

## Associate in Applied Science

### Industrial Maintenance Technology

Writing I .....	3
Technical Mathematics OR Higher .....	3
Natural Sciences.....	3
Heritage/Humanities.....	3
Social/Behavioral Sciences.....	3
Oral Communications .....	3
<b>Subtotal</b>	<b>18</b>

### Advanced Manufacturing Technician Track

#### Technical Core:

Digital Literacy.....	0-3
Basic Blueprint Reading.....	3
Fundamentals of Machine Tools – A .....	3
Electrical Motor Controls I AND.....	2
Electrical Motor Controls I Lab.....	2
Electrical Motor Controls II AND.....	2
Electrical Motor Controls Lab II.....	2
Programmable Logic Controllers AND .....	2
Programmable Logic Controllers Lab .....	2
Fluid Power AND .....	3
Fluid Power Lab.....	2
Safety Culture.....	1
5S .....	1
Total Production System Maintenance .....	1
Problem Solving .....	1
Maintenance Reliability .....	1
Welding for Maintenance AND.....	3
Welding for Maintenance Lab.....	2
Industrial Maintenance Electrical Principles AND .....	3
Industrial Maintenance Electrical Principles Lab.....	2
Maintaining Industrial Equipment AND .....	3
Maintaining Industrial Equipment Lab.....	2
Industrial Robotics and Robotic Maintenance .....	4
Industrial Maintenance Technology Capstone .....	1
<b>Subtotal</b>	<b>48-51</b>
<b>Total Credits</b>	<b>66-69</b>

\*Note: Only Integrated Engineering Technology (IET) courses are substitution into the Advanced Manufacturing Technician

\*Note: Minimum of 1,824 hours of Industry Sponsored Internship.

## **Advanced Manufacturing Technician Track**

Advanced Manufacturing requires demonstrating multiple skills and competencies. Students accepted into this program gain valuable workplace experience, working three (3) days in a manufacturing environment and two (2) days on campus in a manufacturing-based classroom. Critical conceptual components of the track include embedded Safety Culture, Workplace Organization (5S), Lean Manufacturing, Problem Solving and Maintenance Reliability, coupled with Personal Behavior development (Attendance, Communication, Diligence, Teamwork, Initiative, and Interpersonal Relations) within the program pathway. Successful students apply learned skills throughout the program in the campus classroom, campus laboratory and manufacturing workplace. The advanced manufacturing technician (AMT) track develops multiple skills within the industrial maintenance pathway for manufacturing employers.

Progression in the Industrial Maintenance Technology program is contingent upon achievement of a grade "C" or better in all courses and maintenance of a 2.0 cumulative grade point average or better (on a 4.0 scale).

## **Safety Culture 1.0 Credits**

### **Fractional Credit Module**

#### **Description:**

Introduces the importance of cultivating daily safe work habits and the predictable negative results of not being safety conscious in the workplace. Instructs the students in basic safety culture and prepares them to participate in, conduct, and lead safety walk-throughs. Introduces the student to Safety Discussions. Prepares the student to conduct risk assessment activities, construct safety boards, and formulate individual safety commitments.

**Components:** Lecture: 1.0 credits (15 contact hours).

**Pre-requisite:** None

**Pre-requisite or Co-Requisite:** None

#### **Competencies/Student Outcomes:**

Upon completion of this course, the student can:

1. Write an essay describing the initial Safety Culture training day.
2. Successfully complete Hazard Prediction Training, Safety Discussions
3. Lead & participate in daily school Safety Discussions.
4. State from memory and thoroughly explain all the elements on the CHIPS card.
5. State from memory and thoroughly explain all the elements on the CHOICE card.
6. State from memory and thoroughly explain all the elements on the DRIVE card.
7. Earn the CHOICE & DRIVE card Badge.
8. Participate in CHOICE & DRIVE activity.
9. Develop and announce a personal Safety Commitment.
10. Conduct Risk Assessments on equipment or processes at school and work.
11. Establish a class Safety Board and present it to a school and work panel.
12. Identify, complete, and present an Individual School Safety Project.
13. Conduct an individual safety walk-through of the school floor and compare to workplace safety walk-through.
14. Both lead & participate in monthly school safety walk-throughs.
15. Write an essay fully describing the concept of a Safety Culture.

#### **Outline:**

- I. Safety Culture
  - a. Attend training
  - b. Complete process
  - c. Submit essay
- II. Safety Discussion Process
  - a. Attend training
    - i. Process orientation
    - ii. Leadership orientation
    - iii. Lead first Safety Discussion
    - iv. Lead & participate in daily Safety Discussions
- III. Be issued
  - a. CHIPS Safety Card
  - b. Drive & Choice Safety Card
- IV. CHIPS card
  - a. State from memory all the elements
  - b. Explain thoroughly all the elements
- V. CHOICE

- a. State from memory all the elements
- b. Explain thoroughly all the elements
- VI. DRIVE
  - a. State from memory all the elements
  - b. Explain thoroughly all the elements
- VII. CHOICE and DRIVE card
  - a. Earn Badge
  - b. Participate in card in-possession game
  - c. Track those without their card immediately available
- VIII. Safety Commitment.
  - a. Develop a personal Safety Commitment
  - b. Announce this personal Safety Commitment
- IX. Risk Assessment safety training
  - a. Conduct a School Risk Assessment
  - b. Present to School/Work Panel
  - c. Conduct a Workplace Risk Assessment
  - d. Present to School/Work Panel
- X. Safety Board
  - a. Establish class group safety project
  - b. Present group project to School/Work Panel
- XI. Individual Safety Project
  - a. Identify and conduct project
- XII. Individual Safety walk through
  - a. Conduct walk-through
  - b. Record results
  - c. Compare to company walk-through
  - d. Place in Portfolio
- XIII. Monthly school safety walk-through
  - a. Lead
  - b. Participate
  - c. Post results
- XIV. "What is a Safety Culture?"
  - a. Research topic
  - b. Write and submit essay

**5S 1.0 Credits**  
**Fractional Credit Module**

**Description:**

Introduces the fundamental 5S process involving the five-step progression described by the Japanese words Seiri, Seiton, Seiso, Seiketsu, and Shitsuke. Instructs the students in the sequence involving classifying and sorting, ordering, and aligning, cleaning, and sweeping up, standardizing, and developing a process of sustainable practice in the workplace. Fosters the development of a workplace organization in which safety and efficiency are always paramount

**Components:** Lecture: 1.0 credits (15 contact hours).

**Pre-requisite:** None

**Pre-requisite or Co-Requisite:** None

**Competencies/Student Outcomes:**

Upon completion of this course, the student can:

1. State and thoroughly explain each of the 5Ss.
2. Establish your class's group 5S Board project.
3. Present Safety Board to a school and work panel.
4. Conduct and compare individual 5S walk-throughs of your school floor and workplace.
5. Identify, complete, and present 5S Projects in your school and workplace, "Making a better condition."
6. Both lead & participate in monthly school 5S walk-throughs.
7. Participate in ensuring that each class is left in 100% 5S standard each day.
8. Write a paper explaining how 5S is a tool of TPS.
9. Write a paper explaining your impression of your company's daily 5S practice.
10. Write an essay fully describing 5S and how you can improve it at your Company.

**Outline:**

- I. 5S Training
  - A. Attend
  - B. workshop  
Complete  
training
- II. State each 5 S
  - A. Seiri
  - B. Seiton
  - C. Seiso
  - D. Seiketsu
  - E. Shitsuke
- III. Explain each 5S
  - A. Seiri/Sort
  - B. Seiton/Systematize
  - C. Seiso/Shine
  - D. Seiketsu/Standardize
  - E. Shitsuke/Self-Discipline
- IV. Construct class 5S Board
  - A. Group 5S project
  - B. Add to school board
  - C. Present to school and work panel

- V. 5S school walkthrough
  - A. Record results
  - B. Compare to company 5S walkthrough
  - C. Place in portfolio
- VI. 5S workplace walkthrough
  - A. Conduct walkthrough
  - B. Record results
- VII. 5S Project school
  - A. Identify
  - B. Complete
  - C. Present
- VIII. Monthly 5S Project workplace
  - A. Identify
  - B. Complete
  - C. Present
- IX. Monthly 5S school
  - A. Lead
  - B. Participate
- X. Daily 5S Standard
  - A. Conduct walkthrough
  - B. Leave class in 100% 5S standard
- XI. 5S part of TPS
  - A. Explain
  - B. Write paper
- XII. Daily 5S
  - A. Research your company's practice
  - B. Write paper on practice
- XIII. Final Essay
  - A. What is 5S?
  - B. How Can I improve 5S at my company?

**Total Management Production 1.0 Credits**  
**Fractional Credit Module**

**Description:**

Instructs the student in the concepts of value-added product, maintenance value-added product, value-added work, and necessary work. Explains the process of how employers earn profit.

Demonstrates the Lean Production System for Maintenance using the TPS House framework. Describes and explains the three Ms and the seven Mudras and their relationship to maintenance and production.

**Components:** Lecture: 1.0 credits (15 contact hours).

**Pre-requisite:** None

**Pre-requisite or Co-Requisite:** None

**Competencies/Student Outcomes:**

Upon completion of this course, the student can:

1. Explain the "Value Added Product."
2. Describe the Maintenance "Value Added Product."
3. Explain Value-Added Work and Necessary Work.
4. Describe how employers earn profit.
5. Draw, fill-in, and explain all elements of the TPS-M House.
6. State and explain each of the 3 M's and the 7 Mudras.
7. Complete Standardized Work Exercise (JIS/WIS).
8. Complete Problem-Solving Work Exercise
9. Complete Kaizen Exercise (School)
10. Complete Pokayoke Exercise (School)
11. Complete Takt Time Exercise.
12. Identify an example of Heijunka.
13. Identify 2 examples each of Mura, Muri and Muda.
14. Demonstrate mastery by re-taking and passing the TPS-M tests.
15. Write an essay fully describing the Total Production System for Maintenance.

**Outline:**

- I. TPS-M training
  - a. Attend workshop
  - b. Complete training
- II. Explain TPS
  - a. "Value Added Product."
  - b. Maintenance "Value Added Product."
  - c. Value-Added Work and Necessary Work.
  - d. How employers earn profit
- III. TPS-M House Elements
  - a. Draw
  - b. Fill-in
  - c. Explain
- IV. 3 M's
  - a. Muda-waste
  - b. Mura-unevenness
  - c. Muri-overburden
- V. Seven (7) Mudras
  - a. Conveyance
  - b. Inventory
  - c. Motion

- d. Waiting
- e. Over-processing
- f. Over-production
- g. Correction/Defects
- VI. TPS-M House
  - a. Highest Quality
  - b. Lowest Cost
  - c. Shortest Lead Time
  - d. Jidoka-Achievement of Quality
    - i. Right First Time
    - ii. Pokayoke
    - iii. Andon
  - e. Just-in-Time-Achievement of Efficiency
    - i. Right Skill Now
    - ii. Pull System
    - iii. Takt Time
  - f. Stabilized Work
    - i. Heijunka
      - 1. Standard Work
      - 2. Problem Solving
        - a. Event Type
        - b. Setting Type
      - 3. Kaizen
- VII. Problem Solving
  - a. Identify a situation
  - b. Identify an ideal situation
  - c. Identify gap
- VIII. Kaizen
  - a. Continuous improvement of standard work
  - b. Improvements become part of new standard
- IX. Pokayoke
  - a. Developing practices to prevent flow-out of problem conditions
  - b. Ensures quality is delivered to next process
- X. Takt
  - a. Shortest time to safely perform a task
  - b. Evidenced by best practices
- XI. Heijunka
  - a. Explain the meaning of the word
  - b. Identify examples
- XII. Mura, Muri, Muda
  - a. Explain the meaning of the words
  - b. Identify examples
- XIII. TPS-M Tests
  - a. Retake the tests (post-tests)
  - b. Obtain a passing score
- XIV. Essay



**Problem Solving 1.0 Credits**  
**Fractional Credit Module**

**Description:**

Introduces the 8 step Problem Solving method and the 10-part Drive and Dedication model. Instructs the students to clarify the problem, break it down to analyze it, set achievable targets, analyze the root cause, develop countermeasures, evaluate results and the process, standardize the results, and learn from failures. Fosters the development of a customer first philosophy involving all the stakeholders.

**Components:** Lecture: 1.0 credits (15 contact hours).

**Pre-requisite:** None

**Pre-requisite or Co-Requisite:** None

**Competencies/Student Outcomes:**

Upon completion of this course, the student can:

1. State the definition of a problem, including each aspect of the problem illustration.
2. Draw and label the Problem-Solving diagram.
3. State and thoroughly explain each step of the 8-step Problem Solving Process.
4. State and thoroughly explain each one of the Drive & Dedication Principles.
5. Do a "talk through" of a completed problem example.
6. Perform and present both school-based and work-based Problem-Solving exercises.
7. Write an essay fully describing the Problem-Solving Process.

**Outline:**

- I. What is a problem?
  - a. Definition of a problem
  - b. Planning
  - c. Doing
  - d. Checking
  - e. Acting out the results
- II. 8 Step Problem Solving Diagram
  - a. Planning
    - i. Clarifying the Problem
    - ii. Break problem in smaller problems and analyze
    - iii. Set achievable target
    - iv. Analyze root cause
    - v. Develop countermeasures
  - b. Doing
    - i. See countermeasures through
  - c. Checking
    - i. Evaluate results and process
  - d. Acting out results  
Standardize success, learn from failures
- III. Drive and Dedication
  - a. Customer first
  - b. Always confirm purpose of work
  - c. Ownership and responsibility
  - d. Visualization
  - e. Judgment based on facts
  - f. Think and act persistently
  - g. Speedy action in a timely manner

- h. Follow each process with sincerity and commitment
- IV. School based Problem-Solving Exercise
  - a. Perform activity
  - b. Present to work/school panel
- V. Work based Problem Solving Exercise
  - a. Perform activity
  - b. Present to work/school panel
- VI. Essay
  - a. Select related subject
  - b. Complete analysis

**Maintenance Reliability 1.0 Credits**  
**Fractional Credit Module**

**Description:**

Introduces Maintenance Reliability training. Describes the difference between corrective maintenance and preventive maintenance. Breaks down proactive maintenance and the underlying tools and constituent processes. Instructs the students in the various individual units in a system and the steps in evaluating failure modes and countermeasures.

**Components:** Lecture: 1.0 credits (15 contact hours).

**Pre-requisite:** None

**Pre-requisite or Co-Requisite:** None

**Competencies/Student Outcomes:**

Upon completion of this course, the student can:

1. State the difference between Corrective Maintenance and Preventive Maintenance.
2. Define Proactive Maintenance and associated tools/processes.
3. Properly breakdown a system and define its functions.
4. Properly define failure modes and root causes of a system.
5. Properly evaluate a system's failure mode risks and countermeasures accordingly.
6. Perform an in-training 'RCMNET' activity on a troubleshooting machine.
7. Perform a second small scale 'RCMNET' on a system/machine of your choosing.
8. Perform a large-scale floor 'RCMNET' on system/machine that is assigned to you.
9. Report results and findings in the 'RCMNET' to teachers and management.

**Outline**

- I. Maintenance
  - a. Corrective
  - b. Preventive
- II. Proactive Maintenance
  - a. Tools
  - b. Processes
- III. System
  - a. Function a
  - b. Function b
  - c. Function c
- IV. System Failure
  - a. Failure modes
  - b. Root causes
- V. Failure modes
  - a. Risks
  - b. Countermeasures
- VI. RCMNET
  - a. Troubleshooting machine
  - b. Machine of your choosing
  - c. Machine assigned to you
  - d. Report to teachers