

# INDUSTRIAL SYSTEMS TECHNOLOGY

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## DIPLOMA PROGRAM

The Industrial Systems Technology diploma program prepares students for careers as industrial systems technicians/electricians. The program provides learning opportunities that introduce, develop, and reinforce academic and technical knowledge, skills, and attitudes required for job acquisition, retention, and advancement. The program also provides opportunities to retrain or upgrade present knowledge and skills.

The program produces multi-craft industrial systems technicians who have knowledge in automated and robotic systems. Students study preventive maintenance and troubleshooting techniques that integrate knowledge of electrical, electronic, fluidic, mechanical, and computer-controlled systems. Students must complete 90 credit hours of coursework to graduate at this exit point.

## ASSOCIATE DEGREE OPTION

Individuals who are graduates of, or eligible to graduate from, this diploma program and who meet general admission requirements for associate-degree level work may pursue an associate of applied science degree in Technical Studies by completing an additional 50 quarter credit hours of coursework. Interested students should see their advisors to obtain assistance in completing processes associated with readmission and/or change of major.

## PROGRAM EXPENSES

The recent reauthorization of the Higher Education Act requires all colleges and universities to notify students and prospective students of all program costs for which they will be responsible. Students will be responsible for the following expenses:

- Quarterly tuition (\$45 per credit hour)

- Quarterly student activity fees (\$16)
- Quarterly registration fee (\$26)
- Quarterly accident insurance fee (\$4)
- Quarterly instructional and technology supply fee (\$35)
- Textbooks (Approximately \$1,800 for the Industrial Systems Technology program, \$355 for the Industrial Fluid Power Technician program, \$365 for the Industrial Motor Control Technician, and \$285 for the Programmable Control Technician I program)
- Tools (Approximately \$450 for the Industrial Systems Technology program)

The expenses are based on costs in effect at the time this catalog was published. Prices are subject to change.

## CAREER OPPORTUNITIES

Graduates are prepared for jobs in a variety of industrial and manufacturing facilities, as well as hospitals and electrical power generating plants. Positions available to recent program graduates include industrial electricians, master electricians, maintenance technicians, hydroelectric powerplant trainees, line technicians for power companies, automation technicians, and robotics technicians.

## ADMISSION REQUIREMENTS

Applicants must submit the following information to the Admissions Office:

- a. Completed and signed application for admission and a \$20 nonrefundable application fee;
- b. Official high school or GED transcripts and/or official college transcripts from all colleges attended in the past (see *General Admission Requirements*); and
- c. Valid COMPASS, ASSET, SAT, or ACT test scores (see *ASSET and COMPASS Placement Tests*).

## INDUSTRIAL SYSTEMS TECHNOLOGY CURRICULUM OUTLINE

*Diploma Program (Major Code: ICS4)*

*Credit Required for Graduation: 90 quarter credit hours*

			<b>Credits</b>
<b>General Core</b>			<b>13</b>
EMP	1000	Interpersonal Relations and Professional Development	3
ENG	1010	Fundamentals of English I	5
MAT	1013	Algebraic Concepts	5
<b>Technical Core</b>			<b>13</b>
IFC	100	Industrial Safety Procedures	2
IFC	101	Direct Current Circuits I	4
IFC	102	Alternating Current I	4
SCT	100	Introduction to Microcomputers	3

<b>Industrial Systems Technology</b>			<b>64</b>
IDS	101	Industrial Computer Applications	
	OR		5
IDS	107	Basic Mechanics	
IDS	103	Industrial Wiring	6
IDS	105	DC and AC Motors	3
IDS	110	Fundamentals of Motor Controls	3
IDS	113	Magnetic Starters and Braking	3
IDS	115	Two-Wire Control Circuits	2
IDS	121	Advanced Motor Controls	2
IDS	131	Variable Speed Motor Control	3
IDS	141	Basic Industrial Programmable Logic Controllers (PLCs)	6
IDS	142	Industrial Programmable Logic Controllers II	6
IDS	209	Industrial Instrumentation	6
IDS	215	Industrial Mechanics	6
IDS	221	Industrial Fluidpower	7
IDS	231	Pumps and Piping Systems	2
IFC	103	Solid State Devices I	4

**INDUSTRIAL FLUID POWER TECHNICIAN CURRICULUM OUTLINE**

*Technical Certificate of Credit (Major code: IFP1)*

*Credit Required for Completion: 17 quarter credit hours*

**Credits**

**Technical Certificate**

**17**

IDS	215	Industrial Mechanics	6
IDS	221	Industrial Fluidpower	7
IDS	231	Pumps and Piping Systems	2
IFC	100	Industrial Safety Procedures	2

**INDUSTRIAL MOTOR CONTROL TECHNICIAN CURRICULUM OUTLINE**

*Technical Certificate of Credit (Major Code: MTC1)*

*Credit Required for Completion: 16 quarter credit hours*

**Credits**

**Technical Certificate**

**16**

IDS	105	DC and AC Motors	3
IDS	110	Fundamentals of Motor Controls	3
IDS	113	Magnetic Starters and Braking	3
IDS	115	Two-Wire Control Circuits	2
IDS	121	Advanced Motor Controls	2
IDS	131	Variable Speed Motor Control	3

**PROGRAMMABLE CONTROL TECHNICIAN I CURRICULUM OUTLINE**

*Technical Certificate of Credit (Major Code: IPC1)*

*Credit Required for Completion: 17 quarter credit hours*

**Credits**

**Technical Certificate**

**17**

IDS	110	Fundamentals of Motor Controls	3
IDS	141	Basic Industrial Programmable Logic Controllers (PLCs)	6
IDS	142	Industrial Programmable Logic Controllers II	6
IFC	100	Industrial Safety Procedures	2

## EMPLOYABILITY SKILLS

Department Code: EMP

### EMP 1000

#### Interpersonal Relations and Professional Development (3-0-3)

*Banner Title: Interpersonal Relations*

Students study human relations and professional development in today's changing world in order to prepare themselves for living and working in a complex society. Topics include human relations skills, job acquisition skills and communications, job retention skills, job advancement skills, and professional image skills.

*Prerequisite: Provisional admission*

*Offered quarterly*

## ENGLISH

Department Code: ENG

### ENG 1010

#### Fundamentals of English I (5-0-5)

*Banner Title: Fundamentals of English I*

This course emphasizes the development and improvement of written and oral communication abilities. Topics include analysis of writing techniques, applied grammar and writing skills, editing and proofreading skills, research skills, and oral presentation skills.

*Prerequisites: ENG 097 with a grade of C\* or better and RDG 097 with a grade of C\* or better or placement by diagnostic testing*

*Offered quarterly*

## INDUSTRIAL SYSTEMS TECHNOLOGY

Department Code: IDS

### IDS 101

#### Industrial Computer Applications (3-5-5)

*Banner Title: Industrial Computer Appl*

This course provides students with a foundation in industrial computers and computer systems with a focus on linking computers to the plant floor process. Topics include hardware, software, boot sequence, configuration and troubleshooting, and communication platforms.

*Prerequisites/Corequisites: IFC 101, SCT 100*

*Offered Fall and Spring terms*

### IDS 103

#### Industrial Wiring (3-9-6)

*Banner Title: Industrial Wiring*

Instructors teach the fundamental concepts of industrial wiring and emphasize installation procedures. Topics include grounding, raceways, three-phase systems, transformers (three-phase and single-

phase), wire sizing, overcurrent protection, NEC requirements, industrial lighting systems, switches, receptacles, and cord connectors.

*Prerequisites/Corequisites: IFC 101, IFC 102*

*Offered Winter and Summer terms*

### IDS 105

#### DC and AC Motors (2-3-3)

*Banner Title: DC and AC Motors*

This course introduces the fundamental theories and applications of single-phase and three-phase motors. Topics include motor theory and operating principles, motor terminology, motor identification, NEMA standards, AC motors, DC motors, scheduled preventive maintenance, troubleshooting, and failure analysis.

*Prerequisites/Corequisites: IFC 101, IFC 102, MAT 1013*

*Offered Fall and Spring terms*

### IDS 107

#### Basic Mechanics (3-5-5)

*Banner Title: Basic Mechanics*

This course emphasizes the basic skills training needed in mechanical maintenance. Instructors provide instruction for learning common terminology of maintenance and much needed practical measuring/mathematical skills. The course also introduces layout/fabrication procedures focusing on good shop practice skills and addresses typical materials and manufacturing processes used in the plant. The course also introduces power transmission equipment.

*Prerequisite: Provisional admission*

*Offered Summer term*

### IDS 110

#### Fundamentals of Motor Controls (2-3-3)

*Banner Title: Fundamentals of Motor Controls*

This course introduces the fundamental concepts, principles, and devices involved in industrial motor control. Students develop a theoretical foundation of industrial motor control devices. Topics include principles of motor control, control devices, symbols and schematic diagrams, and Article 430 of the National Electric Code.

*Prerequisite/Corequisite: IDS 105*

*Offered Fall and Spring terms*

### IDS 113

#### Magnetic Starters and Braking (1-5-3)

*Banner Title: Magnetic Starters and Braking*

This course provides instruction in wiring motor control circuits and on designing and installing magnetic starters in across-

the-line, reversing, jogging circuits, and motor braking. Topics include control transformers, full-voltage starters, reversing circuits, jogging circuits, and braking.

*Prerequisite/Corequisite: IDS 110*

*Offered Fall and Spring terms*

### IDS 115

#### Two-Wire Control Circuits (0-5-2)

*Banner Title: Two-Wire Control Circuits*

Students receive instruction in two-wire motor control circuits using relays, contractors, and motor starters with application sensing devices. Topics include wiring limit switches, pressure switches, float switches, temperature switches, proximity switches, and photo switches.

*Prerequisite/Corequisite: IDS 110*

*Offered Fall and Spring terms*

### IDS 121

#### Advanced Motor Controls (1-3-2)

*Banner Title: Advanced Motor Controls*

This course continues the study and application of motor control circuits and emphasizes sequencing circuits, complex circuits, motor control centers, reduced voltage starting, and troubleshooting.

*Prerequisite/Corequisite: IDS 115*

*Offered Fall and Spring terms*

### IDS 131

#### Variable Speed Motor Control (2-3-3)

*Banner Title: Variable Speed Motor Control*

In this course, instructors introduce students to the fundamentals of variable speed drives, industrial motors, and other applications of variable speed drives. Topics include fundamentals of variable speed control, AC frequency drives, DC variable speed drives, installation procedures, and ranges.

*Prerequisite/Corequisite: IDS 115*

*Offered Winter and Summer terms*

### IDS 141

#### Basic Industrial Programmable Logic Controllers (PLCs) (4-6-6)

*Banner Title: Basic Industrial PLCs*

This basic course introduces operational theory, systems terminology, programmable logic controllers (PLC) installations, and programming procedures for programmable logic controls. The course emphasizes PLC programming, connections, installations, and start-up procedures. Topics include PLC hardware, software, functions, and terminology; introductory numbering systems; PLC installation and set up; PLC programming basics; relay logic instructions; timers and counters; connecting field devices to I/O cards; and PLC safety procedures.

*Prerequisite/Corequisite: IDS 110*

*Offered Winter and Summer terms*

**IDS 142**  
**Industrial Programmable  
Logic Controllers II (4-6-6)**

*Banner Title: Industrial PLCs II*

This course provides for hands-on development of operational skills in the maintenance and troubleshooting of industrial control systems and automated industrial equipment. Students apply skills developed in previous PLCs courses in an industrial setting. This course includes advanced skills necessary to understand and work with PLCs in industrial plants.

*Prerequisite/Corequisite: IDS 141*  
*Offered Fall and Spring terms*

**IDS 209**  
**Industrial Instrumentation (4-6-6)**

*Banner Title: Industrial Instrumentation*  
Instructors provide instruction in the principles and practices of instrumentation for industrial process control systems and emphasize industrial maintenance techniques for production equipment. Topics include instrument tags; process documentation; sensing pressure, flow, level, and temperature; instrument calibration; and loop tuning.

*Prerequisites/Corequisites: IDS 141,*  
*IDS 142*  
*Offered Fall and Spring terms*

**IDS 215**  
**Industrial Mechanics (4-6-6)**

*Banner Title: Industrial Mechanics*

Instructors introduce basic physics concepts applicable to mechanics of industrial production equipment, teach basic industrial applications of mechanical principles, and emphasize power transmission and specific mechanical components. Topics include mechanical tools, fasteners, basic mechanics, lubrication, bearings, packing, and seals.

*Prerequisite: Provisional admission*  
*Offered Fall and Spring terms*

**IDS 221**  
**Industrial Fluidpower (6-4-7)**

*Banner Title: Industrial Fluidpower*

Students obtain the fundamental concepts and theories needed to operate hydraulic components and pneumatic systems safely. Topics include hydraulic theory, suction side of pumps, actuators, valves, pumps and motors, accumulators, symbols and circuitry, fluids, filters, pneumatic theory, compressors, pneumatic valves, and air motors and cylinders.

*Prerequisite: Program admission*  
*Offered Winter and Summer terms*

**IDS 231**  
**Pumps and Piping Systems (1-4-2)**

*Banner Title: Pumps and Piping Systems*  
Students study the concepts of industrial pumps and piping systems. Topics include pump identification; pump operation; pump installation, maintenance, and troubleshooting; piping systems; and piping systems installation.

*Prerequisite: Provisional admission*  
*Offered Winter and Summer terms*

**INDUSTRIAL TECHNOLOGIES  
FUNDAMENTAL CORE**

*Department Code: IFC*

**IFC 100**  
**Industrial Safety Procedures (2-1-2)**

*Banner Title: Industrial Safety*

*Procedures*

This course provides an in-depth study of the health and safety practices required for maintenance of industrial, commercial, and home electrically operated equipment. Topics include OSHA regulations, safety tools, equipment, procedures, and first aid and cardiopulmonary resuscitation.

*Prerequisite: Provisional admission*  
*Offered quarterly*

**IFC 101**  
**Direct Current Circuits I (3-2-4)**

*Banner Title: Direct Current Circuits I*

This introductory course introduces direct current (DC) concepts and applications, including electrical principles and laws; batteries; DC test equipment; series, parallel, and simple combination circuits; and laboratory procedures and safety. Students must pay a \$10 supply fee when registering for this course.

*Prerequisite/Corequisite: MAT 098*  
*proficiency level for Electronics*  
*Technology and Industrial Systems*  
*Technology students; MAT 1012 for*  
*other program students*  
*Offered quarterly*

**IFC 102**  
**Alternating Current I (3-2-4)**

*Banner Title: Alternating Current I*

This course introduces the theory and applications of varying sine wave voltages and current. Topics include magnetism, AC wave generation, AC test equipment, inductance, capacitance, and basic transformers.

*Prerequisites/Corequisites: MAT 1013 or*  
*MAT 1111, IFC 101*  
*Offered quarterly*

**IFC 103**  
**Solid State Devices I (3-2-4)**

*Banner Title: Solid State Devices I*

This course introduces the characteristics and applications of solid state devices. Topics include semiconductor fundamentals, diode applications, basic transistor fundamentals, basic amplifiers, and semiconductor switching devices.

*Prerequisite/Corequisite: IFC 102*  
*Offered quarterly*

**MATHEMATICS**

*Department Code: MAT*

**MAT 1013**  
**Algebraic Concepts (5-0-5)**

*Banner Title: Algebraic Concepts*

Instructors introduce concepts and operations which can be applied to the study of algebra. Course content emphasizes basic mathematical concepts and both basic and intermediate algebraic concepts. Class includes lecture, applications, and homework to reinforce learning.

*Prerequisite: MAT 098 with a grade of*  
*C\* or better or placement by diag-*  
*nostic testing*  
*Offered quarterly*

**SCIENCE AND TECHNOLOGY**

*Department Code: SCT*

**SCT 100**  
**Introduction to  
Microcomputers (1-4-3)**

*Banner Title: Intro to Microcomputers*

This course introduces the fundamental concepts and operations necessary to use microcomputers. Course content emphasizes basic functions and familiarity with computer use. Topics include computer terminology and an introduction to the Windows environment, networking, word processing, spreadsheets, presentation graphics, and databases.

*Prerequisite: Provisional admission*  
*Offered quarterly*