

EL 3302 Engineering Measurements (26973)
Class Room Building, Room C 101

Spring 2017
TR: 10:30 – 11:50 AM

Instructor: Dr. Scott Starks, PE, Professor of Engineering Leadership
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Office Hours: TBA

Prerequisite: EL 2301 and MATH 1312 each with grades of 'C' or better

Purpose of Course: To enhance your success as a student in the engineering leadership program by gaining a sound grasp of the fundamentals of electric circuits. The course will cover much of the theory of electrical components and their use in circuits. Your knowledge will be enhanced through the completion of several hands-on experiments and projects. These will be conducted in groups and will require you to exercise your leadership and teamwork skills. Formal reports will be required on several experiments and projects. These are intended to improve your written communication skills.

Course Objectives: At the end of the semester you will:

- Better understand your role and responsibilities as a major in the Department of Engineering Leadership and become more aware of opportunities to enhance your future success within the Department of Engineering Leadership.
- Develop an ability to identify, formulate, and solve engineering measurements problems by applying principles of engineering, science and mathematics.
- Have grown the laboratory skills necessary to construct electrical circuits that enable the collection of measurement data to support analysis and interpretation.
- Be able to recognize leadership issues and apply leadership principles.

Learning Environment

Team learning will be used in the classroom. In order for team learning to be successful, each student must come to class prepared to participate. This means that you **MUST** complete reading assignments, library or Internet research, writing assignments, surveys, self-assessments, homework, and other assignments **BEFORE** you arrive for class. You will find assignments posted on the course's Blackboard website. You will be given quizzes in order for the instructor to ascertain whether you are doing adequate work between scheduled class periods. Some periods will be devoted to laboratory exercises. You will be required to complete **Pre-Laboratory Assignments** before you start on the laboratory exercises.

Grading: The course will be based on the following:

1. **Midterm Exam** (20% each)
2. **Quizzes** (20%)
3. **Final Exam** (20%)
4. **Laboratory Reports** (20%)
5. **Class Participation** (10%)
6. **Readings** (10%)

There will be no curving of grades in this course. The grading scale is:

90 – 100	A	80 – 89	B	70 – 79	C	60 – 69	D	< 60	F
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Laboratory Reports: You will complete several Laboratory Reports during the term. These should be type-written and submitted electronically via the course's Blackboard website. Each Laboratory Report will have a strict deadline for submission.

Class Participation: Attendance is mandatory. Excused absences will be granted according to the rules promulgated in the University Catalog. **Students with more than three absences will be dropped from the course.** Your score for Class Participation will be reduced by 2 points/absence.

Class Preparation and Participation: You should be an active participant in your class. Your participation will make the class not only good for you but also for your classmates and instructor. At a minimum, you should develop at least three questions, issues, or perspectives you would like to raise in class. **You should write these down prior to class and be ready to share them for discussion. Students will be called upon randomly by the instructor to present their questions to the rest of the class.**

Scholastic Integrity/Academic Honesty - 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. "Plagiarism" is the unattributed use of someone else's work -- a classmate's, a website's, even a teacher's from another course. For more information on Scholastic Dishonesty and/or Plagiarism, consult the **Handbook of Operating Procedures: Student Affairs**, which is available in the Office of Student Life.

Readings: You will be assigned to read Chapters 6 (Path-Goal Theory) and 15 (Gender and Leadership) from Northouse's "Leadership." You will be given quizzes on this material.

Classroom Etiquette: Part of being a professional is being on time and being prepared to do your job. This applies to your career as a student as much as it does to your future career as an engineer. Coming to class late is unprofessional and is very disruptive to the class. You are expected to be in the class and prepared to participate at the scheduled start time. If you are late to class, you are to come in quietly and take your seat. **DO NOT** attempt to turn in assignments or pick up handouts until class is over.

Wireless devices **are** allowed in the classroom. However, please use professional discretion with wireless devices, shutting them off, or setting them to mute or silent mode **before** coming to class. Do not answer incoming calls or make outgoing calls except in an emergency. **Do not use text messaging or web browser features while in class. Do not play games or aimlessly search the web during class.** If you must answer the phone, leave the class discretely. You may return to the class once your call is finished.

The Center for Accommodations and Support Services (CASS): Students with special needs that are registered with CASS are to contact me immediately so that we can work out accommodations for your needs. CASS may be contacted at 747-5148, cass@utep.edu or go to Room 106 Union East Building.

Scientific Calculator: An inexpensive scientific calculator is **REQUIRED** for this class. Only models of calculators approved for the FE Exam are permitted for use in this class. These include any fx-115 Casio model calculator, all HP 33s and HP 35s models (Hewlett Packard) and all TI-30X or TI-36 models (Texas Instruments). You should bring your calculator to class daily because you never know when you might have an in-class quiz that will require its use.

You will not be allowed to use a cell phone, tablet or laptop in lieu of a scientific calculator on any in-class quizzes or exams.

EL 3302 Topical Outline

Texas Instruments nSpire Calculator and Innovator Hub

- Programming with TI BASIC
- Using the Innovator Hub as a MicroController

Fundamental Laws Governing Electric Circuits

- Ohm's Law
- Kirchoff's Voltage Law (KVL)
- Kirchoff's Current Law (KCL)

Simplification of Electric Circuits by Combining Resistive Networks

- Series Connections
- Parallel Connections

Circuit Analysis Laws

- Voltage Divider Law
- Current Divider Law

Node Voltage Analysis

- Ground
- Writing Node Equations
- Solving Systems of Node Equations

Loop Analysis

- Loop Currents and Branch Currents
- Writing Loop Equations
- Solving Systems of Loop Equations

Equivalent Circuits

- Thevenin Equivalent Circuits
- Norton Equivalent Circuit
- Source Transformations

Capacitors

- Relationship between Current and Voltage for a Capacitor
- Impedance

Operational Amplifiers

- Configuration of Prototypical Operational Amplifier Circuits
- Inverting Amplifier
- Non-Inverting Amplifier
- Summing Amplifier
- Integrator
- Differentiator

Filters

- Passive Filters
- Active Filters
- Frequency Response
- Bode Plots

Logic Circuits

- Fundamental Logic Gates
- Synthesis of Logical Functions using Boolean Algebra
- DeMorgan's Law
- Implementation of Systems using NAND Gates