

COURSE SYLLABUS

Course Title:	Industrial Motor Controls	Date submitted:	May 2019 (AAC: 19-25)	
Department:	Advanced Manufacturing Technology			
Curriculum:	Technology Studies			
Course Descriptors: Make certain that the course descriptors are consistent with college and Board of Trustees policies, and the current course numbering system.	Course Code: (eg. ACC 101) <input type="text" value="MFG*143"/>	Prerequisites:		
	Course Type: <input type="text" value="X"/>	Math for Electricity & Electronics (MFG*133), Circuit Theory I (MFG*137), Digital Fundamentals (MFG*138), Circuit Theory II (MFG*139), and Robotics (MFG*140) or consent of the instructor		
	A: Clinical B: Lab D: Distance Learning I: Individual/Independent L: Lecture N: Internship M: Seminar P: Practicum U: Studio X: Combined Lecture/Lab Y: Combined Lecture/ Clinical/Lab Z: Combined Lecture/Studio	Corequisites:		None
	Elective Type: <input type="text" value="G"/>	None		
	AH: Art History E: English FA: Fine Arts FL: Foreign Language G: General HI: History HU: Humanities LAS: Liberal Arts & Sciences M: Math S: Science SS: Social Science	Other Requirements:		None
	Credit Hours: <input type="text" value="3"/>	None		
	Developmental: (yes/no) <input type="text" value="No"/>	None		
	Lecture: <input type="text" value="1.5"/>	None		
	Clinical: <input type="text" value="0"/>	None		
	Contact Hours:	None		
Lab: <input type="text" value="1.5"/>	None			
Studio: <input type="text" value="0"/>	None			
Other: <input type="text" value="0"/>	None			
TOTAL: <input type="text" value="3"/>	None			
Class Maximum: <input type="text" value="24"/>	None			
Semesters Offered:	None			
Fall, Spring	None			
Catalog Course Description:	The process of motor control is integral to the flow of the product from raw material to finished product. Industrial Motor Controls will familiarize you with the following: principles of solid-state control devices and their components (such as: semiconductors, PN junction, Zener diodes, and the transistors); AC and DC motor controls; motor drives; control circuits; motor starters and pilot devices.			
Topical Outline: List course content in outline format.	<ol style="list-style-type: none"> 1. General Principles of Electric Motor Control 2. Float Switches, Flow Switches & Sensors, Solenoid Valves, Temperature Sensing Devices 3. Pushbuttons & Control Stations, Relays and Contactors 4. Hall Effect Sensors, Proximity Detectors, Photodetectors, The Control Transformer 			

	<ol style="list-style-type: none"> 5. Fractional and Integral Horsepower Manual Motor Starters, Magnetic Line Voltage Starters 6. Hand-off Automatic Controls, Multiple Push-button Stations, Interlocking Methods for Reversing Control 7. Sequence Control, Jogging Control Circuits, Plugging 8. Across-the-Line Starting 9. The Motor & Starting Methods, Primary Resistor Starters, Autotransformer Starters, Automatic Starters for Star-delta Motors. 10. Synchronous Motor Operation, Synchronous Automatic Motor Starter 11. Variable Speed AC Motor Control, Magnetic Clutch and Magnetic Drive, Motor Installation 12. Digital Logic, Programmable Controllers, Programming a PC 13. Semiconductors, The PN Junction, The Zener Diode, The Transistor 14. The Unijunction Transistor, The SCR, The Diac, The Triac
<p>Outcomes: Describe measurable skills or knowledge that students should be able to demonstrate as evidence that they have mastered the course content.</p>	<p>Upon successful completion of this course, the student will be able to do the following:</p> <ol style="list-style-type: none"> 1. Demonstrate an understanding of the general principles of Electric Motor Controls. 2. Discuss the family of pilot devices used in motor control and install and troubleshoot them. 3. Select, install and troubleshoot push-button stations, relays and contactors. 4. Demonstrate an understanding of specialized sensing devices, as well as, install and troubleshoot them. 5. Select, install and troubleshoot fractional and integral horsepower manual motor starters and magnetic line voltage starters. 6. Select, install and troubleshoot hand-off automatic control circuitry, multiple-push-button stations, and methods of interlocking to include mechanical and electrical. 7. Select, install and troubleshoot systems for sequence control, jogging, and plugging. 8. Demonstrate an understanding of timing relays, pressure switches, and regulators and demonstrate the ability required to select, install and troubleshoot same. 9. Discuss “across the line starting” circuitry and identify this method of motor starting from diagrams. 10. Identify and discuss the various systems of reduced voltage starting; identify the systems from diagrams, and install and troubleshoot systems. 11. Describe synchronous motor operation and methods of controlling the synchronous motor. 12. Describe various systems used in industry to control the speed of AC motors, magnetic clutches and drives, and install a variety of AC motors. 13. Describe methods of solid state motor control including digital logic, PC’s, and PLC’s. 14. Identify and discuss solid devices making up solid state motor control circuitry including diodes, Zenor diodes, and transistors. 15. Identify and discuss solid state devices making up solid state motor control circuitry including the unijunction transistor, SCR’s, Diac’s, triac’s.

	<p>PROGRAM: <i>Electronics Technology Certificate and A.S. Degree</i></p> <ol style="list-style-type: none"> 1. Demonstrate an understanding of Shop Safety. 2. Demonstrate an understanding the theory of electrical structure, voltage, current, resistance, and electrical circuit and their measurement. 3. Demonstrate an understanding of the basic laws of arithmetic. 4. Demonstrate an understanding of several number systems and codes that are the foundation of digital theory and digital applications. 5. Make comparisons with personal computers; as well as, develop an understanding of its origin and growth since conception. 6. Demonstrate an understanding of the fundamentals of Automated Manufacturing systems.
	<p>GENERAL EDUCATION: <i>(Numbering reflects General Education Outcomes as they appear in the college catalog)</i></p> <p>[Select the General Education Abilities from the listing below.]</p> <p>No General Education outcomes.</p>
<p>Evaluation: List how the above outcomes will be assessed.</p>	<p>Assessment will be based on the following criteria:</p> <ol style="list-style-type: none"> 1. Tests and quizzes
<p>Instructional Resources:</p> <p>List library (e.g. books, journals, on-line resources), technological (e.g. Smartboard, software), and other resources (e.g. equipment, supplies, facilities) required and desired to teach this course.</p>	<p>Required: Full electronics lab</p> <p>Desired: None</p>
<p>Textbook(s)</p>	<p><u>Industrial Motor Control</u>, Stephen L. Herman, Delmar Publishers, Inc., latest edition</p> <p><u>National Electrical Code</u>, NFPA, latest edition</p>