

# Computer Integrated Manufacturing (2024)

Demonstrate an understanding of manufacturing, its history, models, and procedures. The student will be able to: 33.0

- 1 Explore manufacturing through research and projects. 33.01
- 2 Understand what the enterprise wheel represents and how it represents the overall manufacturing scheme. 33.02
- 3 Research a topic in manufacturing, develop a presentation, and present findings to a group. 33.03
- 4 Explain the different procedures used in manufacturing. 33.04

Demonstrate an understanding of control systems and methods to describe or document their processes. The student will be able to: 34.0

- 1 Identify basic flowcharting symbols and discuss their functions. 34.01
- 2 Create a flowchart that portrays a manufacturing process. 34.02
- 3 Apply flowcharting to areas other than manufacturing. 34.03
- 4 Identify a control system and explain its application to manufacturing. 34.04
- 5 Model and create a program to control an automated system. 34.05

Demonstrate an understanding of the cost of manufacturing. The student will be able to: 35.0

- 1 Create a control system that replicates a factory cell. 35.01
- 2 Maximize the efficiency of the manufacturing system with respect to time and cost. 35.02
- 3 Compare the efficiency of running multiple systems against that of one large system. 35.03

Demonstrate proficiency in designing products for manufacturability. The student will be able to: 36.0

- 1 Use the design process. 36.01
- 2 Use knowledge of design to analyze products with flaws. 36.02
- 3 Use calculated volume, mass, surface area of parts to determine material cost, waste, and packaging requirements. 36.03
- 4 Use solid modeling software to improve a flawed design. 36.04

---

**5 Determine whether a product is safe for a given audience (e.g., children under the age of three).** 36.05

---

**6 Make ethical decisions about manufacturing.** 36.06

---

**7 Create a product using solid modeling software.** 36.07

---

**Demonstrate an understanding of manufacturing processes. The student will be able to:** 37.0

**1 Explain the difference between primary and secondary manufacturing processes.** 37.01

---

**2 Analyze a product to propose the manufacturing processes used to create it.** 37.02

---

**3 Explore manufacturing processes via research.** 37.03

---

**4 Explore prototyping processes.** 37.04

---

**Demonstrate an understanding of computer numeric control (CNC) as it relates to product design and development. The student will be able to:** 38.0

**1 Identify machines when given a process and identify the process that a given machine performs.** 38.01

---

**2 Determine the appropriate speed rate for a given material using a tool with a given diameter.** 38.02

---

**3 Determine the feed rate for a given material using a tool with a given diameter.** 38.03

---

**4 Read and interpret G & M codes.** 38.04

---

**5 Transfer the drawings made in CAD to a CAM program.** 38.05

---

**6 Create numerical code using a CAM program.** 38.06

---

**7 Verify the creation of a part using simulation software.** 38.07

---

**8 Create parts using the machines demonstrated by the instructor.** 38.08

---

**9 Create a product on the computer using knowledge of manufacturing processes.** 38.09

---

**Demonstrate an understanding of automation and robotics relative to the manufacturing process. The student will be able to:** 39.0

**1 Research a topic in automation.** 39.01

---

**2 Identify the advantages and disadvantages of robotic labor versus human labor.** 39.02

---

**3 Explore materials handling.** 39.03

---

**4 Create and program virtual robotic work cells with simulation software.** 39.04

---

**5 Program the interface between a robot and another machine.** 39.05

---

**Demonstrate an understanding of the elements of power and the associated mathematics. The student will be able to:** 40.0

- 1 Identify the three main power types.** 40.01
- 2 Solve problems involving electrical, pneumatic, and mechanical power.** 40.02
- 3 Convert power between units.** 40.03
- 4 Calculate torque and use it to calculate power.** 40.04
- 5 Solve problems involving fluid power.** 40.05
- 6 Construct a system to convert pneumatic power into mechanical power.** 40.06

**Build, program, and configure a robot to perform predefined tasks. The student will be able to:** 41.0

- 1 Build a robot.** 41.01
- 2 Create programs using robotic software that will allow the robot to perform a set of tasks.** 41.02
- 3 Configure servo motors to operate the robot.** 41.03
- 4 Formulate a list of tasks in which the robot can be used in a large scale CIM cell operation.** 41.04

**Demonstrate an understanding of the elements of Computer Integrated Manufacturing (CIM). The student will be able to:** 42.0

- 1 Identify the three categories of CIM systems.** 42.01