The Ohio State University Agricultural Technical Institute offers courses designed to build the skills of industrial and manufacturing technicians. Developed with industry input to ensure relevance and effectiveness, these programs emphasize practical application and problem solving. Approximately 100 companies have enrolled employees in these unique programs.

Courses include (in alphabetical order by course title):

- Advanced Hydraulics
- Applied Mathematics
- Basic Hydraulics
- Basic Industrial Electricity
- Blueprint Reading
- Communicating on the Job
- Industrial Motors & Motor Control
- Material Science
- Mechanical Drives
- Pneumatic Automation
- Technical Physics
- Troubleshooting Electrical Systems
- PLC I
- PLC II

We are pleased to provide the following certificate programs in Industrial Technician Training. You can customize the program to meet your own needs by selecting the certificate that will work best for you!

**Industrial Maintenance Technician Certificate** – the most comprehensive of the Industrial Technician certificates

Successful completion of a *minimum of nine (9) courses*, including:

- Applied Mathematics
- Blueprint Reading
- Communicating on the Job
- At least three (3) electrical courses: Basic Industrial Electricity, Industrial Motors & Motor Control, PLC I, PLC II, Troubleshooting Electrical Systems
- At least two (2) hydraulic / pneumatic courses: Basic Hydraulics, Advanced Hydraulics, or Pneumatic Automation

**Electrical & Controls Technician Certificate** – focusing specifically on the electrical course series

Successful completion of a *minimum of six (6) courses*, including:

- Applied Mathematics
- Blueprint Reading
- At least four (4) of the following: Basic Industrial Electricity, Industrial Motors & Motor Control, PLC I, PLC II, Troubleshooting Electrical Systems or Communicating on the Job

**Mechanical Technician Certificate** – focusing specifically on the mechanical course series

Successful completion of a *minimum of six (6) courses*, including:

- Applied Mathematics
- Blueprint Reading
- At least four (4) of the following: Basic Hydraulics, Advanced Hydraulics, Pneumatic Automation, Technical Physics, Material Science, Mechanical Drives or Communicating on the Job

**PROGRAM REQUIREMENTS**

Successful completion of each course is based upon minimum criteria established by the instructor and listed in the course syllabus. Attendance, class participation, exams, and laboratory exercises will all be included in the evaluation.

*Applied Mathematics is a prerequisite to the electrical, hydraulics and physics courses. All students must either complete or test-out Applied Mathematics prior to enrollment in these courses. Students who can successfully demonstrate previous experience and competency in a given course may receive certificate credit on a case by case basis. There is a $50 test-out fee for each course.*
INDUSTRIAL TECHNICIAN COURSE DESCRIPTIONS

In alphabetical order by course title

Advanced Hydraulics – 30 hour course
A more in-depth look at hydraulic components and systems. Items to be covered will include complex systems of cartridge valves, proportional and servo controls, electrical feedback, closed and open loop control, and hydrostatic drives. Emphasis in the class and lab will be on understanding, troubleshooting and maintenance of these systems. (Prerequisite: Basic Hydraulics)

Applied Mathematics – 30 hour course
Provides a review of basic arithmetic of fractions, decimals and percents, a discussion of units of measure, and introductions to algebra, geometry and trigonometry. After a solid foundation is laid, a strong emphasis is placed on solving practical problems from fields such as hydraulics, pneumatic automation, electricity and electronics. (Applied Mathematics is a prerequisite to the electrical, hydraulics and physics courses. All students must either complete or test-out prior to enrollment in these courses.)

Basic Hydraulics – 30 hour course
Provides a basic understanding of the operation and maintenance of hydraulic components and systems. Topics to be covered in the classroom and in the lab setting: Principles of Hydraulics; Definitions and Terminology; Hydraulic Symbols and Schematics; Types of Circuits; Pumps (designs and applications); Motors (designs and applications); Cylinders (designs and application); Pressure, Direction and Flow Control Valves; Oil Filtration, Sampling and Fabrication; Fittings (use and identification). (Prerequisite: Applied Mathematics)

Basic Industrial Electricity – 30 hour course
Students will gain a basic understanding of the principles of electricity, electronic components, standards and schematics. Class and lab sessions will focus on the following: Personal and Equipment Safety, Definitions and Terminology; Basic Principles, Laws and Calculations, AC Principles, Wiring, Schematics and Codes; AC Motors, Lighting and other Equipment; Testing Instruments, Basic Troubleshooting and Repair (AC Equipment and DC/Electronic Equipment); DC Principles and Components; DC Circuits, Diagrams and Schematics; Electronics and Semiconductors. (Prerequisite: Applied Mathematics)

Blueprint Reading – 30 hour course
Provides basic skills for blueprint applications. Class sessions will focus on the following: Language of industry (universal language, common elements, care of blueprints, technique of reading blueprints); Drafting and Blueprint Reading Procedures (alphabet of lines, basic principles of projections, measurement tools).

Communicating on the Job – 30 hour course
A fresh approach to communicating on the job, this course is interactive and applicable in formal and informal settings. Just come with an open mind while focusing on the following: learning to communicate effectively, busting-out the myths of communication, listening, and always remembering the non-verbal communication. Additionally, you will discover how to communicate effectively with superiors and subordinates as well as across cultures and genders, how to work as part of a team, and how to deal with conflict to create a winning situation. (This course is required for the master certificate.)

Industrial Motors & Motor Controls – 30 hour course
This course is intended for the participant with some working knowledge and/or experience in industrial electricity. Designed to help prepare participants for employment in the field of industrial electrical maintenance, this course consists of lecture, lab demonstration, and hands-on and software-based lab assignments. Areas covered include: Safety, Understanding electrical drawings, Motor transformer and distribution systems, Motor control devices, Motor principles, DC motors, Three phase AC motors, Single phase AC motors, Motor selection, Motor installation, Motor maintenance and troubleshooting, Motor starters, Relays and logic, Motor control devices and AC and DC drives. (Prerequisite: Basic Industrial Electricity)
Material Science – 45 hour course
A course in material science establishes a solid foundation for understanding the behavior and characteristics of metals and materials as well as the practices for materials processing currently used in the metals and materials industry. This course provides the student with a basic understanding of the mechanisms that cause material failures and those that prevent failures. **(Prerequisite: Applied Mathematics and Technical Physics)**

Mechanical Drives – 30 hour course
This consists of classroom presentations and demonstrations. Topics covered include Rigging and Lifting, Lubrication, Contamination, Cleanliness, Filtration, Bearings, Flexible Drives (Belt & Chain and Gear), Vibration & Alignment, Ball & Power Screws and Conveyors.

Pneumatic Automation – 30 hour course
Provides an understanding of the operation and maintenance of pneumatic components and automation systems. Topics such as compressed air and vacuum systems, pneumatic logic systems, component operation, selection, maintenance and troubleshooting are emphasized in the class and lab environment.

PLC I – 30 hour course
Introducing the PLC - What it is and how it functions, number systems, introduction to PLC operations, input modules, output modules, putting together a modular PLC, introduction to Logic, programming a PLC, PLC processors, program and data organization, basic relay instructions, understanding relay instructions and the PLC input module, documenting your system, timer and counter instructions, introduction to comparison, data-handling, and sequencer instructions, including hands-on exercises using the Allen Bradley Compact Logix platform. The basis for the course will be the Allen Bradley Logix hardware and Studio 5000 software systems. **(Prerequisite: Industrial Motors & Motor Control)**

PLC II – 30 hour course
The course will include a review of basic ladder diagrams, analog inputs and outputs, operator interface techniques, specialty I/O modules, sensor interfacing, advanced mathematics and scaling techniques, and advanced trouble-shooting procedures utilizing Allen-Bradley RSLogix 5000 Software/CompactLogix Hardware. **(Prerequisite: PLC I)**

Technical Physics – 30 hour course
Applied Physics covers the following areas: Measurement – Review of math principle, scientific notation, and dimension systems, Motion – Vectors, velocity, acceleration, trajectories, gravity, Force – Force, mass and weight, action and reaction, and equilibrium, Energy – Work, energy and gravity, energy transformation, power, energy and mass, Fluids – Phases of matter, density, pressure, buoyancy, flow, Heat – Heat and temperature, heat transfer, temperature scales, molecular energy and Electricity – Charge, voltage, current, conductors and insulators, resistance, basic circuits and ohm’s law. **(Prerequisite: Applied Mathematics)**

Troubleshooting Electrical Systems – 30 hour course
A course designed to help develop and/or improve troubleshooting skills for industrial maintenance technicians. The course consists of 10 three hour classes and includes topics such as basic troubleshooting techniques, working and communicating with other people and using tools and available information to facilitate logical and effective troubleshooting practices. Lecture, demonstrations, and virtual and hands-on labs are used to these ends. Final examination will consist of a closed-book written exam and a hands-on practical troubleshooting exam. **(Prerequisite: Basic Industrial Electricity)**