



Industrial Systems Technology
Credential: Associate in Applied Science Degree
in Industrial Systems Technology
A50240

The Industrial Systems Technology curriculum is designed to prepare or upgrade individuals to safely service, maintain, repair and install equipment. Instruction includes theory and skill training needed for inspecting, testing, troubleshooting, and diagnosing industrial systems. Students will learn multi-craft technical skills in blueprint reading, mechanical systems maintenance, electricity, hydraulics/pneumatics, welding, machining or fabrication, as well as various diagnostic and repair procedures. Practical application in these industrial systems will be emphasized and additional advanced course work may be offered.

Upon completion of this curriculum, graduates should be able to individually, or with a team, safely install, inspect, diagnose, repair and maintain industrial process and support equipment. Students will also be encouraged to develop their skills as life-long learners.

Program Length: 5 semesters

Career Pathway Options: Associate in Applied Science in Industrial Systems Technology

Program Sites: Lee Campus - Day Program

Course Requirements for Industrial Systems Technology

A. General Education Courses (15/17 SHC)		C-L-SHC
*ENG 111	Expository Writing	3-0-3
ENG 111A	Expository Writing Lab	0-2-1
	Humanities/Fine Arts Elective	3-0-3
	Social/Behavioral Science Elective	3-0-3
MAT 115	Mathematical Models	2-2-3
	Or	
PHY 121	Applied Physics I	3-2-4
Communications Elective (select 3 SHC)		
ENG 112	Argument-Based Research	3-0-3
ENG 113	Literature-Based Research	3-0-3
ENG 114	Prof Research & Reporting	3-0-3
ENG 116	Technical Report Writing	3-0-3
B. Required Major Core Courses (18/19 SHC)		
BPR 111	Blueprint Reading	1-2-2
ELC 112	DC/AC Electricity	3-6-5
HYD 110	Hydraulics/Pneumatics	2-3-3
ISC 110	Workplace Safety	1-0-1
	Or	
ISC 112	Industrial Safety	2-0-2
MEC 111	Machine Processes I	1-4-3
MNT 110	Introduction to Maintenance Procedures	1-3-2
WLD 112	Basic Welding Processes	1-3-2
C. Other Major Hours Required for Graduation (43 SHC)		
AHR 120	HVACR Maintenance	1-3-2
BPR 115	Electric/Fluid Power Diagrams	1-2-2
CIS 111	Basic PC Literacy	1-2-2

ELC 117	Motors and Controls	2-6-4
ELC 128	Introduction to PLC	2-3-3
ELC 228	PLC Applications	2-6-4
ELC 229	Applications Project	1-3-2
ELN 229	Industrial Electronics	3-3-4
ELN 231	Industrial Controls	2-3-3
HYD 121	Hydraulics/Pneumatics II	1-3-2
MNT 230	Pumps and Piping Systems	1-3-2
MNT 240	Industrial Equipment Troubleshooting	1-3-2
WLD 115	SMAW (Stick) Plate	2-9-5
WLD 212	Inert Gas Welding	1-3-2
	Technical Elective	3

Technical Electives (Choose 3 SHC)

COE 111	Co-op Work Experience I	0-10-1
COE 112	Co-op Work Experience I	0-20-2
COE 121	Co-op Work Experience II	0-10-1
MNT 111	Maintenance Practices	2-2-3

*Students may substitute ENG 110.

Total Semester Hours Credit required for graduation: 75/77

Semester Curriculum for Industrial Systems Technology

1st Semester (Fall)		C-L-SHC
BPR 111	Blueprint Reading	1-2-2
ELC 112	DC/AC Electricity	3-6-5
	Humanities/Fine Arts Elective	3-0-3
MEC 111	Machine Processes I	1-4-3
MNT 110	Introduction to Maintenance Procedures	1-3-2
WLD 112	Basic Welding Processes	<u>1-3-2</u>
		10-18-17

2nd Semester (Spring)		
CIS 111	Basic PC Literacy	1-2-2
ELN 229	Industrial Electronics	3-3-4
*ENG 111	Expository Writing	3-0-3
ENG 111A	Expository Writing Lab	0-2-1
MAT 115	Mathematical Models	2-2-3
	Or	
PHY 121	Applied Physics I	3-2-4
WLD115	SMAW (Stick) Plate	<u>2-9-5</u>
		11/12-16/18-17/19

3rd Semester (Summer)		
AHR 120	HVACR Maintenance	1-3-2
BPR 115	Electric/Fluid Power Diagrams	1-2-2
ISC 110	Workplace Safety	1-0-1
	Or	
ISC 112	Industrial Safety	2-0-2
HYD 110	Hydraulics/Pneumatics	2-3-3
	Technical Elective	<u>2</u>
		5/6-8-10/11

4th Semester (Fall)		
ELC 117	Motors and Controls	2-6-4
ELC 128	Introduction to PLC	2-3-3
	Communications Elective	3-0-3
HYD 121	Hydraulics/Pneumatics II	1-3-2
MNT 230	Pumps and Piping Systems	1-3-2
WLD 212	Inert Gas Welding	<u>1-3-2</u>
		10-18-16

5th Semester (Spring)		
ELC 228	PLC Applications	2-6-4
ELC 229	Applications Project	1-3-2
ELN 231	Industrial Controls	2-3-3
MNT 240	Industrial Equipment Troubleshooting	1-3-2
	Technical Elective	1
	Social/Behavioral Science Elective	<u>3-0-3</u>
		9-15-15

Total Semester Hours Credit: 75/77

COURSE DESCRIPTIONS

AHR 120 HVACR Maintenance 1-3-2

This course introduces the basic principles of industrial air conditioning and heating systems. Emphasis is placed on preventive maintenance procedures for heating and cooling equipment and related components. Upon completion, students should be able to perform routine preventive maintenance tasks, maintain records, and assist in routine equipment repairs.

BPR 111 Blueprint Reading 1-2-2

This course introduces the basic principles of blueprint reading. Topics include line types, orthographic projections, dimensioning methods, and notes. Upon completion, students should be able to interpret basic blueprints and visualize the features of a part.

BPR 115 Elc/Fluid Power Diagrams 1-2-2

This course covers sketching of detail and assembly drawings and reading of hydraulic, pneumatic, electrical, mechanical, and piping schematics. Emphasis is placed on interpretation and communication skills utilizing sketches, symbols, diagrams, and other related topics. Upon completion, students should be able to read, demonstrate an understanding of, and draw sketches and schematics commonly used in industry.

CIS 111 Basic PC Literacy 1-2-2

This course provides an overview of computer concepts. Emphasis is placed on the use of personal computers and software applications for personal and fundamental workplace use. Upon completion, students should be able to demonstrate basic personal computer skills.

COE 111 Co-op Work Experience I 0-10-1

Prerequisite: Approval of Instructor or Department Chairperson
This course provides work experience with a college-approved employer in an area related to the student's program of study. Emphasis is placed on integrating classroom learning with related work experience. Upon completion, students should be able to evaluate career selection, demonstrate employability skills, and satisfactorily perform work-related competencies.

COE 112 Co-op Work Experience I 0-20-2

Prerequisite: Approval of Instructor or Department Chairperson
This course provides work experience with a college approved employer in an area related to the student's program of study. Emphasis is placed on integrating classroom learning with related work experience. Upon completion, students should be able to evaluate career selection, demonstrate employability skills, and satisfactorily perform work-related competencies.

COE 121 Co-op Work Experience II 0-10-1

Prerequisite: Approval of Instructor or Department Chairperson
This course provides work experience with a college-approved employer in an area related to the student's program of study. Emphasis is placed on integrating classroom learning with related work experience. Upon completion, students should be able to evaluate career selection, demonstrate employability skills, and satisfactorily perform work-related competencies.

ELC 112 DC/AC Electricity 3-6-5

This course introduces the fundamental concepts of and computations related to DC/AC electricity. Emphasis is placed on DC/AC circuits, components, operation of test equipment; and other related topics.

Upon completion, students should be able to construct, verify, and analyze simple DC/AC circuits.

ELC 117 Motors and Controls 2-6-4

Prerequisites: ELC 111, ELC 112 or ELC 131

This course introduces the fundamental concepts of motors and motor controls. Topics include ladder diagrams, pilot devices, contactors, motor starters, motors, and other control devices. Upon completion, students should be able to properly select, connect, and troubleshoot motors and control circuits.

ELC 128 Introduction to PLC 2-3-3

This course introduces the programmable logic controller (PLC) and its associated applications. Topics include ladder logic diagrams, input/output modules, power supplies, surge protection, selection/installation of controllers, and interfacing of controllers with equipment. Upon completion, students should be able to install PLCs and create simple programs.

ELC 228 PLC Applications 2-6-4

Prerequisites: ELC 128

This course continues the study of the programming and applications of programmable logic controllers. Emphasis is placed on advanced programming, networking, advanced I/O modules, reading and interpreting error codes, and troubleshooting. Upon completion, students should be able to program and troubleshoot programmable logic controllers.

ELC 229 Applications Project 1-3-2

Prerequisites: ELC 112, ELC 113, or ELC 140

This course provides an individual and/or integrated team approach to a practical project as approved by the instructor. Topics include project selection and planning, implementation and testing, and a final presentation. Upon completion, students should be able to plan and implement an applications-oriented project.

ELN 229 Industrial Electronics 2-4-4

Prerequisites: ELC 112, ELC 131, or ELC 140

This course covers semiconductor devices used in industrial applications. Topics include the basic theory, application, and operating characteristics of semiconductor devices (filters, rectifiers, FET, SCR, Diac, Triac, Op-amps, etc). Upon completion, students should be able to install and/or troubleshoot these devices for proper operation in an industrial electronic circuit.

ELN 231 Industrial Controls 2-3-3

Prerequisites: ELC 112, ELC 131, or ELC 140

This course introduces the fundamental concepts of solid-state control of rotating machinery and associated peripheral devices. Topics include rotating machine theory, ladder logic, electromechanical and solid state relays, motor controls, pilot devices, three-phase power systems, and other related topics. Upon completion, students should be able to interpret ladder diagrams and demonstrate an understanding of electromechanical and electronic control of rotating machinery.

ENG 110 Freshman Composition 3-0-3

Prerequisites: RED 080 and ENG 090 or appropriate placement test scores

This course is the first course in a series of two designed to develop informative and business writing skills. Emphasis is placed on logical organization of writing, including effective introductions and conclusions, precise use of grammar, and appropriate selection and use of sources. Upon completion, students should be able to produce clear, concise, well-organized short papers.

- ENG 111 Expository Writing** 3-0-3
Prerequisites: RED 090 and ENG 090 or appropriate placement test scores
Corequisites: ENG 111A
 This course is the required first course in a series of two designed to develop the ability to produce clear expository prose. Emphasis is placed on the writing process including audience analysis, topic selection, thesis support and development, editing, and revision. Upon completion, students should be able to produce unified, coherent, well-developed essays using standard written English. This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in English composition.
- ENG 111A Expository Writing Lab** 0-2-1
Prerequisites: RED 090 and ENG 090 or appropriate placement test scores
Corequisites: ENG 111
 This writing laboratory is designed to apply the skills introduced in ENG 111. Emphasis is placed on the editing and revision components of the writing process. Upon completion, students should be able to apply those skills in the production of final drafts in ENG 111. The computer is used as a writing and design tool for this course.
- ENG 112 Argument-Based Research** 3-0-3
Prerequisites: ENG 111
 This course, the second in a series of two, introduces research techniques, documentation styles, and argumentative strategies. Emphasis is placed on analyzing data and incorporating research findings into documented argumentative essays and research projects. Upon completion, students should be able to summarize, paraphrase, interpret, and synthesize information from primary and secondary sources using standard research format and style. *This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in English composition. This course is also available through the Virtual Learning Community (VLC).*
- ENG 113 Literature-Based Research** 3-0-3
Prerequisites: ENG 111
 This course, the second in a series of two, expands the concepts developed in ENG 111 by focusing on writing that involves literature-based research and documentation. Emphasis is placed on critical reading and thinking and the analysis and interpretation of prose, poetry, and drama: plot, characterization, theme, cultural context, etc. Upon completion, students should be able to construct mechanically-sound, documented essays and research papers that analyze and respond to literary works. *This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in English composition. This course is also available through the Virtual Learning Community (VLC).*
- ENG 114 Prof. Research and Reporting** 3-0-3
Prerequisites: ENG 111
 This course, the second in a series of two, is designed to teach professional communication skills. Emphasis is placed on research, listening, critical reading and thinking, analysis, interpretation, and design used in oral and written presentations. Upon completion, students should be able to work individually and collaboratively to produce well-designed business and professional written and oral presentations. The computer is used as a writing and design tool for this course. This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in English composition.
- ENG 116 Technical Report Writing** 3-0-3
Prerequisites: ENG 110 or ENG 111
 This course, the second in a series of two, introduces layout and design of technical reports used in business and industry. Emphasis is placed on audience analysis, data collection and analysis, technical writing style and organization, oral presentation or technical data, and the appropriate use of graphics in written and oral presentations. Upon completion, students should be able to produce written and oral reports using a variety of technical communication models.
- HYD 110 Hydraulics/Pneumatics I** 2-3-3
 This course introduces the basic components and functions of hydraulic and pneumatic systems. Topics include standard symbols, pumps, control valves, control assemblies, actuators, FRL, maintenance procedures, and switching and control devices. Upon completion, students should be able to understand the operation of a fluid power system, including design, application, and troubleshooting.
- HYD 121 Hydraulics/Pneumatics II** 1-3-2
Prerequisites: HYD 110
 This course is a continuation of HYD 110 and provides further investigation into fluid power systems. Topics include advanced system components, troubleshooting, and other related topics. Upon completion, students should be able to demonstrate an understanding of the installation, operation, and maintenance of fluid power components and systems.
- ISC 110 Workplace Safety** 1-0-1
 This course introduces the basic concepts of workplace safety. Topics include fire, ladders, lifting, lock-out/tag-out, personal protective devices, and other workplace safety issues related to OSHA compliance. Upon completion, students should be able to demonstrate an understanding of the components of a safe workplace.
- ISC 112 Industrial Safety** 2-0-2
 This course introduces the principles of industrial safety. Emphasis is placed on industrial safety, OSHA, and environmental regulations. Upon completion, students should be able to demonstrate knowledge of a safe working environment and OSHA compliance.
- MAT 115 Mathematical Models** 2-2-3
Prerequisites: MAT 070, MAT 080, MAT 120, MAT 121, MAT 161, MAT 171, or MAT 175 or appropriate placement test scores
 This course develops the ability to utilize mathematical skills and technology to solve problems at a level found in non-mathematics-intensive programs. Topics include applications to percent, ratio and proportion, formulas, statistics, functional notation, linear functions and their groups, probability, sampling techniques, scatter plots, and modeling. Upon completion, students should be able to solve practical problems, reason and communicate with mathematics, and work confidently, collaboratively, and independently.
- MEC 111 Machine Processes I** 1-4-3
 This course introduces shop safety, hand tools, machine processes, measuring instruments, and the operation of machine shop equipment. Topics include use and care of tools, safety, measuring tools, and the basic setup and operation of common machine tools. Upon completion, students should be able to safely machine simple parts to specified tolerances.
- MNT 110 Introduction to Maint Procedures** 1-3-2
 This course covers basic maintenance fundamentals for power transmission equipment. Topics include equipment inspection, lubrication, alignment, and other scheduled maintenance procedures. Upon completion, students should be able to demonstrate knowledge

of accepted maintenance procedures and practices according to current industry standards.

MNT 111 Maintenance Practices 2-2-3

This course provides in-depth theory and practical applications relating to predictive and preventive maintenance programs. Emphasis is placed on equipment failure, maintenance management software, and techniques such as vibration and infrared analysis. Upon completion, students should be able to demonstrate an understanding of modern analytical and documentation methods.

MNT 230 Pumps and Piping Systems 1-3-2

This course covers pump installation and maintenance and related valves and piping systems. Topics include various types of pump systems and their associated valves, piping requirements, and other related topics. Upon completion, students should be able to select and install pump and piping systems and demonstrate proper maintenance and troubleshooting procedures.

MNT 240 Indust Equip Troubleshoot 1-3-2

Prerequisites: ELC 112 or ELC 131

This course covers the various service procedures, tools, instruments, and equipment necessary to analyze and repair typical industrial equipment. Emphasis is placed on electro-mechanical and fluid power equipment troubleshooting and repair, including common techniques and procedures. Upon completion, students should be able to troubleshoot and repair industrial equipment.

PHY 121 Applied Physics I 3-2-4

Prerequisites: MAT 060

This algebra-based course introduces fundamental physical concepts as applied to industrial and service technology fields. Topics include systems of units, problem-solving methods, graphical analyses, vectors, motion, forces, Newton's laws of motion, work, energy, power, momentum, and properties of matter. Upon completion, students should be able to demonstrate an understanding of the principles studied as applied in industrial and service fields

WLD 112 Basic Welding Processes 1-3-2

This course introduces basic welding and cutting. Emphasis is placed on beads applied with gases, mild steel fillers, and electrodes and the capillary action of solder. Upon completion, students should be able to set up welding and oxy-fuel equipment and perform welding, brazing, and soldering processes.

WLD 115 SMAW (Stick) Plate 2-9-5

This course introduces the shielded metal arc (stick) welding process. Emphasis is placed on padding, fillet, and groove welds in various positions with SMAW electrodes. Upon completion, students should be able to perform SMAW fillet and groove welds on carbon plate with prescribed electrodes.

WLD 212 Inert Gas Welding 1-3-2

This course introduces inert gas-shielded welding methods (MIG/TIG). Topics include correct selection of consumable and non-consumable electrodes, equipment setup, safety, and welding techniques. Upon completion, students should be able to perform inert gas welding in flat, horizontal, and overhead positions.