Discipline: Electronics

Degree Credit [X]
Non Credit [ ]
Nondegree Credit [ ]
Comm Service [ ]

Riverside Community College District
Integrated Course Outline of Record

Electronics 11

College: R___ M___ N_X_
Lecture Hours: 54
ELE-11: DC Electronics Lab Hours: 54
Units: 4.00

COURSE DESCRIPTION

Prerequisite: None.

Basic electrical theory including Ohm's Law, the Power Law, the Current and Voltage Laws of Kirchhoff, Direct Current (DC) theory, time constants, multimeter measurements, magnetism, electromagnetism, resistors, capacitors, coils, transient analysis and DC Motors, voltage, current, resistance, power, series, parallel and complex series/parallel circuits. 54 hours lecture and 54 hours laboratory.

SHORT DESCRIPTION FOR CLASS SCHEDULE

Basic DC electrical theory, devices, circuits and applications including resistors, capacitors, coils and motors.

ENTRY SKILLS
None.

STUDENT LEARNING OUTCOMES
Upon successful completion of the course, students should be able to:

Solve basic, direct current, electronic problems involving resistance, current, voltage, and power, as applied to both simple and complex combinations of series and/or parallel circuit components, comprised of resistors, capacitors and coils, in a given network configuration.

- Application of Knowledge - Maintain and transfer academic and technical skills to workplace
- Information Skills - Locate, evaluate and use information effectively
- Global Awareness - Demonstrate teamwork skills
- Communication Skills - Read college-level materials with understanding and insight
- Breadth of Knowledge - Analyze experimental results and draw reasonable conclusions from them
- Critical Thinking - Integrate knowledge across a range of contexts

Diagram and discuss the relationship between electricity and magnetism as related to a DC permanent magnet motor, a solenoid or an electromechanical relay.

- Communication Skills - Write with precision and clarity to express complex thought
- Breadth of Knowledge - Use the symbols and vocabulary of mathematics to solve problems and communicate the results
- Critical Thinking - Generalize appropriately from specific contexts

Describe and contrast the construction, operation, and purpose of resistors, potentiometers, switches, fuses, relays, and batteries.

- Application of Knowledge - Maintain and transfer academic and technical skills to workplace
- Breadth of Knowledge - Analyze experimental results and draw reasonable conclusions from them
- Information Skills - Locate, evaluate and use information effectively
- Critical Thinking - Recognize and assess evidence from a variety of sources
- Communication Skills - Write with precision and clarity to express complex thought

COURSE CONTENT

I. Direct Current Electrical Theory
  A. Sub-Atomic Particles
    1. Electrons
    2. Protons
    3. Neutrons
    4. Attraction, Replusion, and Mass
  B. Elements, compounds, and their characteristics
    1. Valences vs. Conductivity
    2. Conductors
    3. Semiconductors
    4. Insulators
  C. Terminology, Schematic Symbols & Relationships
    1. Series Sources & Loads
    2. Parallel Sources & Loads
    3. Combination Circuits
II. Current

- A. Electron-Flow
- B. Coulombs of Charge
- C. Amperes
- D. Series vs. Parallel

III. Voltage
- A. Electrical Pressure
- B. Electro-Motive-Force (EMF)
- C. Series vs. Parallel
- D. Rises vs. Drops

IV. Resistance
- A. Opposition to Electron-Flow
- B. Resistor sizing
- C. Series vs. Parallel

V. Power
- A. Wattage in Series & Parallel
- B. Surface Area vs. Heat Dissipation

VI. Ohm's Law
- A. Voltage Calculations
- B. Current Calculations
- C. Resistance Calculations

VII. Power Law
- A. Wattage Calculations
- B. Voltage Derivations
- C. Current Derivations
- D. Resistance Derivations

VIII. The Laws of Kirchhoff
- A. The Voltage Law
- B. The Current Law

IX. DC Network Theorums
- A. Superposition
- B. Thevenin
- C. Norton

X. Magnetism & Electromagnetism
- A. Attractive Poles
- B. Repulsive Poles
- C. Magnetic Flux and Density
- D. Permanent Magnetism
- E. Temporary Magnetism
- F. Current-Flow through Coils

XI. Electrical Measurements
- A. Voltage
- B. Current
- C. Resistance
- D. Instrumentation
  1. Digital Multimeters
  2. Oscilloscopes

XII. Capacitive Circuits
- A. Series R-C
- B. Parallel R-C

C. RC Time-Constants
D. Time-Delay Circuits

XIII. Inductive Devices
A. Coils
B. Solenoids
C. Relays
D. Back-EMF
E. Surge Suppression Techniques

XIV. Induction
A. Generators
B. Alternators
C. Motors

XV. Transformers & Applications
A. Chopper Circuits
B. Step-Up
C. Step-Down

XVI.Transient Response
A. R-C Circuits
B. R-L Circuits
C. Differentiated Waveforms
D. Integrated Waveforms
E. Applications

METHODS OF INSTRUCTION

Methods of instruction used to achieve student learning outcomes may include, but are not limited to:

- Class lectures and discussions on direct current theory, devices and circuits to help students gain an understanding of relevant course content, as applied to DC electronics.
- Writing assignments for situations and problems that involve DC electronics theory, symbols, circuit configurations and related formulas.
- Interactive problem solving tasks and activities where students reinforce their electronics vocabulary and circuit drawing skills.
- Videos, films, PowerPoint presentations and on-line media content that focus upon industrial uses of DC electronic circuits, devices and calculations.
- Pair and small group activities, discussions, and exercises that promote discovery and enhance DC circuit solutions and problem solving skills.
- Guest speakers, who bring industry experience directly into the classroom and help students to appreciate how active professionals use electronics technology in their daily jobs.

METHODS OF EVALUATION

Students will be evaluated for progress in and/or mastery of learning outcomes by methods of

evaluation which may include, but are not limited to:

- Individual and group assignments, in both lecture and lab settings, designed to prove successful understanding and application of basic, DC circuit concepts and device definitions related to electronics.
- Oral question and answer sessions about DC electronics theory, devices, circuits, and applications, test students' understanding of the course content.
- Quizzes/examinations designed to assess students' ability to recall, critically analyze and apply key concepts of DC electronics.
- Active participation by students ensures their progress in mastering the DC electronics content of the course, as well as fruitful, collaborative learning projects.
- Final examination designed to assess students' mastery of DC electronics theory, devices, circuits, networks, formulas and calculations.

SAMPLE ASSIGNMENTS

Outside-of-Class Reading Assignments

- According to the reading schedule, handed out in class, students will read and prepare for a weekly reading-quiz. The reading will also prepare students for lectures, discussions and laboratory experiments that involve DC electronic circuits, devices and calculations.

Outside-of-Class Writing Assignments

- Weekly written problems from the book, due back within one week of the given assignment date, focus on direct current applications. They require students to prove a working understanding of the devices and circuit applications involved.

Other Outside-of-Class Assignments

- Perform internet research, as directed in class, in preparation for labs and lectures. Then, students return printouts to turn-in for credit, or send them electronically.

COURSE MATERIALS

All materials used in this course will be periodically reviewed to ensure that they are appropriate for college level instruction. Possible texts include:

Buchla, D.M.. Lab Manual for Electronics Fundamentals and Electronic Circuits Fundamentals, Electronics Fundamentals: Circuits, Devices & Applications. 8/E ed. New Jersey: Pearson/Prentice-Hall, 2010.

Floyd, T.L., & Buchla, D.M.. Electronics Fundamentals: Circuits, Devices & Applications. 8/E ed. New Jersey: Pearson/Prentice-Hall, 2010.

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