ELEC A100: ELECTRONIC PROBLEM SOLVING

Item	Value
Curriculum Committee Approval Date	12/02/2020
Top Code	093400 - Electronics and Electric Technology
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S)

Course Description

This course is an introductory course for students who want to learn the fundamentals of electricity and college level math. This course will cover the fundamentals of electricity and electronic circuits. Students will learn how to use math to answer questions about electricity. Students will identify electronic components and basic circuits. Students will be introduced to electronic schematics, Ohm's Law, Kirchhoff's Laws and the concepts of resistance, capacitance, and inductance. The course will cover metric prefixes, unit conversions, number systems, and binary logic. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Students will be able to apply Ohm's Law to answer questions related to electric circuits and power usage.
2. Students will be proficient at reading, interpreting, and creating electrical schematics.
3. Students will be able to identify basic electronic components and articulate their function in the system.
4. Students will be able to employ mathematical tools to solve problems relating to electronic circuits.

Course Objectives

- 1. Demonstrate a complete knowledge of single-variable algebra.
- 2. Use trigonometric functions to evaluate triangles and work with vectors.
- 3. Work with both polar and rectangular coordinates and vectors.
- 4. Apply Ohms Law and Kirchhoffs Laws to analyze electric circuits.
- 5. Use spreadsheets to make reports and perform calculations.
- 6. Understand and convert between various common number systems.
- 7. Identify schematic symbols.
- 8. Understand fundamental electrical concepts.

Lecture Content

Introduction to Electricity The water analogy Voltage, Current and Resistance Electricity and Magnetism Electronic Components Resistors, Capacitors, Diodes, LEDs, and Inductors Buttons and Switches Motors Integrated Circuits Schematics Symbols for basic components Electrical connections Component names, values, and prefixes Mathematical Concepts Metric prefixes, multiplying and dividing by powers of 10 Ohms Law Solving a basic circuit Solving for resistance, voltage, or current Mathematical Concepts Equations, indicating multiplication and division, using multiplication/division to transform equations, variables, subscripts, algebraic expressions, graphing linear equations. Power and Energy Consumption Calculating power Calculating energy use by day, week, month, and year. Mathematical Concepts Integration, variable substitution, exponents, square root and radicals, finding the root of an equation. Kirchhoffs Laws Parallel and Series Circuits Current Law Voltage Law Equivalent Resistance Solving circuits with multiple voltage nodes and resistors in series and parallel. Mathematical Concepts Transforming an equation with addition and subtraction, numerical expressions and evaluating formulas and equations. Working with fractions, forming equivalent fractions, simplifying, multiplying, dividing, adding, and subtracting fractions. complex fractions, changing a mixed equation to fractions, solving equations with fractions and literal equations with fractions. Number Systems Base 10 Number System Binary System Hexadecimal System Bits, Bytes and Hex Code Scientific Notation Mathematical Concepts

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Instructional Techniques

Detailed whiteboard lectures with opportunity for student engagement. Independent in-class problem solving assignments with immediate review. Group based in-class problem solving assignments with immediate review. In-class review of previously assigned homework. Discussion of media provided and assigned via Canvas. Review of material prior to exams.

Reading Assignments

Students will spend approximately three hours a week reading from the text and instructor provided materials available in the LMS.

Writing Assignments

Students will spend approximately two hours a week developing schematic drafting and coordinate plotting and graphing

Out-of-class Assignments

Students will spend approximately two hours a week completing problem-solving exercises along with formative quizzes

Demonstration of Critical Thinking

Electrical circuit analysis and problem solving assignments. Group problem solving projects Quizzes administered at the end of each topic to demonstrate mastery of the specific objective. Midterm and final exam administered to test ability to retain problem solving skills.

Required Writing, Problem Solving, Skills Demonstration

Home electrical inventory and analysis report Several spreadsheet reports and assignments Graphing assignments

Textbooks Resources

1. Required Harter Beitzel. Mathematics Applied to Electronics, 6 ed. New York: Prentice Hall, 2003 Rationale: - 2. Required Kramer, A. Math for Electricity and Electronics, 4 ed. Cengage Learning, 2016

Other Resources

1. Instructor provided materials