WILLIAMSTOWN HIGH SCHOOL
WILLIAMSTOWN, NEW JERSEY
COURSE PROFICIENCY REQUIREMENTS

COURSE: COMPUTER INTEGRATED MANUFACTURING (PLTW)

TEACHER: STAFF

CREDITS: FIVE (5)

WEIGHTED FOR CLASS RANK: (YES)

PREREQUISITES: INTRODUCTION TO ENGINEERING DESIGN(PLTW)

Pursuant to the High School Gradation Standards Act (NJSA 18A:7, et. seq.) successful completion of this course will require:

A. Regular attendance as mandated by Board Policy.
B. Mastery of the below listed content/objectives and achievement of the proficiencies required

OVERVIEW

Computer Integrated Manufacturing - A course that applies principles of robotics and automation. The course builds on computer solid modeling skills developed in Introduction to Engineering Design, and Design and Drawing for Production. Students use CNC equipment to produce actual models of their three-dimensional designs. Fundamental concepts of robotics used in automated manufacturing, and design analysis are included.

PROFICIENCIES

Upon completion of this course the student will be able to:

1. describe historical events and developments contributing to CIM.
2. demonstrate the advantages of 3D solid modeling by demonstrating the part modeling, assembly modeling, drawing layouts and the way in which they are interdependent with each other.
3. demonstrate how points are plotted using each type of coordinate system.
4. identify the need for rapid prototyping.
5. prepare a prototype model from a drawing data base.
6. explain the history of computer controlled machines charting the growth of NC and how it has been implemented into Private Industry.
7. explain how the applications of CNC machines has impacted manufacturing.
8. chart the evolution of machine tools, controllers, and software used in programmable machines
9. explore career opportunities and educational requirements within the field of programmable machines.
10. identify the axis relative to various CNC machines.
11. contrast open and closed loop control systems.
12. use the CNC control program to indicate the machine position to the relative position of the part origin (PRZ).
13. identify and explain the function of the major components of a CNC machine tool.
14. examine and apply various work holding devices commonly used for CNC machining.
15. identify various types of tool changers used in CNC machine tools.
16. select appropriate cutting tools to efficiently, safely and accurately cut parts using a CNC machine.
17. identify the three categories of machine movement; straight line, curve line, and non-regular shape and then program using G and M code.
18. perform a “Dry Run” to verify the machine set up and program operation and machine part.
19. make precision measurements to the degree of accuracy required by plan specification using appropriate instruments.
20. explore the chronological development of automation leading to robotics.
21. investigate career opportunities in the robotics career fields.
22. demonstrate the development of robotics from Science Fiction.
23. identify a minimum of four dangerous and repetitive jobs that robots are used for.
24. formulate a definition of a robot.
25. classify different types of robots.
26. evaluate the positive impact robots have on manufacturing.
27. discuss the social implications of robots.
28. design and build a working model of a robot.
29. identify and report specifications and work envelopes of robots.
30. understand the basic components of robot controllers.
31. demonstrate an understanding of control techniques and computer simulations.
32. design and build a feed system with sensors.
33. program and run robotic arm.
34. understand how the individual components of a flexible manufacturing system are interrelated.
35. recognize the benefits and problems associated with CIM technology and how they affect the manufacturing process.
36. identify some basic characteristics of a manufacturing operation that lend themselves to computer integrated manufacturing.
37. identify some of the typical components and sub systems that make an automated machining, assembly and process type manufacturing operation.
38. identify the three categories of CIM manufacturing systems.
39. recognize the working relationship between the CNC mill and the robot.
40. identify the components of a FMS.
41. identify and study the relationship between a CNC milling machine interface and a jointed arm robot interface through a communication handshaking process.
42. explore the individual components used in selected CIM systems.
43. analyze and select components for a CIM system for a specific industrial application.
44. understand the various applications of a Programmable Logic Controller as related to its use in a CIM system.

**CAREER/OBJECTIVES**
Explore career opportunities in the field of engineering and Computer Integrated Manufacturing.

**MEASUREMENT OF STUDENT ACHIEVEMENT**
Achievement in CIM is measured by tests, quizzes, assignments, homework, Project Lead the Way Rubrics and manual performance. The grade will be according to Board Policy.