SOUTHWESTERN ILLINOIS COLLEGE

**COURSE SYLLABUS**

**EET 101: Introduction to Electricity and Electronics**

## GENERAL INFORMATION

**Instructor**:

**Class time**:

**Semester hours:** 5 **Lecture Hours:** 3.5 **Lab Hours:** 3

**Class Location Campus:** **Room:**

**Phone:**

**Toll Free in Illinois:** 1-866-942-SWIC (7942)

**Office Hours**:

**Office Location:**

**E-mail:**

 **Website:** www.swic.edu

### COURSE DESCRIPTION

This course is designed as the beginning course for those entering the electrical and/or electronics career field. The course’s primary focuses are to (1) inform students about the variety of specialty areas, categories of work relevant to the field, and educational requirements and opportunities that can lead to successful employment; (2) introduce students to the fundamental principles of electricity, basic DC and AC electrical circuits, electrical/electronic components, and electrical/electronic diagrams; and (3) provide the opportunity for students to become skilled in using common test equipment and tools used to construct, install, measure, and repair electrical wiring and cabling, and electrical/electronic systems and equipment. Student will learn to perform complete electrical analysis of complex dc and ac circuits consisting of resistors, capacitors, inductors and transformers connected in various series, parallel, and series-parallel configurations. Course will cover applications of these components in common electrical circuits and will begin teaching students basic troubleshooting skills.

### PREREQUISITES

None

### COURSE OBJECTIVES

* Describe the specialty areas, categories of work, and educational requirements and opportunities in the electrical and electronics career field
* Practice proper electrical/electronic safety procedures
* Define common terms used to describe/analyze electrical/electronic quantities and circuits
* Construct basic DC/AC electrical/electronic circuits and measure electrical quantities in those circuits using common test equipment and tools
* Identify physical electrical and electronic components
* Identify components on schematic or wiring diagram by their respective standard symbol
* Solder wires to terminals and components to circuit boards
* Analyze DC/AC electrical/electronic circuits using applicable electrical laws and formulas

**TEXTBOOK(S) AND OTHER REQUIRED MATERIALS**

DC/AC Fundamentals: A Systems Approach, Floyd, 1st Ed., 2013 (ISBN: 978-0-13-293393-3)

Experiments in DC/AC Fundamentals: A Systems Approach, Floyd, 1st Ed., 2013 (ISBN: 978-0-13-298986-2)

Scientific Calculator (TI84 preferred)

EET 101/111/121 Parts Kit

EET Soldering Projects

### GRADING PROCEDURE

A= 100-90

B= 89-80

C= 79-70

D= 69-60

F= 60 and below

### ATTENDANCE POLICY

College Policy: You are expected to be present for all assigned classes, lectures or laboratory sessions. If you are absent, you must show your instructor that your absence has been for a good cause. If you are absent more times during the semester that the number of times the class meets per week, you may be dropped from the course at the discretion of the instructor. When a student is dropped by an instructor with an effective date before the midterm date of the class a “W” will be recorded. When a student is dropped for non-attendance by an instructor with an effective date after the midterm date, the instructor will have the prerogative to assign a grade of “WF” or “W”.

### ADDITIONAL INFORMATION

**Disability & Access Center** - Students with disabilities who believe they may need accommodations are encouraged to contact the Disability & Access Center at 618-222-5368 or 618-234-3347 (TDD) to ensure accommodations are implemented in a timely fashion.

**Student Learning Outcomes** - The assessment of student learning is an integral part of the educational experience at Southwestern Illinois College. To this end, the faculty continually assess student learning to improve student success. Occasionally you will be requested to participate in college-wide and discipline specific assessment activities. Please take these assessments seriously. The data that is collected will provide valuable information to faculty and will be used to improve student learning at SWIC.

**Academic Dishonesty-College Policy -** Academic misconduct includes, but is not limited to cheating, plagiarism and forgery, failure or refusal to follow clinical practice standards, and soliciting, aiding, abetting, concealing, or attempting such acts. Plagiarism is defined as the act of representing the work of another as one’s own. Plagiarism may consist of copying, paraphrasing, or otherwise using written or oral work of another without proper acknowledgment of the source or presenting oral or written material prepared by another as one’s own.

**Phones in Classroom** – All cell phones and electronic devices should be turned off or silenced prior to entering the classroom.

### Academic Rigor Statement - You are enrolled in an academically rigorous college course. Your success in this course will require a significant investment of time outside of the class. According to the Administrative Rules of the Illinois Community College Board (section 1501.309), it is assumed that the student will invest two hours of outside study time for each hour of classroom lecture time and one hour of outside study time for each two hour laboratory session.

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### This course is approved under the Illinois Articulation Initiative (IAI). The IAI is based upon the assumption that community colleges and universities are equal partners in delivering lower-division baccalaureate courses. This course is considered equal in scope, quality, and rigor to comparable courses offered at other colleges and universities in Illinois.

# **Policy for Inclement Weather Conditions – D**uring times of inclement weather, Southwestern Illinois College has three options for dealing with the situation: cancel classes and cease all business, exercise the delayed-start option, or keep the college open. If the college chooses to use the delayed-start option rather than close, **the college will open at 10 a.m.** The decision to cancel classes or exercise the delayed-start option will be posted on the home page of Southwestern’s Web site at [www.swic.edu](http://www.swic.edu/) as well as broadcast on FOX 2 (KTVI), KMOV-TV Channel 4, KSDK-TV Channel 5, and radio stations KMOX-AM 1120 and WIL-FM 92.3.

**SWIC Know online orientation** - All new students are encouraged to participate in the SWIC Know online orientation, where students learn about the many programs and services available to help them succeed in college.  SWIC know orientation can be found at eSTORM.SWIC.edu.

**TOPICAL OUTLINE/SCHEDULE**

I. Careers and jobs in the electrical/electronic field

1. Specialty areas
2. Categories of work
3. Education requirements
4. Further education opportunities

II. Electrical Safety

1. Electrical shock
2. Arc flash
3. Ground fault interrupt
4. Lockout/tagout
5. Electrical fire hazards
6. Personal protective equipment
7. General precautions
8. Fall protection

III. Quantities and Units

1. Units of measurement
2. Scientific notation
3. Engineering notation
4. Metric unit conversions
5. Measured numbers

IV. Voltage, current, resistance

1. Atomic structure
2. Electrical charge
3. Current
4. Voltage
5. Polarity of voltages
6. DC vs AC
7. Resistance
8. Conductors, insulators, semiconductors
9. The electric circuit

V. Introduction to basic electrical components

1. Conductors
2. Resistors
3. Potentiometers
4. Capacitors
5. Inductors
6. Transformers
7. Switches (SPST, SPDT, DPST, DPDT, etc)
8. Lamps/lights
9. Fuses/circuit breakers
10. Diodes
11. Transistors
12. Assorted Integrated circuits

VI. Basic general purpose test equipment

1. Basic circuit measurements
2. Power sources (VVPS, function generator)
3. Measurement test equipment (VOM, DMM, Clamp on meters, Oscope)

VII. Ohm’s law

1. Relationship of current, voltage, and resistance
2. Current calculations
3. Voltage calculations
4. Resistance calculations

VIII. Energy and power

1. Energy and power
2. Power in an electrical circuit
3. Resistor power ratings
4. Energy conversion and voltage drop in resistance
5. Power supplies and batteries

IX. Series circuits

1. Resistors in series
2. Total series resistance
3. Current in a series circuit
4. Applications of Ohm’s Law
5. Voltage sources in series
6. Kirchoffs Voltage Law
7. Voltage dividers
8. Power in series circuits
9. Voltage measurements

X. Parallel circuits

1. Resistors in parallel
2. Voltage in a parallel circuit
3. Kirchoff’s Current Law
4. Total parallel resistance
5. Application of Ohm’s Law
6. Current sources in parallel
7. Current dividers
8. Power in parallel circuits
9. Parallel circuit applications

XI. Series parallel circuits

1. Identifying series-parallel relationships
2. Analysis of series-parallel resistive circuits
3. Voltage dividers with resistive loads
4. Loading effect of a voltmeter
5. Wheatstone bridge
6. Series and parallel power sources

XII. Source and load analysis

1. Constant voltage sources
2. Constant current sources
3. Source conversions
4. Maximum power transfer

XIII. Introduction to electrical/electronic diagrams

1. Block diagrams
2. Schematic diagram
3. Wiring diagrams
4. Line diagrams

XIV. Principles of Soldering

1. tools
2. techniques
3. practice and projects

XV. Magnetism and electromagnetism

1. The magnetic field
2. Electromagnetism
3. Electromagnetic devices
4. Electromagnetic induction
5. DC generator
6. DC motors

XVI. Alternating current and voltage

1. The sinusoidal waveform
2. Sinusoidal voltage and current values
3. Angular measurement of a sine wave
4. Sine wave formula
5. Introduction to phasors
6. Analysis of AC circuits
7. The alternator (AC generator)
8. The AC motor
9. Nonsinusoidal waveforms

XVII. Capacitors

1. Basic capacitor
2. Types of capacitors
3. Series capacitors
4. Parallel capacitors
5. Capacitors in DC circuits
6. Capacitors in AC circuits
7. Capacitor applications

XVIII. Inductors

1. Basic inductor
2. Types of inductors
3. Series inductors
4. Parallel inductors
5. Inductors in DC circuits
6. Inductors in AC circuits
7. Inductor applications

XIX. Transformers

1. Mutual inductance
2. Basic transformer
3. Ste-up and step-down transformers
4. Loading the secondary
5. Reflected load
6. Impedance matching
7. Transformer ratings and characteristics
8. Tapped and multiple winding transformers

XX. RC circuits

1. Series RC
2. Parallel RC
3. Power in RC circuits
4. RC applications

XXI. RL circuits

1. Series RL
2. Parallel RL
3. Power in RL circuits
4. RL applications

XXII. RLC circuits

1. Series RLC
2. Parallel RLC
3. Bandwidth of resonant circuits
4. RLC applications

XXIII. Frequency response and passive filters

1. Introduction to frequency response
2. Low pass
3. High pass
4. Band pass
5. Band stop

XIV. Time response in reactive circuits

1. RC integrators
2. RC differentiators
3. RL integrators
4. RL differentiators

XXV. Three phase systems in power applications

1. Generators in power applications
2. Types of three phase generators
3. Three phase source/load analysis
4. Three phase power

XXVI. Overview of power generation/transmission/distribution

1. Sources of power generation
2. Basic transmission and distribution system
3. Green power

PREPARED BY: Thomas Zach

CONTACT: 797-7456, 5432

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FOR ADDITIONAL INFORMATION, CONTACT: Bradley Sparks

 Dean, Technical Education

Southwestern Illinois College

2500 Carlyle Road

Belleville, IL 62221

(618) 797-7420, 5447

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