic Integrity:

Students are required to perform all the work specified by the faculty and are responsible for the content and integrity of all academic work submitted, such as papers, reports, and examinations. A student will be guilty of violating the Rule of Academic Integrity if he or she:

- Knowingly represents the work of others as his or her own;
- Uses or obtains unauthorized assistance in any academic work;
- Gives fraudulent assistance to another student.

- Intentionally damages any contents of the lab or classroom
- Is found to have stolen anything from the lab or classroom

Penalty:

First Violation for stealing or damaging is F in the course.

First violation on test or project is an “F” grade for the test or project.

Second violation is “F” in the course.

Temporary Grade Policy:

If you do not complete the course requirements by the end of the semester, and you have a prior agreement with the instructor, you may be given an “I” (incomplete). “I” indicates that the instructor is affording extra time to earn a grade in the course. The amount of extra time is determined by the instructor, up to a maximum of 16 calendar weeks after grades are submitted. An “I” grade which has not been resolved within 16 calendar weeks is changed to an F or NC (no credit) grade, as appropriate to the course.

Letter Grades:

Letter grades and quality points are shown in the chart under grading.

Audit:

If you audit the course, you will receive an “AU” grade—this cannot be changed to a letter grade.

Withdrawal Course Requirements: Deadline: Check college calendar.

To receive a W grade for any course, a student must consult with the course instructor or an appropriate division representative and then withdraw officially before two-thirds of the course has been completed by submitting a withdrawal form to the Office of Student Records. Withdrawal after this point results in a grade other than W (usually F). At any time before two-thirds of the course has been completed, the instructor may also withdraw with a W grade any student who has been absent excessively. A student thus withdrawn will not be entitled to any refund of tuition or fees. The student may appeal this action.

GENERAL OBJECTIVES

Student will be able to demonstrate:

1. An understanding of the history of electricity.
2. An understanding of basic electricity (AC & DC)
3. An understanding of certain electrical components
4. An understanding of analog versus digital meters

UNIT OBJECTIVES

Unit 1

Students will be able to:

1. Describe the following terms: open circuit, closed circuit, voltage, current, power, ampere, ohm, conductor, insulator.
2. Convert basic electrical units into their sub or multiple unit equivalents.
3. Determine the acceptable resistance range for a given resistor color code.
4. Calculate the resistance of given length of AWG wire.
5. Calculate the energy usage and cost for one month for a given set of appliances.
6. Calculate the thickness required for a given insulator and voltage requirement.
7. Use Ohm's law to find voltage, current or resistance given any two.
8. Calculate the power in a resistor.

Unit 2

Student will be able to:

1. Show an example of a series circuit and parallel circuit.
2. Calculate the current, voltages and power in a series circuit.
3. Calculate the currents and power in a parallel circuit.
4. Calculate the total resistance for a series or parallel circuit.
5. Use Ohm's law and the power formula to calculate the currents, voltages and powers, given sufficient information, for a series or parallel circuit.
6. Calculate the total voltage for two or more batteries in series.
7. Calculate the total current available from a set of batteries in parallel.
8. Read current and voltage from either an analog or digital meter.
9. Calculate percent error between two values.
10. Calculate the resistance values for a given potentiometer setting.
11. Identify circuit "ground"

Unit 3

Student will be able to:

1. Distinguish between AC and DC
2. Identify a sine wave, square wave, or triangle wave.
3. Calculate the period and frequency of an AC wave.
4. Calculate V_{pk} , V_{p-p} , V_{rms} or V_{eff} given sufficient information.
5. Calculate the instantaneous voltage for a sine wave given sufficient information.
6. Calculate the time constant for an RC or RL circuit.
7. Calculate the charging time for an RC or RL circuit.
8. Calculate the voltage and current for an RC or RL circuit at any time given sufficient information.
9. Describe the basic construction of a capacitor and inductor
10. Calculate the mmf for a given set of conditions.
11. Calculate the secondary voltage for a given transformer
12. State the basic rules and relationships related to a capacitor or inductor.

Unit 4

Student will be able to:

1. Distinguish between R , X_c and X_L
2. Calculate X_c and X_L given sufficient information.
3. Calculate from a scope trace the voltage and frequency of a sine wave.
4. Calculate the total capacitance for two capacitors in series or parallel.
5. Calculate the total inductance for two inductors in series or parallel.
6. Calculate the currents, voltages, impedance and phase angle for a given series or parallel RLC circuit.

METHOD OF INSTRUCTION

Learning will take place via classroom instruction, demonstrations, and student activities, as well as through textbook reading and homework assignments. Lab activities will augment this.

Use of equipment and manual skills will be developed in the lab.

GRADING

The final grade will be based on four test grades, weekly quizzes, and the lab grade

The lab grade will be based on performance in each lab. The assessment will be based on the lab sheets for each experience.

Since all tests will be cumulative and may also include problems related to the labs, there will not be a final exam.

Letter grade	Nominal %	Definition	QPA quality points
A	93-100	Superior achievement	4.0
A-	90-92		3.7
B+	87-89		3.4
B	83-86	Above average achievement	3.0
B-	80-82		2.7
C+	77-79		2.4
C	70-76	Average achievement	2.0
D	60-69	Minimally passing	1.0
F	0-59	Academic failure	0.0

WEEKLY SCHEDULE

The textbook pages below are based on 3 different textbooks, you have a choice of which book you purchase. **YOU DO NOT NEED ALL THREE.**

Text #1 Intro to DC/AC (Cook), Text #2 Electronics (Cook), Text #3 Grob's Basic Electronics (Schultz)

Week 1 & 2 Home work problems in Class Manual page 10

Read: Text #1 pgs. 14 to 37 or Text #2 pgs. 4 to 31 or Text #3 pgs. 26 to 42

Read Text #1 pgs. 57-64, 72, Text #2 pgs. 35 to 64 Text #3 pgs: 60 - 68

Topic: History of Electricity Through the 19th Century

Electricity

+/- Charges

Voltage

Current

Units, Sub-units, Multiple-units

Week 3: Home work problems in Class Manual

Read Text #1 pgs: 98,99, 103-106, 108-120 Text #2 64 to 74 Text #3 pgs: 82 to 93, 328 to 348

**Topic: Resistance, Power, OHMS Law, Efficiency, KWH
Resistors, Conductors, Insulators**

Week 4: Home work problems in Class Manual page 11

Read Text #1 pgs: 130-140, 156-160 Text #2 pgs: 26-29 Text #3 pgs: 49-50, 356-370

Topic: D.C. Batteries, Fuses, Circuit Breakers, Switches

TEST 1

Week 5: Home work problems in Class Manual page 12,13

Read Text #1 pgs: 172-185 Text #2 pgs: 84-106 Text #3 pgs: 114-127

Topic: Series Circuits, Power, Open & Short Circuit

Week 6: Home work problems in Class Manual page 14,15

Read Text #1 pgs: 214-234 Text #2 pgs 116-133 Text #3 pgs: 148-161

Topic: Parallel Circuits, Power, Open & Short Circuit

Week 7:

TEST 2

Week 8 : Home work problems in Class Manual page 16

Read Text #1 pgs: 315-325, 329-331, 341 Text #2 pgs 182-189, 204-206 Text #3 pgs: 444-457

Topic: AC Electricity & Scope Usage

Week 9: Home work problems in Class Manual page 19

Read Text #1 pgs: 442-445 Text #2 pgs 260-264 Text #3 pgs: 412-416

Topic: Electro Magnetism

Week 10: Home work problems in Class Manual

Read Text #1 pgs: 374-376, 379-383, 397-401 Text #2 pgs 212-218, 229-236

Text #3 pgs: : 487-489, 529-531, 550-559, 678-682

Topic: Capacitors & Capacitive Reactance

Week 11: Home work problems in Class Manual page 20

Read Text #1 pgs: 464-469, 474-477 Text #2 pgs: 280-285 Text #3 pgs: 582-584, 674-676

Topic: Coils, Inductor,

Transformers Instructor's notes. Home work problems in Class Manual page 21

TEST 3

Week 12: Home work problems in Class Manual page 17,18

Text #1 Pgs: 402-413, Text #2 pgs: 229-236 Text #3 pgs: 529-534, 551, 674-676

Topic: Series RC circuits

Week 13: Home work problems in Class Manual page 20

Read Text #1 478-484 Text #2 pgs: 285-289, Text #3 pgs: 625-630, 647

Topic: Series RL circuits

Read Text #1 419 – 420 Text #2 pgs: 241-242, Text #3 pgs: 557-560

Topic: Parallel RC circuits

Week 14: Home work problems in Class Manual

Read Text #1 488 – 490 Text #2 pgs: 293-295, Text #3 pgs: 652-654

Topic: Parallel RL circuits

Week 15: Home work problems in Class Manual page 21

Read Text #1 530-534, 536-538 Text #2 pgs: 320-326

Topic: RLC Circuits

TEST 4

Special Needs

Any student in this class who has special needs because of a disability is entitled to receive accommodations. Eligible students at Mercer County Community College are assured services under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973. If you believe you are eligible for services, please contact Arlene Stinson, the Director of Academic Support Services. She can be reached at (609) 570-3525.