

BBCTA-B125-AE
Computer Integrated Manufacturing (CIM)
2019-2020

Mrs. Ver Steeg • beverlyversteeg@misdmail.org
Ben Barber Innovation Academy • B125

PLTW – Computer Integrated Manufacturing (CIM)

Course Description

Computer Integrated Manufacturing (CIM) is the study of manufacturing planning, integration, and implementation of automation.

The course explores manufacturing history, individual processes, systems, and careers. In addition to technical concepts, the course incorporates finance, ethics, and engineering design. This reflects an integrated approach that leading manufacturers have adopted to improve safety, quality, and efficiency.

Utilizing the activity-project-problem-based (APPB) teaching and learning pedagogy, students will analyze, design, and build manufacturing systems. While implementing these designs, students will continually hone their interpersonal skills, creative abilities, and understanding of the design process. Students apply knowledge gained throughout the course in a final open-ended problem to build a manufacturing system.

Computer Integrated Manufacturing is a high school level course that is appropriate for 10th, 11th, or 12th grade students interested in manufacturing and automation. It is recommended that students are concurrently enrolled in grade level mathematics and science courses and have successfully completed the Introduction to Engineering Design (IED) course.

CIM is one of the specialization courses in the Project Lead the Way high school engineering program. The course applies and concurrently develops secondary-level knowledge and skills in mathematics, science, and technology.

What will my classes be like?

Want to learn up close how things are made? Is the process for making a water bottle the same as a musical instrument? How are assembly lines designed and automated? Through your growing knowledge of the history, principles, and processes of manufacturing, you will design and build your own automated manufacturing system, factoring in safety, quality cost, and efficiency. Use technologies in your projects that have revolutionized manufacturing: computer modeling, Computer Numeric Control (CNC) technology, Computer Aided Manufacturing (CAM) software, robotics, and flexible manufacturing systems.

CIM is one of the specialized courses in the Project Lead the Way (PLTW) “Pathway to Engineering” course sequence. Prior completion of the IED and POE foundation courses (through TCD or your high school) is strongly recommended, though not required, for enrollment in CIM.

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Course Goals / Objectives

The Project Lead the Way curriculum, including Computer Integrated Manufacturing, focuses on making math and science relevant for students. The approach used is called APPB-learning (activities, projects, and problem-based learning). By engaging in hands-on, real-world projects, students understand how the material covered in class can be applied in their everyday lives. Learning activities will include teacher-led instruction, cooperative learning, and project-based learning. Technology will be used to enhance students learning, and provide real-world applications.

Engineering is a profession that contributes to change and improvements in our world. It creates imaginative and visionary solutions to the challenges of the 21st century – the problems of feeding the world, how we will use energy and continue to protect our environment. Engineering and technology play a vital role in the quality of everyday life and wealth creation. Appropriate attitudes relative to the professional social obligations of the engineer, and the relationships between math, science, technology and society need to be learned. Real world, open-ended engineering problems that cover a wide range of content will be presented.

Course Outline (1 Semester)

Unit 1: Principles of manufacturing (16 days)

Lesson 1.1 History of manufacturing (4 days)

Lesson 1.2 Control Systems (5 days)

Lesson 1.3 Cost of Manufacturing (7 days)

Unit 2: Technical Sketching and Drawing (26 days)

Lesson 2.1 Designing for Manufacturability (5 days)

Lesson 2.2 how we make things (3 days)

Lesson 2.3 Product Development (18 days)

MIDTERM EXAM*

Unit 3: Elements of Automation (23 days)

Lesson 3.1 Introduction to Automation (9 days)

Lesson 3.2 Elements of Power (5 days)

Lesson 3.3 Robotic Programming and Usage (9 days)

Unit 4: Integration of Manufacturing Elements (24 days)

Lesson 4.1 Integration of Manufacturing Elements (5 days)

Lesson 4.2 Manufacturing Application (19 days)

CUMULATIVE FINAL EXAM

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Assessment Standards / Grading/Practices

- Grades will be calculated on a straight point basis. Projects will be based on a scale of 1 to 100 points depending on the assignment or project. Daily work and participation grades will be based on completion of the Engineering Notebook and Portfolio. Weekly quizzes, cumulative unit exams and a National PLTW Assessment will be given during the semester.
- All students must maintain an Engineering Notebook and Portfolio to pass the class. They will be checked periodically throughout the semester.

College Credit Opportunities

College Credit Opportunities:

NOTE: *IED and POE are the foundation courses in the PLTW “Pathway to Engineering” course sequence. In order to receive recognition or credit

From PLTW-affiliated colleges or universities, a student must successfully complete these two foundation courses, one specialized course, and one capstone course.

The PLTW Engineering programs offer students an array of advantages, from career readiness and hands-on experience to college preparatory–level classes, labs and creative exercises. PLTW students succeed in the classroom and in life.

Our programs are designed to appeal to all students, from those already interested in STEM-related fields, to those whose experience in the sciences and math has been less comprehensive or who find themselves uninterested in traditional science and math curricula.

PLTW classes are hands-on, based in real-world experience, and engaging for students and teachers. We set the highest standards for rigorous, focused and relevant study, and develop students’ innovative, collaborative, critical-thinking, and problem-solving skills.

Our relationships with teachers, parents, local and national business leaders and university partners allow us to offer a complete experience both for students wishing to pursue a post-secondary degree in a STEM-related field and for those planning to join the workforce after high school. STEM literacy reduces dropout rates, increases attendance and helps students find better-paying jobs after school.

Field Experiences / Competitive Opportunities

The PLTW Engineering programs offer students an array of advantages, from career readiness and hands-on experience to college preparatory–level classes, labs and creative exercises. PLTW students succeed in the classroom and in life.

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Our relationships with teachers, parents, local and national business leaders and university partners allow us to offer a complete experience both for students wishing to pursue a post-secondary degree in a STEM-related field and for those planning to join the workforce after high school. STEM literacy reduces dropout rates, increases attendance and helps students find better-paying jobs after school.

College and Career Pathways

- Science & Mathematics
- Engineering & Technology
- Manufacturing- Production
- Manufacturing Production Process Development
- Manufacturing Maintenance, Installation & Repair
- Manufacturing Quality Assurance
- Manufacturing Logistics & Inventory Control
- Manufacturing Health, Safety, & Environmental Assurance

For sample occupations and postsecondary educational requirements, visit: www.careertech.org and click on “Career Clusters & Pathways”

Academic

• **Attendance:** Being present and actively participating in class. If absent, it is the student's responsibility to see what he or she has missed and make that work up as soon as possible.

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- **Mathematics:** It is suggested that students have Algebra and Geometry completed with a grade of B or better.
- **Reading/Writing:** It is suggested that students have a 9th -10th grade reading level. Technical writing in this class is required.
- **Science:** No prerequisites for this course.

Professional Skills

- **Time Management:** Students need to apply themselves on a daily basis.
- **Personal Motivation:** Actively seeking and taking part in any undertaking relating to the chosen skill area.
- **Problem-Solving Ability:** This course encourages and teaches students to problem solve and use critical thinking to solve problems.
- **Reliability/Dependability:** Demonstration by the student that he/she can be relied upon to do what is expected in class and in group work. This includes completing assignments on time and in a professional manner, as well as working with his/her group or partner.
- **Ability to Work with Others:** A variety of skills including teamwork are addressed. In this course students must work in groups on various tasks and projects for solving problems, generating ideas, stimulating critical thinking by unrestrained spontaneous participation in discussion. Students will acquire strong teamwork and communication skills throughout this course.

Test Retakes (excluding the End of Course Exam)

If the student would like the opportunity to retake a failed test/assessment the student must:

1. Arrange with the instructor to receive remediation
2. Arrange with the instructor to re-test outside of class time within 3 class periods or by the end of a six week grading period, whichever comes first.
3. Sign a contract with the instructor agreeing to the above terms.

Note: The student will receive a maximum of 70% on the retake. Assessment Standards /

Grading Practices:

- Grades will be calculated on a straight point basis. Projects will be based on a scale of 1 to 100 points depending on the assignment or project. Daily work and participation grades will be based on completion of the Engineering Notebook and Portfolio. Weekly quizzes, cumulative unit exams and a National PLTW Assessment will be given during the semester.

MISD GRADING SYSTEM FOR GRADES 9-12

The district high schools use a weighted numerical grading system.* **The following chart reflects the MISD grading system for grades 9-12:**

A	90-100
B	80-89
C	70-79
F	Below 70

40% - Major Grades (tests, projects, lengthy assignments, etc.)
60% - Daily Work

NO EXEMPTIONS for the Final Exam

- All students must maintain an Engineering Notebook and Portfolio to pass the class. They will be checked periodically throughout semester.

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**Computer Integrated Manufacturing – Mrs. Ver Steeg,
Engineering, POE, Drone, CIM and Robotics Instructor**

Please sign and return this packet after reviewing the Course Syllabus, Classroom Policies and the Mansfield ISD Acceptable Use Policy (AUP).

My child and I understand that he/she must comply with these regulations. We realize that if he/she fails to abide by the rules, he/she will adhere to the sanctions listed and will not be able to participate in this computer-based lab or regular classroom.

District policy states that every student will **wear** an ID and have a **signed Acceptable Use Policy (AUP)** on file every day to be able to access any MISD networked computer.

Your signatures below indicate that you have received, reviewed, and accept the course syllabus, classroom policies and the Acceptable Use Policy (AUP) of the Mansfield ISD.

Student's Name: _____

Student's Signature _____ Date: _____

Parent's/Guardian's Name: _____

Parent's/Guardian's Signature: _____ Date: _____

Grade Classification: _____