

Introduction to Electricity & Circuit Components

Fall Term 2019

Instructor: Paul Zimick
Location: IA-217 (IA-227)
Instructor Contact Information:
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CRN: 25922

Class Times: Tue & Thu. 6:00 to 8:50pm
Credit Hours: 6
Home Phone-541-220-5577
Grading: Standard A-F
APR101 Section No.: 03

Course description

This course introduces apprentices to basic electrical terms and concepts. These include electrical symbols and drawings, electrical values including voltage, current, resistance and power, instruments used to measure these values, how these values are used on the job. Students will also receive instruction in electromagnetic theory. Students will receive instruction on safety in the workplace as well as general electrical safety.

At the end of the term, students will be able to:

- read and understand architectural and electrical drawings
- use ohms law to calculate voltage, current, resistance and power values in DC electrical circuits and basic AC circuits
- recognize electrical symbols on electrical drawings
- understand basic electromagnetic concepts as they relate to electrical circuits and devices
- use various electrical measuring instruments accurately and safely
- implement electrical and basic workplace safety practices

Prerequisites

Math skill test or equivalent

Materials

Pens, pencils, paper, notebook, inexpensive SCIENTIFIC calculator, volt-ohm-ammeter(multimeter). See attached page!

Course Instruction

Teaching methods include lectures, demonstrations and class discussions followed by assigned activities to include lab work, topical worksheets and testing. Field trips may be scheduled when available.

Textbook

Textbooks: *Industrial Electricity, 9th Edition, Brumbach*, ISBN : 978-1-2858-6398-6 BLUE COVER
National Electrical Code Codebook 2020 edition. National Fire Protection Assn.
Ugly's Electrical Manual, latest edition or any on hand (optional)

Attendance

Students are expected to attend each class. Roll will be taken at the beginning of class. If you arrive late, make sure your attendance is noted. If it is necessary for you to miss a class, I need notification, in advance, if possible.

Course Evaluation

This course is graded A - F. For grading percentages, please see the paragraph below. Your final grade will be determined by the following course breakdown:

- ◆ Homework and Labwork: 25%
- ◆ Attendance & Class Participation: 25%
- ◆ Class Worksheets & Quizzes: 25%
- ◆ Mid-Term & Final Exam 25%

Students will be assigned a letter grade according to the standard grading scale: 90 – 100% = A, 80 – 89% = B, 70 – 79% = C, 60 – 69% = D, < 59% = F.

Students will be given time to work on assignments after the lecture and are encouraged to work together and with the instructor during this time to complete these assignments. Assignments are due at the beginning of class one week after they are assigned. Late assignments are accepted on a case-by-case basis at the discretion of the instructor.

Students who may need special classroom accommodations due to documented disabilities, who have medical information which the instructor should know, or who need special arrangements in an emergency, should speak with the instructor during the first week of class. If you have not accessed services and think you may need them, please contact Disability Services at 541-917-4789.

Students are required to have the textbook in their hand by the second week of class!! Please make arrangements to get it.

Introduction to Electricity/Circuit Components
Fall 2019 *Tentative* Schedule

Week 1

Introduction to the course and requirements. Instruction to electrical and workplace safety. Math worksheet and introduction to the NEC. Material requirements.

Week 2

Electrical symbols, reading and drawing schematic, architectural and pictorial diagrams. Recognition of basic electrical symbols. Basic NEC exercise. Scientific and Engineering Notation.

Week 3

Structure of matter, insulators and conductors. Voltage sources. What is voltage, current and resistance. Measurement of voltage and current. Introduction to Ohms Law. Quiz #1

Week 4

Electrical and mechanical power. Work, power, energy and efficiency. Mechanical power transmission, drives and simple sizing of motors. Quiz #2

Week 5

Test equipment including volt, ohm and ammeters, voltage testers, meggers, oscilloscopes, leads and probes as well as making measurements. NEC Exercise #2

MID TERM EXAM

Week 6

Electric circuit components. These will include switches and terminals, fixed and variable resistors, batteries and other voltage sources, inductors and capacitors.

Week 7

Basic resistive electrical circuits. Series and parallel resistive circuit combinations. Voltage and current values in these circuits. Quiz #3

Week 8

Magnets and Magnetism. Magnetic materials, fields, forces and how they relate to electrical circuits. Magnetic circuits and measurements.

Week 9

Introduction to Alternating current. How is it different than Direct current. Basic AC theory. Quiz #4

Week 10

Continuing elemental AC theory. Resistive – capacitive circuits, resistive – inductive circuits. How capacitors and inductors work in AC circuits. Electromagnetic induction. Preparation for the final term examination.

Week 11 : Final Exam

Additional Course Recommendations and Information

Safety in the Lab.

During the term, the class will do hands – on lab experiments in order to become familiar with the electrical concepts we will discuss in class. We will be using another area of the college and need to follow school safety guidelines. These include:

1. Use safety glasses **AT ALL TIMES** in the lab. You will be working with 120volt power which is **LEATHAL** if not respected. Short circuits can produce flying debris and metal particles that can cause serious injury. Always be aware of your surroundings.
2. Always be sure of the condition of your measuring equipment! Cracked leads or cases are dangerous.
3. Never work on live electrical circuits when tired. If there is a problem here, please see the instructor.
4. When getting ready to make a measurement, **ALWAYS** double check your meter settings and the placement of your probes. Remember “measure twice and cut once”, here it can save your life!

Electrical Test Equipment.

The lab work will allow you to get practice using your multimeter. We will discuss your acquiring a multimeter in the first week of class. Be sure to **READ** the manual that will come with your meter. This will help to keep you from blowing protective fuses inside your meter. In fact, when purchasing your meter, it would be a good idea to purchase extra replacement fuses at that time. These small, special fuses can be hard to come by and are expensive and not available at your local Wal-Mart or even Platt!

Scientific Calculators.

You **WILL** need a simple, scientific calculator for class. This means you will need to purchase one with simple trigonometric functions. Such as sine, cosine and tangent keys. A very good, simple example can be purchased at Staples or WalMart for \$15.00 or less. If you choose to get or use a **GRAPHING** type of calculator, that is fine. But beware, you will need to know how to use them! **This is not a joke!** Most of these calculators do not work the same as a simple, one line type. They are hand held computers and even simple calculations must performed in the proper manner.

Requirements for Becoming an Electrician.

Most of the students taking this course are part of an accredited Electrician Apprenticeship Program. In order for this class to count in your ambition to become an electrician, you must be part of such an apprenticeship program at your place of employment. Some students have taken this course in the past in order to gain electrical knowledge, or to simply obtain class credits. These are both fine reasons. But understand that by taking this course, you will not automatically become an electrician, or be eligible to take the electricians exam unless you are part of an approved apprenticeship program as well!

Tool Requirements.

When performing experiments in the lab, you will need some simple tools to connect leads and other actions. 2 or 3 different sizes of flat blade and cross point or Phillips screwdriver should be included in your tool kit. Also, wire strippers, diagonal cutters, needle nose and slip joint pliers are a good choice to include. A flashlight will always be needed. You are free to include any other small tool you may think would be helpful. Just be sure to make your tool kit small enough to easily carry. Your tools should have plastic or rubber insulation, but because you will **NOT** be working on live circuits, they need not be considered part of your PPE. Please be sure to bring or purchase safety glasses! They can be any of the simple plastic or glass types available- inexpensive, or as good as you can afford. I always bring extra safety glasses to class for anyone who might forget to bring their own.