



Automotive/Advanced Manufacturing Industrial Systems & Automation

Program Information

The Industrial Systems & Automation Program at Trenholm State Community College is a multi-craft curriculum. Many crafts are a part of the training process. Craft related instructors teach their respective crafts. HVAC (Heating and Air Conditioning) instructors teach two HVAC classes. The Machine Tool class is taught by the Machine Tool instructor. Basic Electrical and Mechanical classes are taught by the Maintenance Department instructors. As a Multi-Craft Technician in an industrial setting, knowledge and skills in the areas of Basic Electrical, Plant Automation, and Basic Robotic Maintenance and Programmable Logic Controller are required. Limited Machine Tool Technology. Hydraulics and Pneumatics are a major area of related skills included in the curriculum.

Occupational Choices

Overall employment of industrial machinery mechanics, machinery maintenance workers, and millwrights is projected to grow 7 percent from 2016 to 2026, about as fast as the average for all occupations. Employment growth will vary by occupation. The increased adoption of sophisticated manufacturing machinery will require more mechanics and millwrights to keep machines in good working order. Increased automation, including the use of many computer-controlled machines in factories and manufacturing plants, should raise the demand for machinery maintenance workers in order to keep the machines functioning properly. The increased use of machinery in manufacturing will require millwrights to install and disassemble this equipment, as well as perform some repair work on it. Job prospects will be good, particularly for applicants with a broad range of skills in machine repair as older workers retire or otherwise leave the occupation.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2026 Edition, 2018 Survey

Average Full-Time Wage

The median annual wage for industrial machinery mechanics, machinery maintenance workers, and millwrights was \$51,630 in May 2018. The median wage is the wage at which half the workers in an occupation earned more than that amount and half earned less. The lowest 10 percent earned less than \$33,010, and the highest 10 percent earned more than \$77,790.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2026 Edition, 2019 Survey

Estimated Program Length & Cost *

Award	Length	Credit Hours	Tuition/Fees	Books	Tools	Supplies
Associate Degree 1	6 Terms	64	\$10,176	\$800	\$650	0
Associate Degree 2	6 Terms	67	\$10,653	\$800	\$650	0
Certificate 1	5 Terms	55	\$8,745	\$600	0	0
Certificate 2	5 Terms	58	\$9,222	\$600	0	0
Short Term Certificate 1	2 Terms	25	\$3,975	\$600	0	0
Short Term Certificate 2	2 Terms	27	\$4,293	\$600	0	0

* Tax not included. Prices are subject to change without prior notice; cost of books may vary considerably among suppliers. Cost of general education books is in addition to the total listed above. The length of the program is based on full-time status of 12-15 credit hours per term. Enrollment in transitional level general education courses will alter the length of the program.

Awards Available

Associate of Applied Science
Automotive/Advanced Manufacturing
Industrial Systems & Automation
Mechanical
Instrumentation

Certificate
Automotive/Advanced Manufacturing
Industrial Systems & Automation
Mechanical
Instrumentation

Short Term Certificate
Automotive/Advanced Manufacturing
Industrial Systems & Automation
Mechanical Technician
Instrumentation Technician

Program Contact

Ralph Burton
Program Coordinator/Instructor
334-420-4284
Location: Patterson Site - Bldg. Q

As part of ongoing planning and evaluation, the College regularly evaluates student learning outcomes for each program.

**Associate of Applied Science
Automotive/Advanced Manufacturing
Industrial Systems and Automation
Mechanical**

General Education Requirements (15 hours)**Area I - Written Composition (3 hours)**

ENG-101	English Composition I	3
ENG-102	English Composition II	3
ENG-130	Technical Report Writing	3

Area II - Humanities & Fine Arts (3 hours)

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

Note: If SPH-106, SPH-107, SPA-101 or SPA-102 has been taken an additional 3 semester hours in Humanities and Fine Arts must be taken to satisfy requirements in Area II.

Arts:

ART-100	Art Appreciation	3
MUS-101	Music Appreciation	3

Humanities:

PHL-106	Intro to Philosophy	3
PHL-206	Ethics & Society	3
REL-100	History of World Religions	3
REL-151	Survey of Old Testament	3
REL-152	Survey of New Testament	3
SPA-101	Intro Spanish I	3
SPA-102	Intro Spanish II	3
SPH-106	Fundamentals of Oral Comm	3
SPH-107	Fundamentals of Public Speaking	3

Literature:

ENG-251	American Literature I	3
ENG-252	American Literature II	3
ENG-261	English Literature I	3
ENG-262	English Literature II	3
ENG-271	World Literature I	3
ENG-272	World Literature II	3

Area III - Natural Science & Mathematics (6 hours)

(In addition to Mathematics, disciplines in the Natural Sciences include: Astronomy, Biological Sciences, Chemistry, Geology, Physical Geography, Earth Science, Physics, and Physical Science.)

Note: 3 semester hours in MTH must be completed. Additional hours can be taken in the Natural Science area.

Mathematics:

MTH-100	Intermediate Algebra	3
MTH-103	Intro to Technical Mathematics	3
MTH-104	Plane Trigonometry	3
MTH-110	Finite Mathematics	3
MTH-112	Precalculus Algebra	3
MTH-116	Mathematical Applications	3

Natural Sciences:

BIO-101	Introduction to Biology I	4
BIO-102	Introduction to Biology II	4
BIO-103	Principles of Biology I	4
BIO-104	Principles of Biology II	4
PHS-111	Physical Science I	4
PHS-112	Physical Science II	4
PHY-120	Introduction to Physics	4

Area IV - History, Social & Behavioral Sciences (3 hours):
(Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

Note: Must complete 3 semester hours.

History:

HIS-101	Western Civilization I	3
HIS-102	Western Civilization II	3
HIS-121	World History I	3
HIS-122	World History II	3
HIS-201	United States History I	3
HIS-202	United States History II	3

Social and Behavioral Sciences:

PSY-200	General Psychology	3
PSY-210	Human Growth and Development	3
SOC-200	Introduction to Sociology	3
POL-200	Introduction to Political Science	3
POL-211	American National Government	3

Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

ORI-101	Orientation to College	1
CIS-149	Intro to Computers	3

ADM-101	Precision Measurement	3
ADM-105	Fluid Systems	3
ADM-110	Blueprint Reading	3
ADM-111	Manufacturing Safety Practices	3
ADM-120	DC Fundamentals	3
ADM-121	AC Fundamentals	3
ADM-291	MSSC Safety Course	3
ADM-294	MSSC Maintenance Awareness	3
INT-117	Principles of Industrial Mechanics	3
INT-126	Preventive Maintenance	3
INT-127	Principles of Pumps & Piping	3
INT-215	Troubleshooting Techniques	3
INT-218	Special Lab Hydraulics & Pneumatics	2
INT-296	Co-op	1
MTT-147	Introduction to Machine Shop I	3
MTT-148	Introduction to Machine Shop Lab I	3

Area V Credit Hours: 49

Total Credit Hours: 64

Certificate
Automotive/Advanced Manufacturing
Industrial Systems and Automation
Mechanical

General Education Requirements (6 hours)**Area I - Written Composition (3 hours)**

ENG-101	English Composition I	3
ENG-102	English Composition II	3
ENG-130	Technical Report Writing	3

Area II - Humanities & Fine Arts (0 hours)

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

Note: If SPH-106, SPH-107, SPA-101 or SPA-102 has been taken an additional 3 semester hours in Humanities and Fine Arts must be taken to satisfy requirements in Area II.

Arts:

ART-100	Art Appreciation	3
MUS-101	Music Appreciation	3

Humanities:

PHL-106	Intro to Philosophy	3
PHL-206	Ethics & Society	3
REL-100	History of World Religions	3
REL-151	Survey of Old Testament	3
REL-152	Survey of New Testament	3
SPA-101	Intro Spanish I	3
SPA-102	Intro Spanish II	3
SPH-106	Fundamentals of Oral Comm	3
SPH-107	Fundamentals of Public Speaking	3

Literature:

ENG-251	American Literature I	3
ENG-252	American Literature II	3
ENG-261	English Literature I	3
ENG-262	English Literature II	3
ENG-271	World Literature I	3
ENG-272	World Literature II	3

Area III - Natural Science & Mathematics (3 hours)

(In addition to Mathematics, disciplines in the Natural Sciences include: Astronomy, Biological Sciences, Chemistry, Geology, Physical Geography, Earth Science, Physics, and Physical Science.)

Note: 3 semester hours in MTH must be completed. Additional hours can be taken in the Natural Science area.

Mathematics:

MTH-100	Intermediate Algebra	3
MTH-103	Intro to Technical Mathematics	3
MTH-104	Plane Trigonometry	3
MTH-110	Finite Mathematics	3
MTH-112	Precalculus Algebra	3
MTH-116	Mathematical Applications	3

Natural Sciences:

BIO-101	Introduction to Biology I	4
BIO-102	Introduction to Biology II	4
BIO-103	Principles of Biology I	4
BIO-104	Principles of Biology II	4
PHS-111	Physical Science I	4
PHS-112	Physical Science II	4
PHY-120	Introduction to Physics	4

Area IV - History, Social & Behavioral Sciences (0 hours): (Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

Note: Must complete 3 semester hours.

History:

HIS-101	Western Civilization I	3
HIS-102	Western Civilization II	3
HIS-121	World History I	3
HIS-122	World History II	3
HIS-201	United States History I	3
HIS-202	United States History II	3

Social and Behavioral Sciences:

PSY-200	General Psychology	3
PSY-210	Human Growth and Development	3
SOC-200	Introduction to Sociology	3
POL-200	Introduction to Political Science	3
POL-211	American National Government	3

Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

ORI-101	Orientation to College	1
CIS-149	Intro to Computers	3
ADM-101	Precision Measurement	3
ADM-105	Fluid Systems	3
ADM-110	Blueprint Reading	3
ADM-111	Manufacturing Safety Practices	3
ADM-120	DC Fundamentals	3
ADM-121	AC Fundamentals	3
ADM-291	MSSC Safety Course	3
ADM-294	MSSC Maintenance Awareness	3
INT-117	Principles of Industrial Mechanics	3
INT-126	Preventive Maintenance	3
INT-127	Principles of Pumps & Piping	3
INT-215	Troubleshooting Techniques	3
INT-218	Special Lab Hydraulics & Pneumatics	2
INT-296	Co-op	1
MTT-147	Introduction to Machine Shop I	3
MTT-148	Introduction to Machine Shop Lab I	3

Area V Credit Hours: 49

Total Credit Hours: 55

Short Term Certificate

Automotive/Advanced Manufacturing
Industrial Systems and Automation
Mechanical Technician

Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

ORI-101	Orientation to College	1
ADM-101	Precision Measurement	3
ADM-105	Fluid Systems	3
ADM-110	Blueprint Reading	3
ADM-111	Manufacturing Safety Practices	3
ADM-120	DC Fundamentals	3
ADM-121	AC Fundamentals	3
ILT-114	Instr Operation & Calibration	3
INT-215	Troubleshooting Techniques	3

Total Credit Hours: 25

**Associate of Applied Science
Automotive/Advanced Manufacturing
Industrial Systems and Automation
Instrumentation**

General Education Requirements (15 hours)**Area I - Written Composition (3 hours)**

ENG-101	English Composition I	3
ENG-102	English Composition II	3
ENG-130	Technical Report Writing	3

Area II - Humanities & Fine Arts (3 hours)

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

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ART-100	Art Appreciation	3
MUS-101	Music Appreciation	3

Humanities:

PHL-106	Intro to Philosophy	3
PHL-206	Ethics & Society	3
REL-100	History of World Religions	3
REL-151	Survey of Old Testament	3
REL-152	Survey of New Testament	3
SPA-101	Intro Spanish I	3
SPA-102	Intro Spanish II	3
SPH-106	Fundamentals of Oral Comm	3
SPH-107	Fundamentals of Public Speaking	3

Literature:

ENG-251	American Literature I	3
ENG-252	American Literature II	3
ENG-261	English Literature I	3
ENG-262	English Literature II	3
ENG-271	World Literature I	3
ENG-272	World Literature II	3

Area III - Natural Science & Mathematics (6 hours)

(In addition to Mathematics, disciplines in the Natural Sciences include: Astronomy, Biological Sciences, Chemistry, Geology, Physical Geography, Earth Science, Physics, and Physical Science.)

Note: 3 semester hours in MTH must be completed. Additional hours can be taken in the Natural Science area.

Mathematics:

MTH-100	Intermediate Algebra	3
MTH-103	Intro to Technical Mathematics	3
MTH-104	Plane Trigonometry	3
MTH-110	Finite Mathematics	3
MTH-112	Precalculus Algebra	3
MTH-116	Mathematical Applications	3

Natural Sciences:

BIO-101	Introduction to Biology I	4
BIO-102	Introduction to Biology II	4
BIO-103	Principles of Biology I	4
BIO-104	Principles of Biology II	4
PHS-111	Physical Science I	4
PHS-112	Physical Science II	4
PHY-120	Introduction to Physics	4

Area IV - History, Social & Behavioral Sciences (3 hours): (Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

Note: Must complete 3 semester hours.

History:

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HIS-121	World History I	3
HIS-122	World History II	3
HIS-201	United States History I	3
HIS-202	United States History II	3

Social and Behavioral Sciences:

PSY-200	General Psychology	3
PSY-210	Human Growth and Development	3
SOC-200	Introduction to Sociology	3
POL-200	Introduction to Political Science	3
POL-211	American National Government	3

Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

ORI-101	Orientation to College	1
ADM-101	Precision Measurement	3
ADM-105	Fluid Systems	3
ADM-110	Blueprint Reading	3
ADM-120	DC Fundamentals	3
ADM-121	AC Fundamentals	3
ADM-291	MSSC Safety Course	3
ADM-294	MSSC Maintenance Awareness	3
ELT-119	Concepts of Solid State Electronics	5
ILT-110	Advanced Industrial Process Control	3
ILT-114	Instr Operation & Calibration	3
INT-105	Introduction to Process Technology	3
INT-113	Industrial Motor Control I	3
INT-184	Introduction to PLCs	3
INT-206	Industrial Motors I	3
INT-215	Troubleshooting Techniques	3
INT-288	Appld Prin of PLCs	3
INT-296	Co-op	1

Electives:

CIS-146	Microcomputer Applications	3
CIS-149	Introduction to Computers	3

Area V Credit Hours: 52**Total Credit Hours: 67**

Certificate
Automotive/Advanced Manufacturing
Industrial Systems and Automation
Instrumentation

General Education Requirements (6 hours)**Area I - Written Composition (3 hours)**

ENG-101	English Composition I	3
ENG-102	English Composition II	3
ENG-130	Technical Report Writing	3

Area II - Humanities & Fine Arts (0 hours)

(Humanities and Arts disciplines include but are not limited to: Area/Ethnic Studies, Art and Art History, Foreign Languages, Music and Music History, Philosophy, Ethics, Religious Studies, Theater and Dance.)

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SPA-102	Intro Spanish II	3
SPH-106	Fundamentals of Oral Comm	3
SPH-107	Fundamentals of Public Speaking	3

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ENG-252	American Literature II	3
ENG-261	English Literature I	3
ENG-262	English Literature II	3
ENG-271	World Literature I	3
ENG-272	World Literature II	3

Area III - Natural Science & Mathematics (3 hours)

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Note: 3 semester hours in MTH must be completed. Additional hours can be taken in the Natural Science area.

Mathematics:

MTH-100	Intermediate Algebra	3
MTH-103	Intro to Technical Mathematics	3
MTH-104	Plane Trigonometry	3
MTH-110	Finite Mathematics	3
MTH-112	Precalculus Algebra	3
MTH-116	Mathematical Applications	3

Natural Sciences:

BIO-101	Introduction to Biology I	4
BIO-102	Introduction to Biology II	4
BIO-103	Principles of Biology I	4
BIO-104	Principles of Biology II	4
PHS-111	Physical Science I	4
PHS-112	Physical Science II	4
PHY-120	Introduction to Physics	4

Area IV - History, Social & Behavioral Sciences (0 hours): (Social and Behavioral Sciences include, but are not limited to: Anthropology, Economics, Geography, Political Science, Psychology, and Sociology.)

Note: Must complete 3 semester hours.

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HIS-102	Western Civilization II	3
HIS-121	World History I	3
HIS-122	World History II	3
HIS-201	United States History I	3
HIS-202	United States History II	3

Social and Behavioral Sciences:

PSY-200	General Psychology	3
PSY-210	Human Growth and Development	3
SOC-200	Introduction to Sociology	3
POL-200	Introduction to Political Science	3
POL-211	American National Government	3

Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

ORI-101	Orientation to College	1
ADM-101	Precision Measurement	3
ADM-105	Fluid Systems	3
ADM-110	Blueprint Reading	3
ADM-120	DC Fundamentals	3
ADM-121	AC Fundamentals	3
ADM-291	MSSC Safety Course	3
ADM-294	MSSC Maintenance Awareness	3
ELT-119	Concepts of Solid State Electronics	5
ILT-110	Advanced Industrial Process Control	3
ILT-114	Instr Operation & Calibration	3
INT-105	Introduction to Process Technology	3
INT-113	Industrial Motor Control I	3
INT-184	Introduction to PLCs	3
INT-206	Industrial Motors I	3
INT-215	Troubleshooting Techniques	3
INT-288	Appld Prin of PLCs	3
INT-296	Co-op	1

Electives:

CIS-149	Intro to Computers	3
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Area V Credit Hours: 52 Total Credit Hours: 58

Short Term Certificate
Automotive/Advanced Manufacturing
Industrial Systems and Automation
Instrumentation Technician

Area V: Pre-Professional/College Requirements:

(Courses appropriate to the degree requirements and major of the individual student and electives.)

College Requirements:

ORI-101	Orientation to College	1
ADM-105	Fluid Systems	3
ADM-111	Manufacturing Safety Practices	3
ADM-120	DC Fundamentals	3
ADM-121	AC Fundamentals	3
ELT-119	Concepts of Solid State Electronics	5
ILT-110	Advanced Industrial Process Control	3
ILT-114	Instr Operation & Calibration	3
INT-105	Introduction to Process Technology	3

Total Credit Hours: 27

Course Descriptions

Automotive/Advanced Manufacturing Industrial Systems and Automation

Course #	Course Title	Credit Hours
ADM-101	PRECISION MEASUREMENT Prerequisite: As determined by college. This course covers the use of precision measurement instruments utilized in inspection. In addition, basic print reading techniques reverse engineering, and related industry standards required in advanced manufacturing disciplines are covered. Upon completion, students should be able to demonstrate correct use of precision measuring instruments, interpret basic prints and apply basic reverse engineering techniques. Note: This is a suitable substitute for MTT-127.	3
ADM-105	FLUID SYSTEMS Prerequisite: As determined by college. This course includes the fundamental concepts and theories for the safe operation of hydraulic and pneumatic systems used with industrial production equipment. Topics include the physical concepts, theories, laws, air flow characteristics, actuators, valves, accumulators, symbols, circuitry, filters, servicing safety, and preventive maintenance and the application of these concepts to perform work. Upon completion, students should be able to service and perform preventive maintenance functions on hydraulic and pneumatic systems.	3
ADM-110	BLUEPRINT READING Prerequisite: As determined by college. This course is designed to provide students with a comprehensive understanding of blueprint reading. Topics include identifying types of lines and symbols used in mechanical drawings; recognition and interpretation of various types of views, tolerance, and dimensions.	3
ADM-111	MANUFACTURING SAFETY PRACTICES Prerequisite: As determined by college. This course is an introduction to general issues, concepts, procedures, hazards, and safety standards found in an industrial environment. This safety course is to make technicians aware of safety issues associated with their changing work environment and attempt to eliminate industrial accidents. This course will offer credentialing for NCCER Core and OSHA 10 hour.	3
ADM-120	DC FUNDAMENTALS PREREQUISITE: None This course is designed to provide students with a working knowledge of basic direct current (DC) electrical principles. Topics include safety, basic atomic structure and theory, magnetism, conductors, insulators, use of Ohm's law to solve for voltage, current, resistance, electrical sources, power, inducers and capacitors. Students will perform lockout/tagout procedures, troubleshoot circuits and analyze series, parallel, and combination DC circuits using the electrical laws and basic testing equipment to determine unknown electrical quantities. CORE	3
ADM-121	AC FUNDAMENTALS PREREQUISITE: AUT-110 This course is designed to provide students with a working knowledge of basic alternating current (AC) electrical principles. Topics include basic concepts of electricity, electrical components, basic circuits, measurement instruments, the laws of alternating current, and electrical safety with lockout procedures. Hands-on laboratory exercises are provided to analyze various series, parallel, and combination alternating current circuit configurations containing resistors, inductors and capacitors. Upon course completion, students will be able to describe and explain alternating current circuit fundamentals, such as RLC circuits, impedance, phase relationships and power factors. They should also be able to perform fundamental tasks associated with troubleshooting, repairing and maintaining industrial AC systems. This is a CORE course.	3
ADM-291	MSSC SAFETY COURSE PREREQUISITE: None This course is designed to provide students with knowledge and skills related to safety in a manufacturing environment. Topics covered include: work in a safe and productive manufacturing workplace, perform safety and environmental inspections, perform emergency drills and participate in emergency teams, identify unsafe conditions and take corrective action, provide safety orientation for all employees, train personnel to use equipment safely, suggest process and procedures that support safety of work environment, fulfill safety and health requirements for maintenance, installation and repair, monitor safe equipment and operator performance, utilize effective, safety-enhancing workplace practices	3

<u>Course #</u>	<u>Course Title</u>	<u>Credit Hours</u>
ADM-294	MSSC MAINTENANCE AWARENESS COURSE PREREQUISITE: ADM-291 This course is designed to provide students with knowledge and skills related to maintenance awareness in a manufacturing environment. Topics covered include: prepare preventative maintenance and routine repair, monitor indicators to ensure correct operations, perform all housekeeping to maintain production schedule, recognize potential maintenance issues with basic production systems, including knowledge of when to inform maintenance personnel about problems with: electrical systems, pneumatic systems, hydraulic systems, machine automation systems, lubrication systems, bearings and couplings.	3
ELT-119	CONCEPTS OF SOLID STATE ELECTRONICS PREREQUISITE: As determined by college. This course is an introduction to semiconductor fundamentals and applications to the electronic devices. Course covers the basic operations and applications to include rectifier circuits, transistors, and thyristors. Coverage is given to safety, use, and care with hazardous materials and personal as well as material and environmental considerations. Upon completion students will be able to construct and test for proper operation of various types of solid state devices.	5
ILT-110	ADVANCED INDUSTRIAL PROCESS CONTROL PREREQUISITE: As determined by college. This course is an advanced study of the principles governing methods of using process variables in the control of industrial processes. The study includes methods and procedures for measuring, displaying and transmitting process variables according to industry standards. The course also includes an in-depth study of mathematics pertaining to industrial control instruments.	3
ILT-114	INSTRUMENTATION OPERATION AND CALIBRATION PREREQUISITE: As determined by college. The hardware used to measure and control process variables is presented. The student learns the principles of operation, servicing, maintenance, calibration, and troubleshooting procedures used on mechanical, pneumatic, electronic and digital based industrial transmitters, recorders, controllers, valves, and other control devices. The course is broken down into theory and laboratory work on actual process measuring and control equipment.	3
INT-105	INTRODUCTION TO PROCESS TECHNOLOGY PREREQUISITE: None This course is designed to provide students with an introduction to process control technology and various instruments used to control processes. Upon completion, students should be able to comprehend principles of process control technology and the application of various instruments used to control processes in an industrial setting.	3
INT-113	INDUSTRIAL MOTOR CONTROL I PREREQUISITES: None This course is a study of the construction, operating characteristics, and installation of different motor control circuits and devices. Emphasis is placed on the control of three phase AC motors. This course covers the use of motor control symbols, magnetic motor starters, running overload protection, pushbutton stations, multiple control stations, two wire control, three wire control, jogging control, sequence control, and ladder diagrams of motor control circuits. Upon completion, students should be able to understand the operation of motor starters, overload protection, interpret ladder diagrams using pushbutton stations and understand complex motor control diagrams.	3
INT-117	PRINCIPLES OF INDUSTRIAL MECHANICS PREREQUISITE: None This course provides instruction in basic physics concepts applicable to mechanics of industrial production equipment. Topics include the basic application of mechanical principles with emphasis on power transmission, specific mechanical components, alignment, and tension. Upon completion, students will be able to perform basic troubleshooting, repair and maintenance functions on industrial production equipment. This is a CORE course.	3
INT-126	PREVENTIVE MAINTENANCE PREREQUISITE: None This course focuses on the concepts and applications of preventive maintenance. Topics include the introduction of alignment equipment, job safety, tool safety, preventive maintenance concepts, procedures, tasks, and predictive maintenance concepts. Upon course completion, students will demonstrate the ability to apply proper preventive maintenance and explain predictive maintenance concepts.	3

Course #	Course Title	Credit Hours
INT-127	PRINCIPLES OF INDUSTRIAL PUMPS AND PIPING SYSTEMS	3
	PREREQUISITE: None	
	This course provides instruction in the fundamental concepts of industrial pumps and piping systems. Topics include pump identification, operation, and installation, maintenance and troubleshooting, and piping systems, and their installation. Upon course completion, students will be able to install, maintain, and troubleshoot industrial pumps and piping systems.	
INT-184	INTRO TO PROGRAMMABLE LOGIC CONTROLLERS	3
	PREREQUISITE: None	
	This course provides an introduction to programmable logic controllers. Emphasis is placed on, but not limited to, the following: PLC hardware and software, numbering systems, installation, and programming. Upon completion, students must demonstrate their ability by developing, loading, debugging, and optimizing PLC programs. This course is also taught as AUT-114, ATM-211, ENT-204, ELT-231, ILT-194, IAT-160, and IET-231.	
INT-206	INDUSTRIAL MOTORS I	3
	PREREQUISITE: None	
	This course focuses on basic information regarding industrial electrical motors. Upon completion students will be able to troubleshoot, remove, replace, and perform routine maintenance on various types of motors.	
INT-215	TROUBLESHOOTING TECHNIQUES	3
	PREREQUISITES: None	
	This course is designed to allow students an opportunity to study directly-related topics of particular interest which require the application of technical knowledge and technical skills. Emphasis is place on the application of skills and knowledge with practical experiences. Upon, completion, students should be able to solve job related problems using technical skills and knowledge.	
INT-218	SPECIAL LAB IN HYDRAULICS AND PNEUMATICS	2
	PREREQUISITE: Permission of instructor.	
	This course provides specialized instruction in maintaining and troubleshooting Hydraulic and Pneumatic systems. Topics include safe component removal and installation, schematic reading and diagramming, and theoretical calculations.	
INT-288	APPLIED PRIN OF PROGRAMMABLE CONTROLLERS	3
	PREREQUISITE: None	
	This course provides a comprehensive study in the theory and application of specific models of programmable logic controllers. Topics include hardware configuration, memory and addressing detail function of software, instruction types, system troubleshooting, and simple programming techniques.	
INT-296	CO-OP	1
	PREREQUISITE: None	
	These courses constitute a series wherein the student works on a part-time basis in a job directly related to Industrial Maintenance. In these courses the employer evaluates the student's productivity and the student submits a descriptive report of his work experiences. Upon completion, the student will demonstrate skills learned in an employment setting.	
MTT-147	INTRODUCTION TO MACHINE SHOP I	3
	PREREQUISITE: None	
	This course introduces machining operations as they relate to the metalworking industry. Topics include machine shop safety, measuring tools, lathes, saws, milling machines, bench grinders, and layout instruments. Upon completion, students will be able to perform the basic operations of measuring, layout, drilling, sawing, turning, and milling. This is a CORE course. MTT-100 is a suitable substitute for MTT-147/148. This course is also taught as AUT-150.	
MTT-148	INTRODUCTION TO MACHINE SHOP I LAB	3
	PREREQUISITE: None COREQUISITE: None	
	This course provides practical application of the concepts and principles of machining operations learned in MTT 147. Topics include machine shop safety, measuring tools, lathes, saws, milling machines, bench grinders, and layout instruments. Upon completion, students will be able to perform the basic operations of measuring, layout, drilling, sawing, turning, and milling. This is a CORE course. MTT-100 is a suitable substitute for MTT-147/148. This course is aligned with NIMS certification standards. This course is also taught as AUT-151.	