

# ADVANCED INDUSTRIAL INTEGRATED TECHNOLOGY (AIT)

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## **AIT 100 (4 credit hours)**

### **Power Generation and Utilization**

Introduces electrical, hydraulic, and pneumatic power systems used in industry. Provides theory and application of DC and AC, including three-phase power and theory and application of hydraulic and pneumatic power utilizing basic circuits. Lecture/Lab: 4.0 credits (90 contact hours). (30:1 Ratio Lab).

**Pre-requisite:** Reading and Mathematics assessment exam scores above KCTCS developmental placement level or successful completion of prescribed developmental courses.

**Attributes:** Course Also Offered in Modules, Technical

**Components:** LAI: Integrated Laboratory, LEI: Integrated Lecture

## **AIT 110 (3 credit hours)**

### **Power Distribution Systems**

Provides instruction in the use of electrical, hydraulic, and pneumatic power as it applies in industry. Covers AC/DC circuit analysis, single-phase and three-phase power including hydraulic and pneumatic power and basic principles of pressure and flow. Lecture/Lab: 3 credits (67.5 contact hours).

**Pre-requisite:** AIT 100 or consent of instructor.

**Attributes:** Course Also Offered in Modules, Technical

**Components:** LAB: Laboratory, LEC: Lecture

## **AIT 120 (3 credit hours)**

### **Equipment Installation**

Focuses on the installation of electrical, hydraulic, and pneumatic industrial systems. Emphasizes motor installation, wiring/box selection, conduit preparation and installation, hydraulic/pneumatic supply, piping, controls, and various lifting and rigging techniques. Lecture/Lab: 3.0 credits (75 contact hours). (30:1 Ratio Lab).

**Pre-requisite:** AIT 100 or consent of instructor.

**Attributes:** Course Also Offered in Modules

**Components:** LAB: Laboratory, LEC: Lecture

## **AIT 130 (4 credit hours)**

### **Measurement and Instrumentation**

Covers measurement and instrumentation concepts and applications, choice of proper instrumentation and calibration, manual and automated measurement processes. Lecture/Lab: 4.0 credits (90 contact hours). (30:1 Ratio).

**Pre-requisite:** AIT 140 or consent of instructor.

**Attributes:** Course Also Offered in Modules

**Components:** LAB: Laboratory, LEC: Lecture

## **AIT 135 (3 credit hours)**

### **Industrial Refrigeration - I**

Presents refrigeration fundamentals and associated components for individuals interested in safe, effective, and efficient maintenance and operation of industrial refrigeration equipment who may also be seeking RETA credentialing. Lecture: 3.0 credits (45 contact hours).

**Attributes:** Technical

**Components:** LEC: Lecture

## **AIT 140 (4 credit hours)**

### **Industrial Controls I**

Provides instruction in the integrated application of basic electrical and fluid power controls. Emphasizes electrical motor controls with starting, reversing, and stopping devices, as well as various hydraulic and pneumatic valves and speed control circuits. Prerequisite: AIT 110 or consent of instructor. Lecture/Lab: 4 credits (90 contact hours). (30:1 Ratio).

**Attributes:** Course Also Offered in Modules

**Components:** LAB: Laboratory, LEC: Lecture

## **AIT 145 (6 credit hours)**

### **Utility Technician I**

Introduces the basics of safely constructing power lines. Covers pole climbing techniques, bucket truck operation and digger/derrick operation. Provides introductory training on all power line construction tools and equipment. Lecture: 1 credit hour (15 contact hours). Laboratory: 5 credit hours (225 contact hours).

**Attributes:** Technical

**Components:** LAB: Laboratory, LEC: Lecture

## **AIT 150 (4 credit hours)**

### **Industrial Controls II**

Provides instruction in the integrated application of advanced industrial controls for electrical, hydraulic, and pneumatic systems. Emphasizes variable frequency drives, SCR speed controls, proximity sensor, hydraulic synchronization circuits, multi-pressure controls, and pneumatic logic circuits, and various flow control valves used in hydraulics and pneumatics. Prerequisite: AIT 140 or consent of instructor. Lecture/Lab: 4 credits (90 contact hours). (30:1 Ratio).

**Attributes:** Course Also Offered in Modules

**Components:** LAB: Laboratory, LEC: Lecture

## **AIT 160 (1 credit hours)**

### **Workplace Safety**

Focuses on General Industry safety practices as defined by the Occupational Safety and Health Administration. Covers PPE, hazard identification, walking and working surfaces, as well as other recognized workplace safety issues. Students will earn the OSHA 10-hour General Industry safety card upon successful completion of the course. Lecture: 1 credit hour (15 contact hours).

**Pre-requisite:** Reading assessment scores above KCTCS developmental placement level or successful completion of prescribed developmental courses.

**Attributes:** Technical

**Components:** LEC: Lecture

## **AIT 200 (4 credit hours)**

### **Process Management and Quality Control**

Emphasizes project team organization. Introduces the following concepts: cycle time, production time, first pass yield, and barrier identification. Introduces quality control including understanding acceptance criteria with tolerances, data collection, and data reporting. Lecture/Lab: 4.0 credits (90 contact hours). (30:1 Ratio Lab).

**Pre-requisite:** AIT 130 or Consent of Instructor.

**Attributes:** Course Also Offered in Modules

**Components:** LEC: Lecture

**AIT 210 (4 credit hours)****Advanced Equipment Maintenance**

Focuses on maintenance techniques and procedures used with advanced and highly technical industrial machinery, including lubrication, V-belt and shaft drives, couplings, chain drives, bearings and seals, brakes and clutches, machine vibration and analysis, laser alignment, and troubleshooting techniques. Emphasizes the use of hand tools and precision measuring instruments. Lecture/Lab: 4.0 credits (90 contact hours).

**Pre-requisite:** Reading and Mathematics assessment exam scores above KCTCS developmental placement level or successful completion of prescribed developmental courses, and AIT 110 or consent of instructor.

**Attributes:** Course Also Offered in Modules

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 220 (3 credit hours)****The Integrated Power Grid**

Introduces students to types of power plants that are tied to the electric grid other than fossil power plants. Provides overviews of nuclear, hydro, and many forms of renewable energy. Includes forms of alternative energy power plants such as solar, wind, and bio-mass power plants.

Lecture: 3.0 (45 contact hours)

**Attributes:** Course Also Offered in Modules, Technical

**Components:** LEC: Lecture

**AIT 230 (3 credit hours)****Integrated Power Plant Operations**

Introduces students to main components found within a fossil power plant. Provides in-depth study of following systems: cooling water system, steam flow system, air flow system, gas flow system, and power distribution. Provides instruction in the integration of systems within a fossil fuel power plant, and preparatory instruction for the Edison Electrical Institute Examination. Lecture: 3.0 (45 contact hours).

**Pre-requisite:** AIT 220 or Consent of Instructor.

**Attributes:** Course Also Offered in Modules, Technical

**Components:** LEC: Lecture

**AIT 235 (3 credit hours)****Industrial Refrigeration - II**

Offers a second level detailed presentation of primary components and systems utilized within industrial refrigeration plants for individuals interested in safe, effective, and efficient maintenance and operation of industrial refrigeration equipment who may also be seeking RETA credentialing. Lecture: 3.0 credits (45 contact hours).

**Pre-requisite:** AIT135.

**Attributes:** Technical

**Components:** LEC: Lecture

**AIT 245 (6 credit hours)****Utility Technician II**

Covers construction of power lines. Teaches framing and use of tools required in construction. Emphasizes safety in establishing a work zone and utilizing rescue techniques. Lecture: 1 credit hour (15 contact hours). Laboratory: 5 credit hours (225 contact hours). Covers construction of power lines. Teaches framing and use of tools required in construction. Emphasizes safety in establishing a work zone and utilizing rescue techniques. Pre-requisite: AIT 245. Lecture: 1 credit hour (15 contact hours). Laboratory: 5 credit hours (225 contact hours).

**Pre-requisite:** AIT 145. AIT 245.

**Attributes:** Technical

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 270 (2 credit hours)****Introduction to Robotics and Programmable Logic Controllers**

Examines fundamental architecture of programmable logic controllers as it pertains to industrial application and incorporates ladder logic principles, commonly used instruction language, editing, program navigation and program analysis. Includes the fundamentals of 6-axis robotics including manual manipulation, execution of existing robotic program file, modification of target parameters, and safety interlocks. Lecture: 1 credit hour (15 contact hour) Lab: 1 credit hour (30 contact hour)

**Pre-requisite:** AIT 1401 or consent of instructor.

**Attributes:** Course Also Offered in Modules

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 290 (0.1-5 credit hours)****Selected Topics in Advanced Integrated Technology**

Includes selected topics in integrated technology, due to rapidly changing technology or in response to local needs. Covers topics which may vary from semester to semester at the discretion of the instructor. May repeat course with different topics to a maximum of five credit hours. Lecture/Lab: Varies by topic.

**Pre-requisite:** Consent of instructor.

**Attributes:** Technical

**Components:** LEC: Lecture

**AIT 299 (4 credit hours)****Advanced Electromechanical Concepts**

Investigates advanced concepts in electromechanical engineering. Includes advanced concepts in fluid power, motor controls, instrumentation, and automation controls. Required for students in the Advanced Integrated Technology program who want to pursue the Bachelor of Science Electromechanical Engineering Technology transfer agreement with Murray State University. Lecture/Lab: 4.0 credits (90 contact hours).

**Pre-requisite:** AIT 1501 or consent of instructor.

**Attributes:** Technical

**Components:** LEC: Lecture

**AIT 1001 (2 credit hours)****Basic Electrical Knowledge**

Introduces electrical power systems used in industry. Provides introductory theory and application of DC/AC circuits, control transformers, and operation of DC power supplies. Lecture/Lab: 2.0 credits (45 contact hours).

**Pre-requisite:** Reading and Mathematics assessment exam scores above KCTCS developmental placement level or successful completion of prescribed developmental courses or consent of instructor.

**Components:** LEC: Lecture

**AIT 1002 (1 credit hours)****Power Development**

Introduces electrical power systems used in industrial settings, including basic theory and application of alternators, electric motors, and three-phase. Integrated Lecture/Lab: 1.0 credit (22.5 contact hours).

**Pre-requisite:** AIT 1001 or Consent of Instructor.

**Components:** LAI: Integrated Laboratory, LEI: Integrated Lecture

**AIT 1003 (1 credit hours)****Hydraulic/Pneumatic Fundamentals**

Introduces basic theory and application of hydraulic and pneumatic industrial power systems. Integrated Lecture/Lab: 1.0 credit (22.5 contact hours).

**Pre-requisite:** Reading assessment exam scores above KCTCS developmental placement level or successful completion of prescribed developmental courses.

**Components:** LAI: Integrated Laboratory, LEI: Integrated Lecture

**AIT 1101 (1 credit hours)****Electrical Power Distribution**

Provides instruction in the use of electrical power as it applies in industry. Includes AC/DC circuit analysis, AC power generation and three-phase distribution systems, and transformers. Lecture/Lab: 1.0 credits (22.5 contact hours).

**Pre-requisite:** AIT 1001 or consent of instructor.

**Components:** LEC: Lecture

**AIT 1102 (2 credit hours)****Fluid Power Distribution**

Provides instruction in the use of hydraulic and pneumatic power as it applies to industry. Includes basic principles of pressure and flow, basic hydraulic/pneumatic circuits including pumps, valves, cylinders, and motors. Lecture/Lab: 2.0 credit (45 contact hours).

**Pre-requisite:** AIT 1003 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1201 (1 credit hours)****Electrical Installation**

Focuses on the installation of electrical industrial systems, including print reading, wiring/box selection, component installation, raceways and conduit, control wiring, and wiring techniques. Lecture/Lab: 1.0 credit (25 contact hours).

**Pre-requisite:** AIT 1101 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1202 (1 credit hours)****Piping, Pneumatic, & Installation**

Focuses on the installation of pneumatic industrial systems, including interpretation of drawings and diagrams, fabrication of pipe and pipefittings, pneumatic supply lines, piping safety, and pipe installation for pneumatic systems. Lecture/Lab: 1 credit (25 contact hours).

**Pre-requisite:** AIT 1102 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1203 (1 credit hours)****Mechanical Installation**

Includes motor and machine mounting, speed, torque, power measurement, and various lifting and rigging techniques. Lecture/Lab: 1 credit (25 contact hours).

**Pre-requisite:** Reading assessment exam scores above KCTCS developmental placement level or successful completion of prescribed developmental courses or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1301 (2 credit hours)****Principles of Instrumentation**

Introduces measurement and instrumentation concepts and applications by examining the four main components of instrumentation: temperature, pressure, flow, and level. Lecture/Lab: 2.0 credit (45.0 contact hours).

**Pre-requisite:** AIT 1401 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1302 (2 credit hours)****Integrated Process Control**

Covers measurement and instrumentation concepts and applications and introduces the concept of loop controls and the proper calibration of loops. Examines the importance of PID controllers in a control loop. Lecture/Lab: 2.0 credits (45 contact hours).

**Pre-requisite:** AIT 1301 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1401 (2 credit hours)****Basic Electrical Controls**

Provides instruction in the integrated application of basic electrical controls including electrical motor controls with starting, reversing, and stopping devices. Lecture/Lab: 2.0 credits (45 contact hours).

**Pre-requisite:** AIT 1101.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1402 (1 credit hours)****Basic Pneumatic Controls**

Introduces the student to pneumatic speed control circuits. Uses air pressure regulators and flow controls to obtain cylinder speeds. Lecture/Lab: 1.0 credit (22.5 contact hours).

**Pre-requisite:** AIT 1102 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1403 (1 credit hours)****Basic Hydraulic Controls**

Provides instruction in hydraulic speed and pressure control; includes flow control valves, metering circuits, pressure reducing valves, and sequence valves. Lecture/Lab: 1.0 credit (22.5 credit hours).

**Pre-requisite:** AIT 1102 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1501 (2 credit hours)****Intermediate Electrical Controls**

Provides instruction in the integrated application of advanced industrial controls for electrical systems. Emphasizes variable frequency drives, proximity sensors, SCR speed controls. Lecture/Lab: 2.0 credits (45 contact hours).

**Pre-requisite:** AIT 140 or AIT 1401 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1502 (1 credit hours)****Intermediate Pneumatic Controls**

Provides instruction in the integrated application of advanced industrial controls for pneumatic systems. Emphasizes pneumatic logic circuits. Lecture/Lab: 1.0 credit (22.5 contact hours).

**Pre-requisite:** AIT 1402 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 1503 (1 credit hours)****Intermediate Hydraulic Controls**

Provides instruction in the integrated application of advanced industrial controls for hydraulic circuits. Emphasizes hydraulic synchronization circuits and multi-pressure circuits. Lecture/Lab: 1.0 credit (22.5 contact hours).

**Pre-requisite:** AIT 1403 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 2002 (2 credit hours)****Quality Control and SPC**

Introduces quality control including understanding acceptance criteria with tolerances, data collection, and data reporting. Pre requisite: AIT 130 or Consent of Instructor. Lecture/Lab: 2.0 credits (45 contact hours).

**Components:** LAI: Integrated Laboratory, LEI: Integrated Lecture

**AIT 2101 (1 credit hours)**

**Predictive/Preventive Maintenance and Lubrication**

Focuses on maintenance techniques and procedures used with advanced and highly technical industrial machinery. Pre requisite: AIT 1101 or consent of instructor. Lecture/Lab: 1.0 credits (22.5 contact hours).

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 2102 (1 credit hours)**

**Power Transmission Systems**

Focuses on maintenance techniques and procedures used with advanced and highly technical industrial machinery including v-belt and shaft drives, couplings, chain drives, bearings and seals, brakes and clutches.

Pre requisite: Reading and Mathematics assessment exam scores above KCTCS developmental placement level or successful completion of prescribed developmental courses or consent of instructor. Lecture/Lab 1.0 credit (22.5 contact hours).

**Components:** LEC: Lecture

**AIT 2103 (2 credit hours)**

**Advanced Mechanical**

Focuses on various installation methods required for advanced and highly technical industrial equipment components. Lecture/Lab: 2.0 credits (45 contact hours).

**Pre-requisite:** Reading and Mathematics assessment exam scores above KCTCS developmental placement level or successful completion of prescribed developmental courses or consent of instructor.

**Components:** LAI: Integrated Laboratory, LEI: Integrated Lecture

**AIT 2701 (1 credit hours)**

**Introduction to PLCs**

Examines fundamental architecture of programmable logic controllers as it pertains to industrial applications and incorporates ladder logic principles, commonly used instruction language, editing, program navigation and program analysis. Lecture/Lab: 1.0 credit (22.5 contact hours).

**Pre-requisite:** AIT 1401 or consent of instructor.

**Components:** LAB: Laboratory, LEC: Lecture

**AIT 2702 (1 credit hours)**

**Introduction to Robotics**

Investigates underlying principles, applications and fundamentals of 6-axis robotics including manual manipulation, execution of existing robotic program file, modification of target parameters, and safety interlocks.

Lecture/Lab: 1.0 credit (22.5 contact hours).

**Pre-requisite:** AIT 1401.

**Components:** LAB: Laboratory, LEC: Lecture