

Industrial Machine Mechanic		Course to Program Map					
Program Outcomes: Upon completion of the program, graduates will be able to...	Institutional Skills	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
Courses							
INPR 114 OSHA 10	CPW	IA					
INPR 131 Shop Operations	CPW	IRA	IRA	RA			
INPR 101 Basic Electricity	CPW	RA	IRA		IRA		IRA
INPR 132 Electro-Mechanical Print Reading	CPW				IA	IA	IA
INPR 185 Industrial Wiring	CPW	IRA			IRA		IRA
MATH 107T Math for Tech	CPW		IA		IRA	IA	
INPR 231 Fundamentals of Motor Control	CPW	IRMA	IA		IRMA		IA
INPR 233 Variable Speed Motor Controls	CPW	RA			IRMA		
INPR 134 Mechanical Systems	CPW	RA	IRMA	IRMA		IRMA	
INPR 255 Mechanical Systems Reliability	CPW	RMA	IRMA	IRMA		IRMA	
INPR 258 Intro to Conveyor Systems	CPW	RA		IRMA		IRMA	
INPR 160 Fluid Power I	CPW	RA		IRA		IRMA	
INPR 170 Fluid Power II	CPW	RA		IRA		IRA	
INPR 100 Industrial Process Control	CPW		RA				IRMA

Mapping	
I	Introduced
R	Reinforced
M	Mastered
A	Assessed/Artifact

Essential Skills	
1	written communication
2	oral communication
3	critical thinking
4	cultural diversity
5	social responsibility

Employability Skills	
C	communication
P	problem solving
W	work ethic

INPR 190 Industrial Programmable Logic Controls	CPW	RA	IA		RA		IRA
INPR 242 Troubleshooting Industrial PLCs	CPW	RA	RA	RA	IRA		IRA
INPR 180 Automation Systems and Robotics	CPW	RA	IRA				IRA
INPR 122 Intro to Manufacturing Welding	CPW	IA	IA				

INPR 114 OSHA 10	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
explain the importance of OSHA in providing a safe and healthful workplace to workers.	IA					
protect themselves from walking/working hazards including fall hazards.	IA					
select appropriate personal protective equipment for common industry hazards.	IA					
Recognize hazards and best practices associated with the following:						
emergency action plans, fire prevention plans, and exit routes	IA					
electrical safety	IA					
hazard Communication, Global Harmonizing System (GHS)	IA					
material Handling	IA					
industrial Hygiene	IA					
bloodborne Pathogens	IA					
ergonomics	IA					
safe Driving	IA					
workplace Violence	IA					

INPR 131 Shop Operations	Curriculum Map						
	Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to						
identify and explain jobsite safety hazards and how to prevent them.	RA	RA					
identify and use the mathematic principles used within industry.							
identify and use the different types of hand tools used in industry.	IA	IA					
identify and use the different types of power tools used in industry.	IA	IA					
identify and describe various types of construction drawings, including their fundamental components and features.	IA						
identify and describe various types of rigging slings, hardware, and equipment.	IA						
describe communication skills needed to be successful in industry.	IA						
describe and explain the importance of basic employability skills.	IA						
identify material handling concepts and equipment.	RA	RA	RA				

INPR 101 Basic Electricity	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
explain safety practices to prevent electrical shock while working with electricity and performing electrical maintenance.	RA	IRA		I		I
describe proper PPE usage to prevent electrical shock.	RA	RA		RA		RA
perform lockout/tagout.	RA	RA		RA	RA	RA
describe the major parts of an atom, the nature of an electric charge, and how electrons move through a conductor.				I		I
describe the AC terms cycle, period, and power factor, and the formulas for calculating their values.				I		I
explain voltage, voltage polarity, the unit of voltage, and different names for voltage.				I		I
describe electrical insulators, conductors, principle of resistance, and the unit of resistance.				I		I
describe AC current and voltage waveforms and the principles of three-phase current.				I		I
demonstrate using Ohm's Law to solve for an unknown value of voltage, current, or resistance.	RA			IRA		IA
calculate voltage, voltage drops, current, resistance, and power in series, parallel and series-parallel electrical circuits.				IRA		IA
calculate AC power in resistive, inductive, and capacitive circuits.				IRA		IA
demonstrate correct meter settings and proper meter placement in a circuit to measure voltage, current, and resistance.	RA			IRA		IA
demonstrate the correct use of the following: clamp-on ammeter, megohmmeter.	RA			IRA		IA
describe the features of common digital and analog multimeters and their primary differences.				I		I
connect, operate, and troubleshoot basic electrical circuits.	RA	IA		IRA		IA

explain the principles of electromagnetism, reluctance, induced voltage, and inductance.						
explain how capacitors, inductors and resistors function in AC, DC, series and parallel circuits.						

INPR 132 Electro-Mechanical Print Reading	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
Course SLO: Students will be able to						
distinguish between the different types of lines and various abbreviations used to identify print features.				IA		IA
describe various component parts of a print, including schedules, title blocks, notes, and detail drawings.				IA		IA
differentiate between various types of common industrial drawings.				IA		IA
identify common industrial equipment using symbols and abbreviations.				IA		IA
describe the major characteristics of each type of electrical and electronic diagram.				IA		IA
compare special functions included on ladder diagrams and PLC programming diagrams.				IA		IA
compare the applications and component arrangements of wiring diagrams and schematic diagrams.				IA		IA
describe the basic rules of ladder diagrams.				IA		IA
describe and compare the number systems used in control logic circuits.				IA		IA
describe the purpose of each logic function and the device arrangements used to form each one.				IA		IA
describe the voltages, basic arrangement, and typical uses for the most common types of electrical services.				IA		IA
compare the use of plug and receptacle configurations for different electrical services.				IA		IA
describe the use of color-coding in various electrical services.				IA		IA
describe and identify the advantages/disadvantages of common types of wiring methods.				IA		IA
describe the purpose of layout and location drawings.				IA		IA
compare the similarities and differences between hydraulic, pneumatic, and electrical systems.				IA	IA	IA

describe the operation, symbol, and typical variations of each of the common types of fluid power devices.				IA	
describe the characteristics of piping and instrumentation diagrams (P&IDs) regarding scale, equipment locations, and process details.					IA

INPR 185 Industrial Wiring	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
understand how electrical tools and test instruments work that are used when installing industrial wiring.	RA			RA		RA
describe the National Electrical Code (NEC) and how to use it.	IA			IA		IA
identify and interpret electrical drawings and schematics used to install industrial wiring.				RA		RA
properly select, route, splice, and terminate electrical conductors in an industrial electrical system.	IA			RA		RA
properly support and protect cables and conductors from physical damage.	IA			IA		IA
select and install correct electrical enclosures, boxes, conduit bodies, and fittings.				IA		IA
identify and describe industrial electrical distribution systems.				RA		RA
understand and describe the different types of electrical circuits and the devices used within them.				RA		RA
understand and describe the different types of locations in which industrial wiring can be installed.				RA		RA
identify and describe structured cabling systems.				RA		RA

MATH 107T Math for Tech	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
factor quadratic expressions, expressions of quadratic form, special forms, and factor by grouping.						
perform addition, subtraction, multiplication, and division on rational expressions.				RA		
simplify complex fractions.						
apply the laws of exponents to simplify expressions containing rational exponents.		IA			IA	
apply the laws of radicals to perform addition, subtraction, and multiplication on expressions involving radicals. Rationalize denominators containing radicals.				IA	IA	
simplify radicals containing negative radicands. Perform arithmetic operations on complex numbers.						
evaluate functions using function notation.						
solve linear inequalities in one variable showing solutions both on the real number line and in interval notation.						
solve literal equations, including those that require factoring.						
solve systems of linear equations in two variables.						
solve equations by factoring and quadratic formula.						
solve equations containing rational expressions.				IA	IA	
solve equations involving radicals.						
solve linear absolute value equations and inequalities in one variable.						
develop and solve mathematical models including variation, mixture, motion, work, and geometrical applications.					IA	
graph quadratic functions.						

find an equation of a line given either sufficient information (two points) or a particular condition (perpendicular to a given line, parallel to a given line through a specific point, through a specific point with a given slope, etc.).					
calculate the distance between two points.				IA	
distinguish between functions and relations using the Vertical Line Test.					
find the domain and range of a function given its graph.					
find missing angles of polygons.					
solve right triangles.				IA	
use Pythagorean Theorem to solve application problems.				IA	
find the areas of common geometric shapes: Quadrilaterals, Circles Triangles etc.				IA	
find length of arcs and associate angles.					
use trigonometric ratios to solve problem.				IA	
finding trigonometric values and angles using a calculator.				IA	
represent data by bar charts.					
represent data by Pie charts.					
find linear regression that models a data.					
find measures of central tendency.					
find measures of dispersion.					
find profit and loss					
estimate simple and compound interest					
solve problem using the discount, depreciation and commission.					
find the probability of an event.					

INPR 231 Fundamentals of Motor Control	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
Course SLO: Students will be able to						
identify, read, interpret, and label control circuitry ladder diagrams.				RAM		
draw control circuit ladder diagrams using the proper symbology from a functional description.				RAM		
identify and describe the functional characteristic of mechanical input control devices.				IRAM		
explain how to select the proper transformer based off circuit requirements.		IA		IA		
troubleshoot transformers.	IAM			IA		
identify and describe the operational characteristics of different types of AC motors.				IA		
identify and explain how abnormal conditions affect AC motors.				IA		
troubleshoot AC motors and the control circuitry.	IAM			IA		IA
identify, explain, and properly wire in different AC motor control circuit configurations.				IA		

INPR 233 Variable Speed Motor Controls	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
identify and explain the different types of electric motor drives.				IA		
understand and explain electric motor load and power requirements.				RA		
identify, compare, and explain the different types of electric motor control.				IA		
describe and explain solid-state electric drive operation fundamentals.				IA		
understand electric motor drive installation procedures.				IA		
list and describe parameters used in electric drive motor programming.				IA		
select and install electric motor drives.	RA			IRAM		
troubleshoot electric motor drives using proper test equipment.	RA			IRAM		

INPR 134 Mechanical Systems	<i>Curriculum Map</i>					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
identify shaft size using precision measuring instruments.	RA	IRAM	IRAM		IRAM	
demonstrate shaft alignment using a flexible jaw coupling and a straight edge and feeler gauge.	RA	IRAM	IRAM		IRA	
select, measure, and install a key fastener to locate a hub on a shaft.	RA	IRAM	IRAM		IRA	
demonstrate shaft alignment skills necessary to install chain, grid, and gear couplings using the straight edge and feeler gage method.	RA	IRAM	IRAM		IRA	
demonstrate selection, maintenance and troubleshooting of a variety of couplings.	RA	IRA	IRA		IRA	
calculate sprocket ratio, shaft speed, and torque of a chain drive system.	RA	IRAM	IRAM		IRAM	
demonstrate installation and alignment of a chain drive system to include the use of master link connectors. Determine allowable chain sag and adjust chain tension.	RA	IRAM	IRAM		IRAM	
calculate pulley ratio, shaft speed, and torque of a v-belt drive system.	RA	IRAM	IRAM		IRAM	
demonstrate installation and alignment of a v-belt drive system. Calculate allowable belt deflection and adjust tension.	RA	IRMA	IRMA		IRAM	
demonstrate installation and alignment of spur gear drive system. Determine and adjust backlash in gear drive system.	RA	IRAM	IRAM		IRAM	
identify, specify, and select v-belts and their drive components. Demonstrate maintenance and troubleshooting skills for v-belt drives.	RA	IRAM	IRAM		IRAM	
explain the purpose and application of different types of lubrication.			IA		IA	

INPR 255 Mechanical Systems Reliability	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
identify various types of plain bearings and their applications, installation and maintenance.			IRAM		IRAM	
demonstrate how to install, maintain, and specify plain and anti-friction bearings.	RAM	IRAM	IRAM		IRAM	
demonstrate selection, maintenance, and troubleshooting of a variety of couplings.	RAM	RAM	RAM		RAM	
calculate gear ratio, shaft speed, and torque of a gear drive system.					IRAM	
select and identify gears for a given application.					IRAM	
explain laser shaft alignment principles and operation.			IA		IRAM	
demonstrate vertical parallel and vertical angular alignment.	RAM		IRAM		IRAM	
demonstrate horizontal parallel and horizontal angular alignment.	RAM		IRAM		IRAM	
explain vibration concepts, resonant frequency and sympathetic vibration.			IA		IRA	
demonstrate velocity, acceleration and spike energy measurement with vibration meter.	RAM		RAM		RAM	

INPR 258 Intro to Conveyor Systems	<i>Curriculum Map</i>					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
explain conveyor safety.	RA				RA	
identify and explain the use of roller conveyors and their components.					IRA	
identify and explain the use of belt conveyors and their components.					IRA	
identify and explain the use of chain conveyors and their components.					IRA	
identify and explain the use of screw conveyors and their components.					IRA	
identify and explain the use of pneumatic conveyors and their components.					IRA	
identify and explain types of fans.					IRA	
explain how to install fans.					IRA	
identify and explain types of blowers.					IRA	
explain how to install blowers.					IRA	
maintain, troubleshoot, and repair belt and roller conveyors.			IRA		IRA	
maintain, troubleshoot, and repair chain conveyors.			IRA		IRA	
maintain, troubleshoot, and repair screw conveyors.			IRA		IRA	
maintain, troubleshoot, and repair pneumatic conveyors.			IRA		IRA	
identify and describe the conveyor belting and belt series.					IRA	
demonstrate the proper method of belt removal and reinstallation on the conveyor.	RA		IRA		IRA	
identify the correct catenary's sag for the conveyor belt.					IRAM	
demonstrate the proper methods of aligning and adjusting belt length.	RA		IRAM		IRAM	

INPR 160 Fluid Power I	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
Course SLO: Students will be able to						
identify and explain centrifugal pumps.					IRA	
identify and explain rotary pumps.					IRA	
identify and explain reciprocating pumps.					IRA	
identify and explain meter pumps.					IRA	
identify and explain vacuum pumps.					IRA	
explain net positive suction head and cavitation.					IRA	
identify types of drivers.					IRA	
inspect a pump.					IA	
troubleshoot a pump.	RA		IRA		IRA	
prepare a pump for shutdown and repair.					IRA	
remove a pump from the system.					I	
disassemble a pump.					I	
reassemble a pump.					I	
install a pump.					I	
prepare a checklist for pump startup.					IA	
identify types of valves that start and top flow.					IA	
identify types of valves that regulate flow.					IA	
identify valves that relieve pressure.					IA	
identify valves that regulate the direction of flow.					IA	
explain how to properly store and handle valves.					IA	
explain valve locations and position.					IA	
remove and install threaded valves.	RA				IRAM	
remove and install flanged valves.					IA	
replace valve stem o-rings.					IA	
replace bonnet gaskets.					IA	
explain the purpose of valve packing.					IA	
repack a valve.					IA	

INPR 170 Fluid Power II	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
Course SLO: Students will be able to						
define hydraulics and identify terms related to fluid flow.					IRA	
explain the different types of pressure.					IRA	
identify the three basic types of hydraulic diagrams.					IRA	
list and describe all the different types of components used in hydraulic systems.	RA	IRA			IRA	
describe the use of pneumatic systems.					IRA	
identify the properties and characteristics of gas.					IRA	
list the gas laws.					IRA	
identify and explain how compression, temperature, moisture, and contaminants affect pneumatic systems.					IRA	
list the different types of air compressors and explain the importance of pressure control.					IRA	
list and describe all the different types of components used in pneumatic systems.	RA	IRA			IRA	
identify pneumatic logic.					IRA	

INPR 100 Industrial Process Control	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
Course SLO: Students will be able to						
understand the fundamentals of process control and interpret Process and Instrumentation drawings.		RA				IAR
identify and explain the principles of temperature, pressure, level, flow, and position measurement.		RA				RA
define analysis, and explain the different processes used to perform.						IA
identify and explain the different ways that process control transmission and communication is accomplished.						IA
understand and describe automatic process control.		RA				IA
explain how system components (valves, pumps, positioners, etc.) are used to maintain process control.		RA				RMA
describe how process control is used specifically in safety systems.						IRA
list and describe different types of process control applications.						IA

INPR 190 Industrial Programmable Logic Controls	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
describe how PLCs are used and what components make up PLCs.				RA		IRA
list and describe the safety requirements for installing and using PLCs.	RA			RA		IRA
identify and explain the electrical principles, ratings, and circuit calculations for PLCs.						IA
identify and explain PLC programming symbols, diagrams, and logic functions.						IA
explain PLC hardware, memory, and operating cycle.						IA
list, identify, and describe different PLC systems, circuits, and interface devices.						IA
describe, locate, and explain PLC programming diagrams, addresses, and bit instructions.						IA
explain and demonstrate the purpose of PLC programming timer and counter functions.						IA
describe, install, and program a PLC analog device.						IA
demonstrate PLC wiring methods, wiring termination methods, and I/O wiring related to PLC installations.	RA	IA		RA		IRA

INPR 242 Troubleshooting Industrial Programmable Logic Controls	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
recognize and diagnose faults within a PLC program.	RA	RA	RA	IRA		IRA
use troubleshooting methods and test instrumentation to locate faults.	RA		RA	RA		RA
test and troubleshoot electrical devices and PLC hardware.	RA		RA	RA		RA
troubleshoot automated systems using PLC software.	RA	RA	RA	RA		RA
properly maintain a PLC system.	RA	RA	RA	RA		RA

INPR 180 Automation System Robotics	Curriculum Map					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
describe and identify all aspects of basic robot operation.						
understand and perform programming tasks for basic robot functions.	RA	IRA				IRA
create and input commands required for interfacing and material handling.	RA	IRA				IRA
design basic programs for specific application development.	RA	IRA				IRA
identify and use commands to create programming for flexible manufacturing cells.	RA	IRA				IRA
explain and design robotic programs using is manufacturing quality control.	RA	IRA				IRA
describe and use programming function commands used for manufacturing production control.	RA	IRA				IRA

INPR 122 INTRO TO MANUFACTURING WELDING	<i>Curriculum Map</i>					
Program Outcomes	perform all work safely.	set up and operate equipment and systems to ensure reliable performance.	research preventative and predictive maintenance techniques.	troubleshoot and repair electrical systems.	troubleshoot and repair mechanical systems.	troubleshoot and repair automated systems.
	Course SLO: Students will be able to					
demonstrate safe work practices.	IRA					
demonstrate skills to safely operate basic welding and cutting equipment.	IA	IA				
identify materials (aluminum, cast iron, mild steel, etc.) and proper tools and processes to repair.	IA					
properly use an oxy-acetylene torch in heating and cutting operations.	IA	IA				
demonstrate proper use of plasma cutting systems.	IA	IA				
demonstrate proper use of MIG, TIG, and Stick welding systems.	IA	IA				
perform basic diagnostic and maintenance operations on welding and related equipment.	IA	IA				