EL 3302 Engineering Measurements (Spring 2020)

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Office: Room E230B, within CREATE Office
Office Hours: 1:00 – 2:45, Tuesdays and Wednesdays
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Course Location: Room 101, Class Room Building
Class Time: 3:00 – 4:20 PM, Mondays and Wednesdays
Textbooks:

Electric Circuits, Mahmood Nahvi and Joseph Edminister, Shaum's Outline Series, McGraw-Hill Publishers.
Leadership: Theory and Practice by Peter Northouse, Sage Publishers.

Course Description

Conducting experiments and making measurements is an essential aspect of all branches of science and engineering. Nearly all of our current quantitative understanding of the natural and engineered world has come from the interplay between theory and measurements. Models and simulations of systems require experimental validation and performance of engineered systems must not only be predicted, but also measured and tested. In this course we will learn the basic tools of making physical measurements and conducting experiments. We will collect data, analyze data, conduct basic error analysis, and design experimental systems. Using inexpensive components, we will build electrical and electronic circuits and learn how they operate.

Grading Policy

Exam 1	20 %
Exam 2	20 %
Final Exam	30 %
Quizzes	10%
Laboratory Experiments	10 %
Leadership Project	10 %

Letter grades will be assigned according to the following scale:

90 – 100 %	A
80 – 89 %	B
70 – 79 %	C
60 – 69 %	D
59 or below	F

Exams

There will be two Exams given during regular course periods along with a Final Exam which will be given on **Monday, May 11 at 1:00 – 3:45 PM**.

- The first Exam will cover topics related to the analysis of **Direct Current (DC) Circuit Analysis.**
- The second Exam will cover topics related to the analysis of **(AC) Alternating Circuit Analysis.**
- The Final Exam will emphasize topics related to **Operational Amplifiers and Filters.** It will be comprehensive so it will include all topics covered in the class.

Quizzes

In order to obtain success in the field of Circuit Analysis, it is essential to learn how to solve problems. Problems will be assigned as homework throughout the semesters. Students are expected to work the assigned problems outside of regular class hours. Quizzes will be given in order to gauge one's ability to solve Circuit Analysis problems. Quizzes will also help the Instructor to ascertain the readiness of students to understand the topics related to Laboratory Experiments.

Students who experience difficulties in working the assigned problems are strongly encouraged to ask questions in class. Time permitting, the Instructor will provide additional help in working the problems that are assigned. Students are very much encouraged to seek help from the Instructor outside of class. The Teaching Assistant can also provide additional help to students.

In many cases, Quiz problems will be similar to problems that are assigned as homework. The most effective way to prepare for Quizzes is to work and understand the problems assigned as homework and to review the solution of problems worked in class.

Laboratory Experiments

Students, working in teams, will be required to complete a number of laboratory experiments during the term. These projects primarily deal with the design and construction of electric circuits. They will be completed during class.

The grading of Laboratories is simple. If a student participates in the successful completion of a Laboratory Experiment, he/she will be marked/graded as having done so.

- If a student successfully completes all Experiment, he/she will receive full credit for this portion of the course (10% of the Final Grade.)
- If a student successfully completes 8 of 10 Experiments, he/she will receive 80% of the credit associated with Laboratory Experiments (thus 8% of the Final Grade.)

Leadership Issues and Principles

In order to build one's leadership abilities, it is essential to become aware of the contemporary issues that confront leaders. You will be responsible for Chapters 6 and 15 from the text by Northouse. Students are expected to read this book, complete assignments relating to the book, and to be prepared to discuss its merits during the class. **Students will complete a Project on Leadership based upon the topics of these Chapters from the Northouse text.**

Attendance Policy

Students are expected to attend all classes. **A penalty of 3% will be assessed for each missed class.** Students who miss 3 or more classes **may be dropped** from the class.

Cell Phone Policy

Cell phones are not permitted during the lecture. Students are required to turn off cell phones before entering the classroom. Cell phones should be placed out of sight (like in a purse or backpack). Students should **NOT** receive or make calls/text messages during class. **Students using cell phones during class will be asked to leave.**

Academic Dishonesty

Cheating is taken very seriously. Students are encouraged to collaborate on most assignments throughout the semester but all graded materials must represent the student's individual work. (When in doubt, ask your professor!) Scholastic dishonesty is the attempt to present the work of somebody else as his or her own work or attempting to pass any examination by improper means. It is a serious offense and will not be accepted. Any academic misconduct will be handled according to the current university policy and will be reported. In accordance with University regulations, scholastic dishonesty on a given assignment will be referred to the Dean of Students and may result in a zero on the assignment, an "F" in the course, or even suspension from the university. If you need assistance with your assignments, please consult authorized sources of help. For more information on Academic Dishonesty visit the Dean of Students or http://studentaffairs.utep.edu.

Special Accommodations

If you would like to request special accommodation due to a disability, we can certainly work that out. Please contact The Center for Accommodations and Support Services via their website http://sa.utep.edu/cass/.

Student Outcomes (ABET)

At the end of the semester, students will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science and mathematics
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
8. An ability to recognize leadership issues and to apply leadership principles

Course Topics

I. Introduction to Electric Circuit Analysis
   a. Charge, Current and Voltage
   b. Ohm's Law
   c. Kirchoff's Voltage Law (KVL)
   d. Kirchoff's Current Law (KCL)
   e. Combining Resistors and Simplifying Circuits

II. DC Circuit Analysis
   a. Node Voltage Analysis
   b. Loop Current Analysis
   c. Voltage Divider Principle
   d. Current Divider Principle
   e. Source Transformations
   f. Equivalent Circuits

III. Laboratory Practice
   a. Powered Breadboards
   b. Supply Voltages and Ground
   c. Constructing Circuits
   d. Resistor Color Codes
   a. Potentiometers

IV. Capacitors and Inductors
   a. Voltage/Current Relationships for Capacitors and Inductors
   b. Phasor Representation for Capacitors and Inductors
   c. AC Circuit Analysis
   d. Filters
   e. Transient Response of RC and RL Circuits

V. Operational Amplifiers
   a. Circuit Configuration
   b. Measurement of Operational Amplifier Characteristics
   c. Closed-Loop Performance and Negative Feedback

VI. Filters
   a. Passive Filters
   b. Active Filters
   c. Frequency Response (Amplitude and Phase)

VII. Leadership Issues and Principles
   a. Northouse, Chapter 6: Path-Goal Theory
   b. Northouse, Chapter 15: Gender and Leadership