CHINO VALLEY UNIFIED SCHOOL DISTRICT
INSTRUCTIONAL GUIDE
COMPUTER INTEGRATED MANUFACTURING

Course Number   5933
Department   Project Lead the Way
Prerequisites   Introduction to Engineering Design and/or Principles of
                       Engineering
Length of Course   Two (2) Semesters/One (1) Year
Grade Level   9-12
Credit   5 units per semester/10 total units - elective
Repeatable   Not repeatable for credit
UC/CSU   Does not meet a-g requirement
Board Approved   December 10, 2009

Description of Course – This course is designed to give students a practical, hands-on experience on the fundamentals of computerized manufacturing technology. Students will develop skills design, programming, model building, and working with engineering tools such as CNC machines. Students will work in teams to design and build systems of related elements to accomplish a given task. This course is built around several key concepts computer modeling, Computer Numerical Control (CNC) equipment, Computer aided Manufacturing (CAM) software, robotics, and flexible manufacturing systems. This course is aligned to the Project Lead the Way program.

The course is conducted at an accelerated level and is designed to prepare students for postsecondary engineering programs or careers in engineering technology. Engineering is for students interested in engineering, biomechanics, aeronautics, and other applied math and science arenas, Project Lead the Way is an exciting portal into these industries.

Rationale for Course – Computer Integrated Manufacturing is one course in a multiyear sequence of courses that integrates core academic knowledge with technical and occupational knowledge to provide students with a pathway to postsecondary education and careers.

Standard 1 – Students know how to communicate and interpret information clearly in industry standard visual and written formats.

1.1   Objective: Communicate and interpret information clearly in industry standard visual and written formats.

        1.1.1 Performance Indicator: Students will understand the classification and use of various electronic components, symbols, abbreviations, and media common to electronic drawings.

1.1.2 Performance Indicator: Students will understand, organize, and complete an assembly drawing by using information collected from detailed drawings.

1.1.3 Performance Indicator: Students will know the current industry standards for illustration and layout.

1.1.4 Performance Indicator: Students will draw flat layouts of a variety of objects by using the correct drafting tools, techniques, and media.

1.1.5 Performance Indicator: Students will prepare reports and data sheets for writing specifications.

Standard 2 – Students understand the design process and how to solve analysis and design problems.

2.1 Objective: Understand the design process and how to solve analysis and design problems.

2.1.1 Performance Indicator: Students will understand the steps in the design process.

2.1.2 Performance Indicator: Students will determine what information and principles are relevant to a problem and its analysis.

2.1.3 Performance Indicator: Students will choose between alternate solutions in solving a problem and be able to justify the choices made in determining a solution.

2.1.4 Performance Indicator: Students will translate word problems into mathematical statements when appropriate.

2.1.5 Performance Indicator: Students will understand the process of developing multiple details into a single solution.

2.1.6 Performance Indicator: Students will build a prototype from plans and test it.

2.1.7 Performance Indicator: Students will evaluate and redesign a prototype on the basis of collected test data.

Standard 3 – Students understand industrial engineering processes, including the use of tools and equipment, methods of measurement, and quality assurance.

3.1 Objective: Understand industrial engineering processes, including the use of tools and equipment, methods of measurements, and quality assurance.

3.1.1 Performance Indicator: Students will know the common structure and processes of a quality assurance cycle.

3.1.2 Performance Indicator: Students will understand the major manufacturing processes.

3.1.3 Performance Indicator: Students will use tools, fasteners, and joining systems employed in selected engineering processes.

3.1.4 Performance Indicator: Students will estimate and measure the size of objects in both Standard International and United States units.

3.1.5 Performance Indicator: Students will calibrate and measure objects by using precision measurement tools and instruments.

Standard 4 – Students understand computer systems and solve computer-related problems from an engineering perspective.

4.1 Objective: Understand computer systems and solve computer-related problems from an engineering perspective.

4.1.1 Performance Indicator: Students will understand how to design systems that use computer programs to interact with hardware.

4.1.2 Performance Indicator: Students will install and configure the main computer hardware and software components.

4.1.3 Performance Indicator: Students will understand the ethical issues in computer engineering.

4.1.4 Performance Indicator: Students will know the function and interaction of basic computer components and peripherals.

4.1.5 Performance Indicator: Students will understand the relationship among computer hardware, networks, and operating systems.

4.1.6 Performance Indicator: Students will understand the process of testing and troubleshooting computer equipment and systems.

4.1.7 Performance Indicator: Students will use utility software efficiently to diagnose and correct problems.

Standard 5 – Students understand fundamental automation modules and able to develop systems that complete preprogrammed tasks.

5.1   Objective: Understand fundamental automation modules and able to develop systems that complete preprogrammed tasks.

  5.1.1   Performance Indicator: Students will use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data in a simulated or modeled automated system.

  5.1.2   Performance Indicator: Students will understand the use of sensors for data collection and process correction in an automated system.

  5.1.3   Performance Indicator: Students will program a computing device to control an automated system or process.

  5.1.4   Performance Indicator: Students will use motors, solenoids, and similar devices as output mechanisms in automated systems.

  5.1.5   Performance Indicator: Students will assemble input, processing, and output devices to create an automated system capable of accurately completing a preprogrammed task.

Standard 6 – Students understand the fundamentals of systems and products as they are developed and released to production and marketing.

6.1   Objective: Understand the fundamentals of systems and products as they are developed and released to production and marketing.

  6.1.1   Performance Indicator: Students will understand the process of product development.

  6.1.2   Performance Indicator: Students will understand charting and the use of graphic tools in illustrating the development of a product and the processes involved.

Standard 7 – Students understand the effective use of engineering technology equipment.

7.1   Objective: Understand the effective use of engineering technology equipment.

  7.1.1   Performance Indicator: Students will use methods and techniques for employing all engineering technology equipment appropriately.

  7.1.2   Performance Indicator: Students will apply conventional engineering technology processes and procedures accurately, appropriately, and safely.

7.1.3 Performance Indicator: Students will apply the concepts of engineering technology to the tools, equipment, projects, and procedures of the Engineering Technology Pathway.

Standard 8 – Students know how to use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.

8.1 Objective: Use contemporary and emerging technological resources in diverse and changing personal, community, and workplace environments.

8.1.1 Performance Indicator: Students will understand past, present, and future technological advances as they relate to a chosen pathway.

8.1.2 Performance Indicator: Students will understand the use of technological resources to gain access to, manipulate, and produce information, products, and services.

8.1.3 Performance Indicator: Students will understand the influence of current and emerging technology on selected segments of the economy.

Standard 9 – Students understand the essential knowledge and skills common to all pathways in the engineering and design sector.

9.1 Objective: Understand the essential knowledge and skills common to all pathways in the engineering and design sector.

9.1.1 Performance Indicator: Students will use and maintain industrial and technological products and systems.

9.1.2 Performance Indicator: Students will understand the importance of technical and computer-aided technologies essential to the language of the engineering and design industry.

9.1.3 Performance Indicator: Students will understand how to use, adjust, maintain, and troubleshoot the equipment and tools of the engineering and design industry in a safe, effective, and efficient manner.

9.1.4 Performance Indicator: Students will acquire, store, allocate, and use materials and space efficiently.

9.1.5 Performance Indicator: Students will understand the role of the engineering and design industry in the California economy.

9.1.6 Performance Indicator: Students will understand and apply the appropriate use of quality control systems and procedures.

9.1.7 Performance Indicator: Students will understand the need and process to obtain and maintain industry-standard, technical certifications and affiliations with professional organizations, including the American Society for Engineering Education, the Accreditation Board for Engineering and Technology, and the American Society of Civil Engineers.

9.1.8 Performance Indicator: Students will understand the need to obtain and maintain industry-standard, technical certifications significant to a particular industry.

Standard 10 – Students recognize historical and current events related to engineering design and their effects on society.

10.1 Objective: Recognize historical and current events related to engineering design and their effects on society.

10.1.1 Performance Indicator: Students will know historical and current events that have relevance to engineering design.

10.1.2 Performance Indicator: Students will understand the development of graphic language in relation to engineering design.

Standard 11 – Students understand the effective use of engineering design equipment.

11.1 Objective: Understand the effective use of engineering design equipment.

11.1.1 Performance Indicator: Students will use the appropriate methods and techniques for employing all engineering design equipment.

11.1.2 Performance Indicator: Students will apply conventional engineering design processes and procedures accurately, appropriately, and safely.

11.1.3 Performance Indicator: Students will apply the concepts of engineering design to the tools, equipment, projects, and procedures of the Engineering Design Pathway.

Standard 12 – Students will know various object-editing techniques and Computer aided Design and Drafting (CADD) programs.

12.1 Objective: Know various object-edition techniques and CADD programs.

12.1.1 Performance Indicator: Students will understand the commands and concepts necessary for editing engineering drawings.

12.1.2 Performance Indicator: Students will know the various object-altering techniques.

12.1.3 Performance Indicator: Students will know the CADD components and the operational functions of CADD systems.

12.1.4 Performance Indicator: Students will apply two-dimensional and three-dimensional CADD operations in creating working and pictorial drawings, notes, and notations.

12.1.5 Performance Indicator: Students will understand how to determine properties of drawing objects.

Standard 13 – Students understand and apply proper dimensioning to drawings.

13.1 Objective: Understand and apply proper dimensioning to drawings.

13.1.1 Performance Indicator: Students will know a variety of drafting applications and understand the proper dimensioning styles for each.

13.1.2 Performance Indicator: Students will apply dimensioning to various objects and features.

13.1.3 Performance Indicator: Students will learn to edit a dimension by using various editing methods.

Standard 14 – Students understand sectional view applications and functions.

14.1 Objective: Understand sectional view applications and functions.

14.1.1 Performance Indicator: Students will understand the function of sectional views.

14.1.2 Performance Indicator: Students will use a sectional view and appropriate cutting planes to clarify hidden features of an object.