

ILLINOIS VALLEY COMMUNITY COLLEGE



COURSE OUTLINE

DIVISION: Workforce Development Division

COURSE: ELT-1000; Introduction to Electronics

Date: Fall 2013

Credit Hours: 3.0

Prerequisite(s): None

Delivery Method: **Lecture** **2 Contact Hours** (1 contact = 1 credit hour)
 Seminar **0 Contact Hours** (1 contact = 1 credit hour)
 Lab **2 Contact Hours** (2 contact = 1 credit hour)
 Clinical **0 Contact Hours** (3 contact = 1 credit hour)
 Online
 Blended

Offered: **Fall** **Spring** **Summer**

IAI Equivalent –**Only for Transfer Courses**-go to <http://www.itransfer.org>:

CATALOG DESCRIPTION:

Designed to cover the electrical knowledge necessary for students who have a background in basic mathematics but who need not have had any background in electricity and who wish to pursue an interest in electronics. The course covers fundamental concepts of electricity, Ohm's Law, batteries, simple electrical circuits, DC compound and bridge circuits, electrical conductors, electromagnetism, alternating currents, inductance, reactance, basic electrical meters, and fundamental operation of electronic devices.

GENERAL EDUCATION GOALS ADDRESSED

[See the last page of this form for more information.]

Upon completion of the course, the student will be able:

[Choose those goals that apply to this course.]

- To apply analytical and problem solving skills to personal, social and professional issues and situations.
- To communicate orally and in writing, socially and interpersonally.
- To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
- To understand and use contemporary technology effectively and to understand its impact on the individual and society.
- To work and study effectively both individually and in collaboration with others.
- To understand what it means to act ethically and responsibly as an individual in one's career and as a member of society.
- To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
- To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals.]

Upon completion of the course, the student will be able to:

1. Analyze and troubleshoot basic resistive DC circuits.
 - Competency 1.1. Interpret resistor color codes.
 - Competency 1.2. Explain relationships between voltage current and resistance using Ohms law.
 - Competency 1.3. Correctly and safely use a DMM.
 - Competency 1.4. Calculate and Safely measure volts, ohms, and amps in series and parallel circuits.
2. Analyze complex resistive DC circuits.
 - Competency 2.1. Correctly use kirchhoff's laws
 - Competency 2.2. Correctly design equivalent circuits.
 - Competency 2.3. Correctly use network theorems.
 - Competency 2.4. Safely Build and measure a complex DC circuit.
3. Understand the characteristics of basic AC circuit elements.
 - Competency 3.1. Correctly state the relationship of time and frequency.
 - Competency 3.2. Calculate inductive reactance.
 - Competency 3.3. Explain the use of and measurements of transformers.
 - Competency 3.4. Calculate capacitive reactance.
 - Competency 3.5. Calculate and measure impedance and phase angle.
4. Recognize semiconductor theory and how it relates to various solid state devices.
 - Competency 4.1. Correctly state what a semiconductor is.
 - Competency 4.2. Explain the basic uses of a diode.
 - Competency 4.3. Explain the basic uses and types of Transistors.

5. Recognize Logic skills

Competency 5.1 Correctly convert Numbers from Binary, Octal, Hexidicimal, BCD, and Digital.

Competency 5.2. Explain Logic gates.

Competency 5.3 Develop Truth Tables.

Competency 5.4 Intreprete Boolean Algibra..

COURSE TOPICS AND CONTENT REQUIREMENTS:

I. The Atom

- A. Introduction
- B. Static Electricity
- C. Atomic Energy

II. Dynamic Electricity

- A. Electrons in Motion

III. Ohm's Law in Direct Current Applications

- A. Ohm's Law for Direct Current
- B. Applications of Ohm's Law

IV. Electrical Circuits

- A. Series Circuits
- B. Parallel Circuits
- C. Series-Parallel Circuits
- D. More Advanced Circuit Types

V. Magnetism and Electromagnetism

- A. Magnetism
- B. Electromagnetism

VI. Simple Electrical Generators

- A. Introduction
- B. Primary Cells
- C. Secondary Cells
- D. Other Means of Generating Electricity
- E. Cells and Batteries in Circuits

VII. Direct Current Generators

- A. General Principles
- B. The Direct Current Armature
- C. Direct Current Field Structure

VIII. Alternating Current Principles

- A. Generation of Alternating Current
- B. Inductance in Alternating Current Circuits
- C. Capacitance in Alternating Current Circuits

IX. Electric Motors

- A. Principles of Operation
- B. Speed Characteristics of Direct Current Motors
- C. Alternating Current Motors

X. Transformers, Voltage Regulators, and Power Rectifiers

- A. Transformers
- B. Autotransformers and Regulators
- C. Regulators
- D. Power Rectifiers

- XI. Electrical Measuring Instruments
 - A. Direct Current Meters
 - B. Alternating Current Meters
 - C. Electronic Test Equipment
- XII. Solid State Devices
 - A. Introduction
 - B. Semiconductor Science
 - C. Semiconductor Devices
 - D. Diode Circuits
 - E. Transistor Circuits
- XIII. TTL Logic
 - A. Logic Gates
 - B. Truth Tables
 - C. Boolean Algebra
- XIV. Electrical/Electronic Safety
 - A. General
 - B. Responsibility
 - C. Electrical Shock
 - D. Rapid Rescue Techniques for Electrical Exposure
 - E. Sneaky Electrical Conductors
 - F. Battery handling
 - G. How to Control an Electrical Fire
 - H. Good Soldering Habits

INSTRUCTIONAL METHODS:

1. Lecture - discussion sessions will be used to present related information.
2. Problem solving will be utilized as a means of understanding Ohm's Law and series-parallel circuits.
3. Demonstrations will be given on proper operating procedure of electronic test equipment.
4. Video-tapes and movies will be used to reinforce or supplement related information.
5. Laboratory means of demonstrating circuit operation of electronic devices.

INSTRUCTIONAL MATERIALS:

Introduction to Electronics, Gates, 5th edition, 2007, Thompson Delmar
Introduction to Electronics, Lab Manual, 5th edition, 2007, Thompson Delmar

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

1. Students will be required to solve problems and demonstrate their ability and understanding of simple electronic circuits.
2. Students will perform basic laboratory experiments in bread-boarding electronic circuits.
3. Students will demonstrate ability to utilize test equipment for basic test measurements.

A= 90-100

B= 80-89

C= 70-79

D= 60-69

F= 0-59

OTHER REFERENCES

Challenge Software

MultiSim

ELVIS

Course Competency/Assessment Methods Matrix

ELT-1000; Introduction to Electronics		Assessment Options																																		
For each competency/outcome place an "X" below the method of assessment to be used.	Assessment of Student Learning	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment				
	Direct/ Indirect	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D										
Competency 1.1. Interpret resistor color codes.					X			X	X																											
Competency 1.2. Explain relationships between voltage current and resistance using Ohms law.					X			X	X																											
Competency 1.3. Correctly and safely use a DMM.					X			X	X																											
Competency 1.4. Calculate and Safely measure volts, ohms, and amps in series and parallel circuits.					X			X	X																											
Competency 2.1. Correctly use kirchhoff's laws					X			X	X						X																					
Competency 2.2. Correctly design equivalent circuits.					X			X	X						X																					
Competency 2.3. Correctly use network theorems.					X			X	X						X																					
Competency 2.4. Safely Build and measure a complex DC circuit.					X			X	X						X																					

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Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	Direct/ Indirect																															
Competency 3.1. Correctly state the relationship of time and frequency.				X			X	X						X														X	X			
Competency 3.2. Calculate inductive reactance.				X			X	X						X														X	X			
Competency 3.3. Explain the use of and measurements of transformers.				X			X	X						X														X	X			
Competency 3.4. Calculate capacitive reactance.				X			X	X						X														X	X			
Competency 3.5. Calculate and measure impedance and phase angle.				X			X	X						X														X	X			
Competency 4.1. Correctly state what a semiconductor is.			X	X										X															X			
Competency 4.2. Explain the basic uses of a diode.			X	X										X															X			
Competency 4.3. Explain the basic uses and types of Transistors.			X	X										X															X			
Competency 5.1 Correctly convert Numbers from Binary, Octal, Hexidicimal, BCD, and Digital.			X	X			X	X						X														X	X			
Competency 5.2. xplain Logic gates.			X	X			X	X						X														X	X			

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	Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	Direct/ Indirect	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D							
	Competency 5.3 Develop Truth Tables.			X	X			X	X						X														X	X			
	Competency 5.4 Intreprete Boolean Algibra.			X	X			X	X					X														X	X				