

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

ELECTRONICS TECHNOLOGY 110 – INTRODUCTION TO ELECTRICITY AND ELECTRONICS

3 hours lecture, 3 hours laboratory, 4 units

Catalog Description

This course includes the laws of physics as they relate to electricity and electronics. Topics include the history of electrical science, atomic structure, basic electrical laws, DC and AC circuits, semiconductors, integrated circuits, amplifiers, waveforms, electrical test equipment, circuit construction, and electrical safety. Knowledge of basic algebra and how to use scientific calculators is highly desirable.

Prerequisite

None

Course Content

- 1) History of electricity
- 2) Energy source and generation
- 3) Atomic structure
- 4) Polarity
- 5) Electrical units
- 6) Closed and open circuits
- 7) Direct and alternating current
- 8) Sources of electricity
- 9) Resistors, rheostats and potentiometers
- 10) Ohms law, power formulas
- 11) Series circuits
- 12) Parallel circuits
- 13) Series parallel circuits
- 14) Voltage and current dividers
- 15) Meters
- 16) Kirchhoff's law
- 17) Network theorems
- 18) Conductors and insulators
- 19) Batteries
- 20) Magnetism, magnetic units
- 21) Electromagnetic inductance
- 22) Alternating voltage and current
- 23) Capacitance and capacitive circuits
- 24) Inductance, inductive reactance and inductive circuits
- 25) RC and L/C time constants
- 26) Complex AC circuits
- 27) Resonance and filters
- 28) Electronic devices and circuits
- 29) Integrated circuits

Course Objectives

Students will be able to:

- 1) Analyze the historical development of energy sources and supply in the field of electricity/electronics.
- 2) Evaluate career opportunities in the field of electronics.
- 3) Demonstrate and describe basic electrical safety principles and practices.
- 4) Distinguish differences in physical and operating characteristics, and explain how the various electronics components are used in their applications.
- 5) Describe basic atomic structure and explain the role it plays on electrical and electronic systems.
- 6) Describe the differences between and evaluate the characteristics of resistance, current and voltage in a circuit.
- 7) Differentiate between direct and alternating current.
- 8) Calculate total and branch circuits' resistance in series, parallel and series parallel circuits.
- 9) Build various circuits using laboratory circuit boards.

Method of Evaluation

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Quizzes, written exams that measure students' ability to safely: identify, determine the necessary action or repair, diagnose and measure electrical circuits, and describe tasks relating to electrical circuits.
- 2) Evaluation of student progress relating to diagnosis, expected values testing, and adjustments of electrical circuits and components.

Special Materials Required of Student

- 1) Materials for electronics projects must be purchased by distance education students
- 2) Scientific calculator
- 3) Safety glasses
- 4) Computer or device with camera and microphone for web conferencing
- 5) High-speed internet access

Minimum Instructional Facilities

- 1) Classroom with tables to perform electrical labs, visual aides
- 2) Software for constructing simulated electronic circuits
- 3) Variety of equipment for demonstration and student lab experiments
- 4) Cameras and digital equipment for distance education.

Method of Instruction

- 1) Lecture and demonstration
- 2) Group discussion
- 3) Laboratory
- 4) Simulation
- 5) Web based training modules

Out of Class Assignments

- 1) Reading assignments
- 2) Written exercises
- 3) Web based training modules

Texts and References

- 1) Required (representative example): Schultz, Mitchel E. *Grob's Basic Electronics*. 13th edition. McGraw-Hill, 2021. ISBN: 9781259852671 or the equivalent or older version
- 2) Supplemental: Web-based references Open Education Resources.

Exit Skills

Students having successfully completed this course exit with the following skills, competencies and/or knowledge:

- 1) Identify or perform:
 - a. Various electronic components.
 - b. Tests of electrical circuits.
 - c. Analysis of simple and complex circuits through mathematics equations and compare to actual test data.
- 2) Evaluate:
 - a. The effect that electronics has on our society.
 - b. Advantages and disadvantages of various circuit designs.
 - c. The role mathematics plays in the understanding of electronic principles.

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1) Critique the historical development in the field of electricity/electronics.
- 2) Evaluate career opportunities in the field of electronics.
- 3) Describe basic electrical safety principles and practices.
- 4) Distinguish the difference in physical and operating characteristics, and explain how the various electronics components are used in their applications.
- 5) Describe basic atomic structure and explain its role in electrical and electronic systems
- 6) Describe the differences between and evaluate the characteristics of resistance, current and voltage in a direct and alternating current circuit.
- 7) Calculate total and branch circuits resistance in series, parallel and series parallel circuits.