



## **COURSE SYLLABUS**

### **INMT-1317 INDUSTRIAL AUTOMATION**

**Catalog Description:** A study of the applications of industrial automation systems, including identification of system requirements, equipment integration, motors, controllers, and sensors. Coverage of set-up, maintenance, and testing of the automated system.

Lecture Hrs = 2, Lab Hrs = 2

**Prerequisites:** ELPT 1301

**Semester Credit Hours:** 3

**Lecture Hours per Week:** 3

**Contact Hours per Semester:** 48

**State Approval Code:** 1509030000

**Course Subject/Catalog Number:** INMT-1317

**Course Title:** INDUSTRIAL AUTOMATION

**Course Rationale:** Provides the student with basic knowledge of the industrial automation systems design, installation, modification, maintenance, and repair.

**Instructional Goals and Purposes:** The purpose of this course is to provide the student with basic skills useful in identifying the concepts of automated machines and equipment and describe the terms and phrases associated with industrial automation. The student will perform preventative maintenance, identify or solve problems in machines, and other technologies. Performance will be satisfactory when student can demonstrate competence in maintaining and troubleshooting technology includes identifying, understanding, and performing routine preventative maintenance and service on technology; detecting more serious problems; generating workable solutions to correct deviations; and recognizing when to get additional help.

**Learning Objectives:** Upon completion of this course, the student will be able to accomplish the following competencies (Including SCANS):

1. Explain the General function of Industrial Automation
  - List basic Devices in Automated Systems
  - Distinguish Different Controllers Employed In Automated Systems  
(1Ai, 1Aii, 2Ciii, 2Di, 2Ei)
2. Identify Safety in Industrial Automation (F6)
  - Demonstrate Proper Lockout-Tag Out Procedures in Industrial Environments  
(1Aiv, 1Bii, 1Ci, 2Di)
3. Identify Practical Programmable Logic Controller Applications
  - Know the History of the PLC
  - Demonstrate Basic PLC Skills  
(1Ai, 1Aii, 1Aiii, 2Ciii, 2Di, 2Ei)

4. Recognize Fundamentals of Programming Including
  - Programming
  - Coils
  - Contacts
  - Timers and Counters
  - Logical Program Development  
(1Ai, 1Aii, 1Aiii, 1Biii, 1Biv, 1Bv, 2Ciii, 2Civ, 2Di, 2Diii, 2Ei, 2Eii)
5. Categorize Input/Output Modules And Wiring.
  - Identify Input & Output Module differences
  - Demonstrate Proper Wiring Techniques  
( 1Ai, 1Aii, 1Aiii, 1Biii, 1Biv, 1Bv, , 2Di, 2Diii, 2Ei, 2Eii)
6. Use Arithmetic and Advanced Instructions in Industrial Automation Including
  - Common Arithmetic Instructions
  - Add, Subtract, Multiply, Divide, and Compare Function
  - Logical Operators, Average, Standard Deviation, Trigonometric
  - Numbering System Conversion
  - Sequencers and Shift Register  
(1Ai, 1Aii, 1Aiii, 1Biii, 1Biv, 1Bv, 2Ciii, 2Civ, 2Di, 2Diii, 2Ei, 2Eii, 2Eiii)
7. Identify Types of Industrial Sensors
  - Optical
  - Inductive
  - Capacitive
  - Encoders
  - Ultrasonic
  - Thermocouples
  - Demonstrate Proper Wiring Techniques and Practical Applications  
(1Ai, 1Aii, 1Aiii, 1Biii, 1Biv, 1Bv, , 2Di, 2Diii, 2Ei, 2Eii)
8. Explain Robotics
  - Identify Types of Robot
  - Distinguish Uses and Applications of Robot  
(1Ai, 1Aii, 1Aiii, 1Biii, 1Biv, 1Bv, 2Di, 2Diii, 2Ei, 2Eii)
9. Explain Fundamentals of Process Control Including
  - Process and Control
  - Proportional
  - Integral
  - Derivative (PID) Control
  - Tuning  
(1Ai, 1Aii, 1Aiii, 1Biii, 1Biv, 1Bv, , 2Di, 2Diii, 2Ei, 2Eii)
10. Classify Process Control System
  - Distinguish Types of Process Control Devices
  - Apply Process Control Devices to Practical Level, Flow, and Temperature Control Systems  
(1Ai, 1Aii, 1Aiii, 1Biii, 1Biv, 1Bv, 2Di, 2Diii, 2Ei, 2Eii)

11. Perform Maintenance Techniques Including

- Installation
- Maintenance
- Troubleshooting Of PLC Systems  
(1Aiii, 1Biii, 1Biv, 1Bv, 2Di, 2Diii, 2Ei, 2Eii2, Eiii)

**Methods of Instruction/Course Format/Delivery:** This course is taught either as weekly lecture class or an online course.

**Course Grade:**

Note: The instructor may implement a different grading policy.

Attendance and Participation:	10 %
Weekly assignments:	30 %
Quizzes:	30 %
Final Exam	30%

Exams: Any test missed by the student will be counted as a 0 unless prior arrangements have been made with the instructor.

Assignments: Assignments are due as assigned and 10 points for each day the work is late.

**Texts, Materials, and Supplies:**

Title: *Industrial Control Electronics Devices, Systems, & Applications 3D Edition*  
Author: Terry Bartlet  
Publisher: Delmar  
Catalog Number: ISBN # 9781401862923

**Note: See student counselor or instructor concerning the acquisition of the books for this course.**

## Secretary of Labor's Commission on Achieving Necessary Skills (SCANS)

### 1. BASIC SKILL COMPETENCIES

#### A. Basic Skills

- i. **Reading:** Locate, understand and interpret written information in prose and in documents such as manuals, graphs and schedules.
- ii. **Writing:** Communicate thoughts, ideas, information and messages in writing, and create documents such as letters, directions, manuals, reports, graphs, and flow charts.
- iii. **Arithmetic & Mathematical Operations:** Perform basic computations and approach practical problems by choosing appropriately from a variety of mathematical techniques.
- iv. **Listening:** Receive, attend to, interpret, and respond to verbal messages and other cues.
- v. **Speaking:** Organize ideas and communicate orally.

#### B. Thinking Skills

- i. **Creative Thinking:** Generate new ideas.
- ii. **Decision Making:** Specify goals and constraints generate alternatives, consider risks and evaluate and choose the best alternative.
- iii. **Problem Solving:** Recognize problems and devise and implement plan of action.
- iv. **Visualize ("Seeing Things in the Mind's Eye"):** Organize and process symbols, pictures, graphs, objects, and other information.
- v. **Reasoning:** Discover a rule or principle underlying the relationship between two or more objects and apply it when solving a problem.

#### C. Personal Qualities

- i. **Responsibility:** Exert a high level of effort and persevere toward goal attainment.
- ii. **Self-Esteem:** Believe in one's own self-worth and maintain a positive view of oneself.
- iii. **Sociability:** Demonstrate understanding, friendliness, adaptability, empathy, and politeness in group settings.
- iv. **Self-Management:** Assess oneself, set personal goals, monitor progress, and exhibit self-control.
- v. **Integrity & Honesty:** Choose ethical courses of action.

## 2. WORKPLACE COMPETENCIES

### A. Resources:

- i. **Time:** Select goal-relevant activities, rank them, allocate time, and prepare and follow schedules.
- ii. **Money:** Use or prepare budgets, make forecasts, keep records, and make adjustments to meet objectives.
- iii. **Material & Facilities:** Acquire, store, allocate, and use materials or space efficiently.
- iv. **Human Resources:** Assess skills and distribute work accordingly, evaluate performance and provide feedback.

### B. Interpersonal Skills:

- i. **Participate as Member of a Team:** Contribute to group effort.
- ii. **Teach Others New Skills.**
- iii. **Serve Clients/ Customers:** Work to satisfy customers' expectations.
- iv. **Exercise Leadership:** Communicate ideas to justify position, persuade & convince others, responsibly challenge existing procedures & policies.
- v. **Negotiate:** Work toward agreements involving exchange of resources, resolve divergent interests.
- vi. **Work with Diversity:** Work well with men and women from diverse backgrounds.

### C. Information:

- i. **Acquire and Evaluate Information.**
- ii. **Organize and Maintain Information.**
- iii. **Interpret and Communicate Information.**
- iv. **Use computers to process information.**

### D. Systems:

- i. **Understand Systems:** Know how social, organizational and technological systems work and operate effectively with them.
- ii. **Monitor & Correct Performance:** Distinguish trends, predict impacts on system operations, and diagnose deviations in systems' performance.
- iii. **Improve or Design Systems:** Suggest modifications to existing systems and develop new or alternative systems to improve performance.

### E. Technology

- i. **Select Technology:** Choose procedures, tools or equipment including computers and related technologies.
- ii. **Apply Technologies to Task:** Understand overall intent and proper procedures for setup and operation of equipment.
- iii. **Maintain and Troubleshoot Equipment:** Prevent, identify, or solve problems with equipment, including computers and other technologies.