

# Industrial Maintenance Technology

## Program Design Summary

### ***Program Information***

<b>Organization</b>	Washburn Institute of Technology
<b>Program Number</b>	47.0303
<b>Instructional Level</b>	Certificate
<b>Instructional Area</b>	Industrial Maintenance Technology
<b>Original Developer(s)</b>	Vance Lively
<b>Last Revision Date</b>	7/6/2009

### **Target Population**

Grades 11 & 12; Post Secondary

### **Description**

This program prepares individuals to apply technical knowledge and skills to repair and maintain industrial machinery and equipment such as pumps, electric motors, pneumatic tools, conveyor systems, and production machinery. Instruction includes electrical theory, wiring, motor controls, 3-Phase/Single Phase/DC motors, blueprint reading, programmable logic controllers (PLC), hydraulics and pneumatics, and mechanical systems.

### **Indirect Measures**

1. Completion of Program Competencies
2. Keytrain Applied Math and Reading for Information levels should be raised one level above entry levels

### **Entry Requirements**

1. Prospective students must pass the general entrance assessment, WorkKeys®, with a Level 4 in Applied Math and Reading for Information.

### **Evaluation Summary**

Grading Criteria: Unit grades are issued at the completion of each quarter.

The following grading scale will prevail:

90% or higher A  
80% to 89% B  
70% to 79% C  
60% to 69% D  
Less than 60% F

Grades are based on 3 categories. All categories will be averaged to determine a grade for each unit.

Daily Grade - 35% - (0 or 10 points awarded). The daily grade will assess:

Participation - Is based on completion of all class assignments, participation in class discussions, willingness to work with others, and be respectful of their points of view and learning.

Teaming - Working cooperatively together to achieve the highest learning possible using skills like listening, observation, respect and problem solving.

Ethics - Following all the school policies regarding safety and care of equipment/simulators, shop

cleanliness, internet and computer use, respect, conduct, and appropriate language.

Pop Quizzes - Questions may come from book assignments or lectures. There is no makeup for pop quizzes.

Lab Activities - 35% - The student will be evaluated on labs based on the completion of skills. A student must complete all unit skills before advancing (with instructor permission) to the next unit.

Exams - 30% - A comprehensive exam will be given over each module in a unit.

Dress Code: Shorts, sandals (any open toe footwear), sleeveless shirts, caps, baggy or loose clothing, and jewelry are not to be worn in the classroom. T shirts with sexual, profane, racial, alcohol related themes or advertisements, and other objectionable subjects are not allowed.

Electronic Equipment: Use of cell phones and other electronic devices are forbidden in the classroom and lab areas. Computers are for school usage only.

Make up Policy: For scheduled absences (if approved by the instructor) all work must be made up before the absence in order to receive credit for the work. For emergency situations (if approved by the instructor) work can be made up in a timely manner as agreed upon with the instructor.

#### ADA Notification Statement

##### Disability Services:

The Special Support Services (SSS) Office is responsible for assisting in arranging accommodations and for identifying resources at KATS for persons with disabilities. Qualified students with disabilities **MUST** register and provide documentation with the office to be eligible for services. New requests for accommodations should be submitted two months or more prior to the date services should begin; however, contact the SSS Office as soon as a need may arise. Depending on the accommodation request, four to eight weeks lead time may be needed for timely and effective provision of services. SSS coordinates and assist in arranging services it deems appropriate for eligible students on a case-by-case basis.

If you are a student with a disability that may substantially limit your ability to participate in this class and believe you will need accommodations, it is your responsibility to contact:

Who: Special Support Services Coordinator

Location: Career Resource Center,

Phone: 785-228-6356)

E-Mail: [SSScoordinator@washburntech.edu](mailto:SSScoordinator@washburntech.edu)

Student may voluntarily identify themselves to the instructor for a referral to the Special Support Services Coordinator.

## Program Outcomes

- A. Analyze problems using technical diagrams and prints.
- B. Apply all safety guidelines appropriate for each course in order to prepare students to work safely in industrial environments.
- C. Assess problems to determine if they are electrical or mechanical in nature.
- D. Demonstrate skills and knowledge needed to work in the highly technical environment.
- E. Acquire the basic skill needed to expand and gain the knowledge for a more complex application of Industrial Technology.
- F. Develop skills needed to read and understand technical manuals.

- G. Motivate learning in technical and employability skills.

**Core Abilities**

- A. Demonstrate Responsible Work Ethics
- B. Communicate Effectively
- C. Integrate technology
- D. Learn Effectively - use academics effectively
- E. Demonstrate cooperative/teamwork skills
- F. Apply Safety
- G. Think critically and creatively

<b>Course Configuration</b>						
<b>Semester</b>	<b>Course #</b>	<b>Course Title</b>	<b>Credits</b>	<b>Contact Hrs</b>	<b>Category</b>	<b>Req?</b>
	IND100	Basic Skills	4	75	Core Course	Yes
	IND110	Basic Electricity	4	90	Core Course	Yes
	IND120	Electrical Control Systems I	4	90	Core Course	Yes
	IND 125	Electrical Control Systems II	5	105	Core Course	Yes
	IND130	Pneumatics	2	45	Core Course	Yes
	IND140	Hydraulics	3	75	Core Course	Yes
	IND150	Industrial Pumps	2	45	Core Course	Yes
	IND205	Electrical Control Systems III	4	90	Core Course	Yes
	IND210	Mechanical Systems	3	75	Core Course	Yes
	IND220	Intelligent Motors	2	45	Core Course	Yes
	IND230	Industrial Power Electronics	3	60	Core Course	Yes
	IND240	Process Control	3	75	Core Course	Yes
	IND250	AB SLC 500	7	0	Core Course	Yes
	IND270	Workplace Skills	2	30	Core Course	Yes
	IND280	Industrial Technology OJT	3	135	Elective	Yes

**Program Course Detail**

**Course A -- Basic Skills**

<b>Course Number</b>	IND100
<b>Credits</b>	4
<b>Contact Hours</b>	75
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	Math: Work with whole numbers, fractions, decimals, percentages, ratios and proportions, systems of measurement, geometry, trigonometry, formulas, conversions, statistics and

number systems.

Mechanical Blueprint Reading: Identify lines and their functions, single, multiple and auxiliary views, reading and location blueprint dimensions, determine tolerances, identify thread dimensions, identify tapers and machine surfaces, cutting plane and sections, geometric dimensioning, wear limits and assembly drawings.

Lubrication: Lubrication fundamentals and terms identify lubrication oils, general purpose and special purpose greases, apply lubrication oils and greases, bearing lubrication, set up lubrication schedule, select synthetic lubricants, load grease gun, pack bearings, connect and operate grease lubricator - drop feed oiler and electric chain oiler.

### **Course B -- Basic Electricity**

<b>Course Number</b>	IND110
<b>Credits</b>	4
<b>Contact Hours</b>	90
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	Topic area covered in this course include Lockout Tagout, basic electric circuits, Resistors & Conductors, Inductive-Capacitive & Resistive circuits, AC/DC Circuit schematics and Industrial applications of these devices and circuits. Hands on Labs will help guide student learners to assimilate this material.

### **Course C -- Electrical Control Systems I**

<b>Course Number</b>	IND120
<b>Credits</b>	4
<b>Contact Hours</b>	90
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	Solenoid Operated Devices, Overload/Over current Protection & Monitoring, Transformers, Relays, Timers, & Time Delays, High Current Control Devices, Electric Motors, Manual Electric Motor Control, Electro-Magnetic Motor Starters are topics and devices covered in this course.

### **Course D -- Electrical Control Systems II**

<b>Course Number</b>	IND 125
<b>Credits</b>	5
<b>Contact Hours</b>	105
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	Continuation of topics: Solenoid Operated Devices, Overload/Over current Protection & Monitoring, Transformers,

Relays, Timers, & Time Delays, High Current Control Devices, Electric Motors, Manual Electric Motor Control, Electro-Magnetic Motor Starters are topics and devices covered in this course.

#### **Course E -- Pneumatics**

<b>Course Number</b>	IND130
<b>Credits</b>	2
<b>Contact Hours</b>	45
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	Pneumatic Principles, Air Compressors, Air Conditioning Components, Pneumatic Control Valves, Pneumatic Cylinders, Pneumatic Motors and Electro-Pneumatic Controls will be discussed. How each of these areas are integrated into industrial; machinery will be demonstrated and practiced in lab exercises.

#### **Course F -- Hydraulics**

<b>Course Number</b>	IND140
<b>Credits</b>	3
<b>Contact Hours</b>	75
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	Topic covered in this course includes Hydraulic Principles, Hydraulic Power Units, Hydraulic Control Valves, Hydraulic Cylinders & Motors and Electrohydraulic Control. These components are used to construct and test circuits found on industrial equipment to give students experience working on hydraulic systems.

#### **Course G -- Industrial Pumps**

<b>Course Number</b>	IND150
<b>Credits</b>	2
<b>Contact Hours</b>	45
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	Topics covered in this course include Basic Pump Principles, Centrifugal Pumps, Magnetic Drive Pumps, Diaphragm Pumps, Gear Pumps, Metering Pumps and Pump Seals. Pumps are inspected, disassembled, reassembled and installed in working systems.

#### **Course H -- Electrical Control Systems III**

<b>Course Number</b>	IND205
<b>Credits</b>	4

**Contact Hours** 90  
**Category** Core Course  
**Required** Yes  
**Course Description** Continuation of topics covered in ECS I & II

**Course I -- Mechanical Systems**

**Course Number** IND210  
**Credits** 3  
**Contact Hours** 75  
**Category** Core Course  
**Required** Yes  
**Course Description** Basic Mechanical Drive Components, Mechanical Drive Test Topics covered in this course include Bearings, Belt Drive Systems, Roller Chain Drives, Gear Drives, Speed Reducers, Coupling and Shaft Alignment, and Linear Drives. Systems are constructed, checked for proper alignment and tension and ran to check for proper operation...

**Course J -- Intelligent Motors**

**Course Number** IND220  
**Credits** 2  
**Contact Hours** 45  
**Category** Core Course  
**Required** Yes  
**Course Description** Topics included in this course are motion and position control system; servo motors and servo system feedback devices. These components are used to construct and test circuits used in industrial applications.

**Course K -- Industrial Power Electronics**

**Course Number** IND230  
**Credits** 3  
**Contact Hours** 60  
**Category** Core Course  
**Required** Yes  
**Course Description** Industrial Power Electronics Test Equipment, Industrial Topics included in this course include Solid-State DC Power Supplies, Thyristor, Electric Motor Drives, Electronic Timers, Basic Stepper Motor Drives and Basic Servo Motor Drives. These devices are used to create circuits used in industrial applications.

**Course L -- Process Control**

**Course Number** IND240  
**Credits** 3

<b>Contact Hours</b>	75
<b>Total Hours</b>	0
<b>Required</b>	Yes
<b>Course Description</b>	Topics covered in this course include Process Control Principles & Temperature, Thermistors, Thermocouples, & RTD's, Temperature Measurement Devices, On/Off Temperature Controllers, Programmable Process Heat Controllers, Transmitters, Process Loop Test Equipment and Final Control Elements. These components and information are combined to construct, test and operate systems found in industrial applications.

#### **Course M -- AB SLC 500**

<b>Course Number</b>	IND250
<b>Credits</b>	7
<b>Total Hours</b>	165
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	In this course students apply PLC principles to design and write application programs on their own, based on what they have learned in earlier courses. Students then are to connect circuitry, implement, test and modify their programs for advanced applications.

#### **Course N -- Workplace Skills**

<b>Course Number</b>	IND270
<b>Credits</b>	2
<b>Contact Hours</b>	30
<b>Category</b>	Core Course
<b>Required</b>	Yes
<b>Course Description</b>	<p>This course utilizes Key Train Software to assist in advancement of knowledge in Applied Math and Reading for Information WorkKeys assessments that are required prior to exiting the program. Students will also be required to attend seminars provided through the Career Resource Center. Seminar topics include interview techniques, developing and preparing a resume, completing job applications, ethics, and teamwork.</p> <p>This course is the final preparation for the exit assessment by using Key Train software for Applied Math and Reading for Information. A student will be required to attend remaining seminars that were not attended in Workplace Skills I through the Career Resource Center.</p>

#### **Course O -- Industrial Technology OJT**

<b>Course Number</b>	IND280
<b>Credits</b>	3
<b>Contact Hours</b>	135

**Category**

Elective

**Required**

Yes

**Course Description**

Students have the opportunity to work in the industrial field of their choice.