12/6/2024 DATE
☑ REQUIRED COURSE
☐ ELECTIVE COURSE

TEC DIVISION
☑ NEW COURSE
☐ REVISION

Lake Land College

Course Information Form

COURSE NUMBER:	AET-040		**TITLE:** *(30 Characters Max)*		Electrical Systems I						
SEM CR HRS:	1.5	**Lecture:**	1.0	**Lab:**	1.0	**ICCB Lab:**	1.0	**ECH:**	2.0		
Course Level:	☐ Gen Ed/IAI ☑ Career/Technical ☐ Baccalaureate/Non-IAI ☐ Dev Ed/Not in Degree Audit			**Clinical Practicum:**	0.0	**Work-based Learning:**	0.0	**WBL ECH:**	0.0		
COURSE PCS #	12 - 15.0303		**IAI Code**	N/A		**Contact Hours (Minutes/Week)**					
Repeatable (Y/N):	N	**Pass/Fail (Y/N):**	N	**Variable Credit (Y/N):**	N	**Min:**		**Max:**		**16 Wks**	100	**8 Wks**	200
Prerequisites:	None										
Corequisites:	None										
Catalog Description: (40 Word Limit)	How to read schematics; connect and operate electrical circuits; use a digital multimeter; use resistors, capacitors, and inductors in series and parallel circuits as well as electrical safety are covered. (Meets SACA Automation Specialist I C-201 Electrical Systems 1 credential.)										

List the Major Course Segments (Units)	Contact Lecture Hours	Contact Lab Hours	Clinical Practicum	Work-based Learning
Standard 201.1 Apply electrical system safety	1	1		
Standard 201.2 Connect and operate basic electrical circuits	2	2		
Standard 201.3 Interpret electrical schematics and diagrams	2	2		
Standard 201.4 Use a digital multimeter (DMM) to make electrical measurements	2	2		
Standard 201.5 Analyze basic load circuits (Ohms Law)	2	2		
Standard 201.6 Test and replace/reset fuses and circuit breakers	1	1		
Standard 201.7 Connect and operate basic reactive components	1	2		
Standard 201.8 Analyze basic combination circuits	2	2		
Standard 201.9 Troubleshoot basic series and parallel electrical circuits	2	3		
Standard 201.10 Connect and operate single-phase transformer circuits	1	1		
Standard 201.11 Analyze inductive circuits	2	2		
Standard 201.12 Analyze capacitive circuits	2	2		
TOTAL	20	22	0	0

EVALUATION							
QUIZZES	☑	**EXAMS**	☑	**ORAL PRES**	☑	**PAPERS**	☑
LAB WORK	☑	**PROJECTS**	☐	**COMP FINAL**	☑	**OTHER**	☐

COURSE MATERIALS		
TITLE:	Foundations of Electronics	
AUTHOR:	Meade	
PUBLISHER:	Delmar	
VOLUME/EDITION/URL:	6th edition	
COPYRIGHT DATE:	2007	

MAJOR COURSE SEGMENT	HOURS	LEARNING OUTCOMES
		The student will be able to:
Standard 201.1 Apply electrical system safety	2	Performance Indicators 1. Perform a lockout/tagout. 2. Identify electrical hazards. Knowledge Indicators 1. Describe how to identify electrical hazards. 2. Describe PPE/ safe dress for operating electrical systems. 3. Describe how to determine if equipment is properly grounded. 4. Describe the basic rules of electrical safety. 5. Describe the basic elements of NFPA 70E Arc Flash and live cabinet safety rules.

Standard 201.2 Connect and operate basic electrical circuits	4	Performance Indicators 1. Use an AC tester to check a wall outlet power. 2. Connect and operate a power supply. 3. Connect and operate circuits that use knife, push button and selector switches. 4. Connect and operate circuits that use resistors, buzzers and lamps. 5. Connect and operate basic series and parallel circuits. Knowledge Indicators 1. Define electricity and give an application. 2. Describe the two types of electrical current: AC and DC. 3. Describe the operation of a circuit tester. 4. Describe the basic operation of common input and output devices. 5. Define series and parallel circuits. 6. Describe the operation of two types of power supplies: AC and DC. 7. Describe the operation of NO and NC switch contacts.
Standard 201.3 Interpret electrical schematics and diagrams	4	Performance Indicators 1. Identify the schematic symbols for resistors, transistors, transformers, lamps, motors, solenoids, meters, fuses and switches. 2. Identify series and parallel circuits in a schematic. 3. Interpret a basic electrical schematic. Knowledge Indicators 1. Describe resistor color codes. 2. Describe the function of an electrical schematic. 3. Explain the difference between a schematic and a wiring diagram.
Standard 201.4 Use a digital multimeter (DMM) to make electrical measurements	4	Performance Indicators 1. Use a DMM to measure voltage drops in series and parallel circuits. 2. Use a DMM to measure current in series and parallel circuits. 3. Use a DMM to measure the resistance of a component. 4. Measure the resistance in series and parallel circuits. 5. Use a DMM to test wire continuity. Knowledge Indicators 1. Define voltage and give its units of measurement. 2. Describe the basic operation of a digital multimeter. 3. Describe the basic operation of a clamp-on ammeter. 4. Describe the voltage characteristics of series and parallel circuits. 5. Define current and give its units of measurement. 6. Describe current characteristics of series and parallel circuits. 7. Define resistance and give its units of measurement. 8. Describe the resistance characteristics of series and parallel circuits. 9. Describe two methods of measuring continuity.
Standard 201.5 Analyze basic load circuits (Ohms Law)	4	Performance Indicators 1. Calculate voltage, current, and resistance in a series circuit. 2. Calculate the total power used in a series circuit. 3. Calculate the main line current in a parallel circuit. 4. Calculate the total parallel resistance. 5. Calculate the total power used in a parallel circuit. Knowledge Indicators 1. State Ohm's Law and explain its importance. 2. State Kirchhoff's Voltage and Current Laws and explain their importance. 3. Define power and give its units of measurement.
Standard 201.6 Test and replace/reset fuses and circuit breakers	2	Performance Indicators 1. Test and replace a fuse 2. Test and reset a circuit breaker Knowledge Indicators 1. Describe the function and application of two types of circuit protection 2. Describe the operation of a fuse 3. Describe the operation of two types of circuit breakers 4. Describe how fuses and circuit breakers are rated

Standard 201.7 Connect and operate basic reactive components	3	Performance Indicators 1. Connect and operate a circuit with an inductor. 2. Connect and operate a circuit with a capacitor. 3. Discharge a capacitor. 4. Test a capacitor with a DMM. Knowledge Indicators 1. Define electromagnetism and give an application. 2. Describe the operation of an inductor and give its schematic symbol. 3. Describe the effect of an inductor in an AC and DC circuit and give an application. 4. Describe the operation of a capacitor and its schematic symbol. 5. Describe the effect of a capacitor in an AC and DC circuit and give an application. 6. Describe the functions of 3 types of capacitors.
Standard 201.8 Analyze basic combination circuits	4	Performance Indicators 1. Trace the current path in a combination circuit. 2. Connect and operate a basic lighting circuit. 3. Connect and operate a voltage divider network. 4. Connect and operate a rheostat as a load dimmer. 5. Design a voltage divider network given parameters. 6. Solve a combination circuit. Knowledge Indicators 1. Define a series-parallel circuit. 2. Describe how to identify series and parallel circuit sections. 3. Describe the operation of 3 types of voltage dividers.
Standard 201.9 Troubleshoot basic series and parallel electrical circuits	5	Performance Indicators 1. Locate a short circuit in a basic series or parallel circuit. 2. Locate an open circuit in a basic series or parallel circuit. Knowledge Indicators 1. Explain the effects of short and open circuits. 2. Describe how to troubleshoot short and open circuits. 3. Describe the basic steps for troubleshooting an open circuit.
Standard 201.10 Connect and operate single-phase transformer circuits	2	Performance Indicators 1. Connect and operate a transformer. 2. Test a transformer. 3. Size a transformer. 4. Design a control transformer circuit to provide a given output voltage. Knowledge Indicators 1. Describe the operation of a transformer. 2. Describe the function of a control transformer. 3. Describe the function/ application of a secondary tap on a transformer.
Standard 201.11 Analyze inductive circuits	4	Performance Indicators 1. Calculate the total load on an AC inductive circuit. 2. Calculate the total inductance in series and parallel circuits. 3. Calculate the current load on a transformer. 4. Calculate the secondary coil voltage of a transformer. Knowledge Indicators 1. Describe how to calculate total series inductance and inductive reactance. 2. Describe how to calculate total parallel inductance and inductive reactance.
Standard 201.12 Analyze capacitive circuits	4	Performance Indicators 1. Calculate the total load on an AC capacitive circuit. 2. Calculate the time to charge and discharge a capacitor. 3. Calculate the total capacitance in series and parallel circuits. Knowledge Indicators 1. Describe how to calculate total series capacitance and capacitive reactance. 2. Describe how to calculate total parallel capacitance and capacitive reactance.
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Outcomes*	Outcome Title	At the successful completion of this course, students will be able to:
Course Outcome 1	ElectrCirc AET040	Connect and operate basic electrical circuits safely.
Course Outcome 2	Use DMM AET040	Properly use a DMM
Course Outcome 3	Ohms Law AET040	Demonstrate proficiency with Ohms law
Course Outcome 4	InductCirc AET040	Calculate reactance and phase shift properly in an inductive circuit.
Course Outcome 5	CapactCirc AET040	Calculate reactance and phase shift properly in a capacitive circuit.
Primary Laker Learning Competency	Creative Thinking & Problem Solving: Students think creatively to solve problems.	
Secondary Laker Learning Competency	Communication: Students communicate through the exchange of information.	

**Course and program outcomes will be used in the software for outcomes assessment and should include at least 1 primary and 1 secondary Laker Learning Competency. Limit to 3-5.*