

SOUTHEAST COMMUNITY COLLEGE
CONSTRUCTION MANUFACTURING AND TECHNOLOGY DIVISION
Electronic Systems Technology Program
Revision Date: January 11, 2021

I. CATALOG DESCRIPTION

Course Number: ELEC1240
Course Title: Fundamentals of Electronic Circuits II
Prerequisite(s): ELEC1130
Catalog Description: Fundamentals of Electronic Circuits II covers magnetism, transformers, circuits containing reactive components in series and parallel combinations. Topics will include filters and frequency response. Lab will require use of oscilloscope, function generator, frequency counter, and DMM.
Credit Hours: 6
Class Hours: 68
Lab Hours: 68
Total Contact Hours: 136

II. COURSE OBJECTIVES: *Course will:*

- A. Review magnetism and electromagnetism concepts.
- B. Review capacitors and inductors in DC circuits.
- C. Briefly explain residential wiring standards.
- D. Present and analysis of AC voltage and current waveforms.
- E. Present vectors in both rectangular and polar form
- F. Continue to demonstrate measurements techniques using VOM, DMM, and Oscilloscope.
- G. Present the analysis of reactive and resistive components in AC circuits.
- H. Discuss power in AC circuits (Watts, VARs, VAs)
- I. Explain transformer operations and applications.
- J. Introduce rectification and filtering methods and functions.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

- A. Student Learning Outcomes: *Student will be able to:*
 - 1. Describe the basics of magnetism and electromagnetism.
 - 2. Explain Lenz's and Maxwell's set of laws as they apply to AC circuits.
 - 3. Demonstrate and interpret the characteristics of resistors, capacitors, and inductors in AC circuits.
 - 4. Differentiate different forms of power in AC circuits.
 - 5. Operate analog and digital test equipment to measure parameters of AC circuits.
 - 6. Construct, analyze and troubleshoot series and parallel RL and RC circuits.
 - 7. Construct, analyze and troubleshoot series and parallel resonant circuits.
 - 8. Predict and measure the frequency response of RL and RC filter circuits.
 - 9. Construct and analyze basic passive filters.
 - 10. Experiment with transformer to determine their characteristics.
- B. General Education Learning Outcomes (GELOs)
 - 1. GELO #3: Critical Thinking & Problem Solving
Outcome 1: Collect, identify, interpret and analyze data.

IV. CONTENT/TOPICAL OUTLINE

- A. Magnetism and Electromagnetism
 - 1. Principles of magnetic materials

2. Permanent and electromagnets
3. Application of magnetism in electronics
4. Magnetic properties, induction, hysteresis
5. Motors and generators
- B.** Capacitors and Inductors in DC circuits
 1. Principles and applications of capacitors in DC circuits
 2. Principles and applications of inductors in DC circuits
- C.** Residential Wiring Standards
 1. NMB wire
 2. Hot, Neutral, Earth Ground
 3. 2way, 3way, 4way Switching
 4. US standard voltages and frequency
 5. Analysis of Voltage and Current Waveforms
- D.** Sinusoidal Waveforms
 1. Mathematical relationships of RMS, PEAK, PEAK-TO-PEAK and average values
 2. Time & Frequency
 3. Phase Relationships
 4. 3 Phase Power
 5. Rotating vectors
 6. Instantaneous values
 7. AC meters response
- E.** Analysis of Passive components in AC circuits
 1. Resistors
 2. Capacitive Reactance (XC) & Inductive Reactance (XL)
 3. Phase Shift (ELI & ICE)
- F.** Series AC Circuits
 1. Circuit Phase Angle
 2. Series RC circuits
 3. Series RL circuits
 4. Series RLC circuits
 5. Frequency response of series AC circuits (Filters)
 6. Complex impedance, voltage and power calculations
 7. Series resonance
- G.** Parallel AC Circuits
 1. Parallel RL & RC circuits
 2. Parallel RLC circuits
 3. Parallel resonance
 4. Power Factor Correction (PFC)
 5. Complex conductance, current and power calculations
- H.** Transformers
 1. Transformers operation
 2. Reflected impedance
 3. Transformer open circuit & short circuit tests
 4. Autotransformers
- I.** Rectification & Filtering
 1. Semiconductor diodes
 2. Half wave rectifiers
 3. Full wave rectifiers
 4. Bridge rectifiers

V. INSTRUCTIONAL MATERIALS

- A. Required Text(s): *Floyd, Electronics Fundamentals: A Systems Approach*, 1st Edition, 2014
ISBN: 0-13-314363-5 (it says none in the bookstore)
- B. Supplies: Calculator, USB drive, tool kit, and 3 ring binder

VI. METHODS OF PRESENTATION/INSTRUCTION

- A. Methods of presentation typically include a combination of the following:
 - 1. Technology enhanced lecture
 - 2. Classroom discussion
 - 3. Interactive group activities
 - 4. Audio visual materials

VII. METHODS OF EVALUATION

- A. Methods of evaluation, although determined by the individual instructor, traditionally includes a combination of the following:
 - 1. Class Participation
 - 2. Daily assignments
 - 3. Written exams and/or quizzes
 - 4. Performance and observational assessment

VIII. SPECIFIC COURSE REQUIREMENTS

- A. A minimum grade of 60% is required.
- B. Credit by Examination: Credit for the course CANNOT be earned through Credit by Examination.