

9/3/2024 DATE
☒ REQUIRED COURSE
☐ ELECTIVE COURSE

TEC DIVISION
☒ NEW COURSE
☐ REVISION

Lake Land College

Course Information Form

COURSE NUMBER:	APT-052		TITLE: (30 Characters Max)		Motor Ctrl Troubleshooting I								
SEM CR HRS:	1	Lecture:		0.5	Lab:	1	ICCB Lab:	1	ECH:	1.5			
Course Level:	<input type="checkbox"/> Gen Ed/IAI <input type="checkbox"/> Baccalaureate/Non-IAI		<input checked="" type="checkbox"/> Career/Technical <input type="checkbox"/> Dev Ed/Not in Degree Audit		Clinical Practicum:	0	Work-based Learning:	0	WBL ECH:	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	75	8 Wks	150
Prerequisites:	APT-046, APTC-046 or consent of the instructor												
Corequisites:	None												
Catalog Description: (40 Word Limit)	Students learn skills in troubleshooting motor control components, using a clamp-on ammeter and VOM and troubleshooting motor control circuits including VFDs. (Meets SACA Automation Specialist I C-204 Motor Control Troubleshooting 1 credential.)												

List the Major Course Segments (Units)	Contact Lecture Hours	Contact Lab Hours	Clinical Practicum	Work-based Learning
Standard 204.1 Troubleshoot motor control components	1	4		
Standard 204.2 Use a clamp-on ammeter to measure motor current	1	1		
Standard 204.3 Troubleshoot 2/3-wire motor control circuits	1	3		
Standard 204.4 Troubleshoot reversing motor control circuits	1.25	3		
Standard 204.5 Troubleshoot motor control circuits with automatic input devices	1.25	3		
Standard 204.6 Troubleshoot timer control circuits	1.25	3		
Standard 204.7 Troubleshoot an AC VFD motor control system	1.25	3.5		
TOTAL	8	20.5	0	0

EVALUATION							
QUIZZES	<input checked="" type="checkbox"/>	EXAMS	<input checked="" type="checkbox"/>	ORAL PRES	<input checked="" type="checkbox"/>	PAPERS	<input checked="" type="checkbox"/>
LAB WORK	<input checked="" type="checkbox"/>	PROJECTS	<input type="checkbox"/>	COMP FINAL	<input checked="" type="checkbox"/>	OTHER	<input type="checkbox"/>

COURSE MATERIALS	
TITLE:	Electric Motors and Control Systems
AUTHOR:	Petruszella
PUBLISHER:	McGraw Hill
VOLUME/EDITION/URL:	2nd edition
COPYRIGHT DATE:	2010

MAJOR COURSE SEGMENT	HOURS	LEARNING OUTCOMES
		<i>The student will be able to:</i>
Standard 204.1 Troubleshoot motor control components	5	Performance Indicator 1. Test motor control circuit components: indicator lamps, manual switches, control relays, motor contactors and overload relays. 2. Test the windings of a 3-phase motor with a digital multimeter. 3. Test the windings of a control transformer with a digital multimeter. Knowledge Indicator 1. Describe the electric motor faults. 2. Describe 3-phase motor starter faults. 3. Describe manual switch faults. 4. Describe control transformer faults. 5. Describe types of in-circuit component tests.
Standard 204.2 Use a clamp-on ammeter to measure motor current	2	Performance Indicator 1. Use a clamp-on ammeter to measure AC current draw in a 3-phase circuit. Knowledge Indicator 1. Describe the operation of a clamp-on ammeter.

Standard 204.3 Troubleshoot 2/3-wire motor control circuits	4	Performance Indicator 1. Troubleshoot a 2-wire motor control system. 2. Troubleshoot a 3-wire motor control system. Knowledge Indicator 1. Describe a 6-step troubleshooting sequence. 2. Describe methods of systems level troubleshooting and give advantages of each. 3. Describe methods used to analyze circuit signals. 4. Describe how to isolate a bad component using the output-back and half-split troubleshooting methods. 5. Describe faults, symptoms, and causes of 2 and 3-wire motor control circuits.
Standard 204.4 Troubleshoot reversing motor control circuits	4.25	Performance Indicator 1. Troubleshoot a reversing motor control circuit. 2. Troubleshoot a motor control circuit that has manual and automatic modes. Knowledge Indicator 1. Describe faults, symptoms, and causes of reversing motor control circuits.
Standard 204.5 Troubleshoot motor control circuits with automatic input devices	4.25	Performance Indicator 1. Test an automatic input switch. 2. Troubleshoot a motor control circuit with automatic input devices. 3. Troubleshoot a motor control sequence control circuit. Knowledge Indicator 1. Describe how to test an automatic input device with a multimeter. 2. Describe automatic input switch faults. 3. Describe how to troubleshoot a sequence circuit.
Standard 204.6 Troubleshoot timer control circuits	4.25	Performance Indicator 1. 1. Test a timer relay. 2. Troubleshoot an On-Delay timer circuit. 3. Troubleshoot an Off-Delay timer circuit. Knowledge Indicator 1. Describe the methods used to test a timer relay.
Standard 204.7 Troubleshoot an AC VFD motor control system	4.75	Performance Indicator 1. Troubleshoot an AC VFD motor control system. 2. Use status and diagnostic indicators to troubleshoot a VFD system. Knowledge Indicator 1. Describe types of VFD processor faults. 2. Describe a VFD systems troubleshooting process.
28.5		

Outcomes*		At the successful completion of this course, students will be able to:
Course Outcome	Standard 204.2 Use a clamp-on ammeter to measure motor current.	
Course Outcome	Standard 204.3 Troubleshoot 2/3-wire motor control circuits.	
Course Outcome	Standard 204.4 Troubleshoot reversing motor control circuits.	
Course Outcome	Standard 204.5 Troubleshoot motor control circuits with automatic input devices.	
Course Outcome	Standard 204.6 Troubleshoot timer control circuits.	
Course Outcome	Standard 204.7 Troubleshoot an AC VFD motor control system.	
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.