

COMPUTER AIDED DRAFTING II

COURSE DESCRIPTION

Computer Aided Drafting II is a course in which students learn advanced two-dimensional and basic three-dimensional concepts of scale drawings and orthographic projections using a software program. Course content will enable individual students to create increasingly sophisticated drawings using a software program and will culminate in the creation of a complete set of construction and/or assembly drawings for a mechanical project.

It is strongly recommended that administration and guidance follow the scope and sequence and course recommendations as listed.

Recommended: Computer Aided Drafting I; Algebra I; basic experience with graphical computer interface. Math and science requirements should be obtained according to graduation requirements during and prior to the conclusion of the credits. Concurrency is acceptable.

Recommended Credits: 1

Recommended Grade Level(s): 9th, 10th

Number of Competencies in Course: 30

Note: *This course may be offered as a part of the Construction or the Manufacturing Sub-Cluster, depending upon the student's career focus.

COMPUTER AIDED DRAFTING II

STANDARDS

- 1.0** Students will take personal responsibility for the safety of themselves, their coworkers, and bystanders and perform safety examinations and maintain safety records.
- 2.0** Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.
- 3.0** Students will integrate reading, writing, math, and science skills and understand the impact of academic achievement in the workplace.
- 4.0** Students will use the functions of a software program to draw advanced two-dimensional and basic three-dimensional objects.
- 5.0** Students will demonstrate proficiency in creating sectional and pictorial drawings using a software program.
- 6.0** Students will use software skills to produce complete sets of project drawings.

COMPUTER AIDED DRAFTING II

STANDARD 1.0

Students will take personal responsibility for the safety of themselves, their coworkers, and bystanders and perform safety examinations and maintain safety records.

LEARNING EXPECTATIONS

The student will:

- 1.1** Pass with 100% accuracy a written examination on safety issues specific to this course of study.
- 1.2** Pass with 100% accuracy a performance examination on tools and equipment specific to this course of study.
- 1.3** Maintain a portfolio with a copy of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.
- 1.4** Follow rules and regulations to comply with personal and lab safety standards, including general, fire, and electrical standards.
- 1.5** Practice and apply health and safety OSHA standards as they pertain to the course.
- 1.6** Select tools, technology, machinery, equipment, and materials appropriate for the given assignment.

PREFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 1.1** Passes with 100% accuracy a written examination on safety issues specific to this course of study.
- 1.2** Passes with 100% accuracy a performance examination on tools and equipment specific to this course of study.
- 1.3** Maintains a portfolio record with a copy of written safety examinations and equipment examinations for which the student has passed an operational checkout by the instructor.
- 1.4** Demonstrates and follows procedures for classroom and lab safety, fire safety, and electrical safety.
- 1.5** Assesses and applies health and safety OSHA standards as they pertain to the course.
- 1.6A** Demonstrates appropriate use of tools to complete assignments.
- 1.6B** Identifies sources of information concerning state-of-the-art tools, equipment, materials, and technologies.
- 1.6C** Identifies potential hazards related to use of tools and equipment.

SAMPLE PERFORMANCE TASKS

- Assess the work area for safety hazards.
- Design a correctional program for identified hazards.
- Model the appropriate protective equipment for an assigned task.
- Read manufacturer specifications to determine safe practices while working on various electrical and electronic systems.
- Demonstrate personal safety (e.g., dress, eye and hearing devices, and jewelry).

- Demonstrate the handling and disposing of chemicals.
- Complete a safety inspection evaluating possible fire and water hazards.
- Develop a presentation on right to know laws and any other laws required for safety.
- Practice safe disposal procedures for chemicals used in related processes.
- Practice ergonomic processes when using the computers and equipment.
- Prepare an Occupational Safety and Health notebook for the Tennessee SkillsUSA Championships.

INTEGRATION LINKAGES

Science, Computer Skills, Research and Writing Skills, Language Arts, Communication Skills, Leadership Skills, Teamwork Skills, Algebra, Geometry, Secretary's Commission on Achieving Necessary Skills (SCANS), SkillsUSA, Skills USA *Professional Development Program* (PDP), SkillsUSA *Total Quality Program* (TQP)

COMPUTER AIDED DRAFTING II

STANDARD 2.0

Students will demonstrate leadership, citizenship, and teamwork skills required for success in the school, community, and workplace.

LEARNING EXPECTATIONS

The student will:

- 2.1** Cultivate positive leadership skills and work ethics.
- 2.2** Participate in the approved student organization and other industry organizations directly related to their program of study as an integral part of classroom instruction.
- 2.3** Assess situations, apply problem-solving techniques and decision-making skills within the school, community, and workplace.
- 2.4** Participate as a team member in a technical learning environment.
- 2.5** Be aware and adaptive to individual differences, customs, and culture of others.
- 2.6** Develop a personal career plan identifying career organizations, interests, strengths, and opportunities.
- 2.7** Respect the opinions, direction, and constructive criticisms of career professionals and leaders.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 2.1A** Demonstrates character and leadership using creative-and critical-thinking skills.
- 2.1B** Uses creative thought process by “thinking outside the box.”
- 2.2A** Relates the creed, purposes, motto, and emblem of their student organization, directly related to personal and professional development.
- 2.2B** Plans and conducts meetings and other business according to accepted rules of parliamentary procedure.
- 2.3A** Makes decisions and assumes responsibilities.
- 2.3B** Analyzes a situation and uses a professional development program or career and technical student organization materials directly related to the student’s program of study to resolve it.
- 2.3C** Understands the importance of learning new information for both current and future problem solving and decision making.
- 2.4A** Organizes committees and participates in functions.
- 2.4B** Cooperates with peers to select and organize a community service project.
- 2.5A** Researches different customs and individual differences of others.
- 2.5B** Interacts respectfully with individuals of different cultures, gender, and backgrounds.
- 2.6A** Creates personal career development by identifying career interests, strengths, and opportunities.
- 2.6B** Identifies opportunities for career development and certification requirements.
- 2.6C** Plans personal educational paths based on available courses and current career goals.
- 2.6D** Creates a resume that reflects student’s skills, abilities, and interests.
- 2.6E** Develop professional industry organization relationships to support career paths upon program completion.
- 2.7** Resolves conflicts and differences to maintain a smooth workflow and classroom environment.

SAMPLE PERFORMANCE TASKS

- Create a leadership inventory and use it to conduct a personal assessment.
- Participate in various career and technical student organization programs and/or competitive events.
- Implement an annual program of work.
- Prepare a meeting agenda for a specific career and technical student organization monthly meeting.
- Attend a professional organization meeting.
- Develop a program of study within their career interest.
- Participate in the American Spirit Award competition with SkillsUSA.
- Complete *Professional Development Program Level I and Level II*, SkillsUSA.
- Participate in National Design Drafting Week, Annual Drafting Contest, Annual Poster Contest.

INTEGRATION LINKAGES

SkillsUSA, *Professional Development Program*; SkillsUSA; Communications and Writing Skills; Teambuilding Skills; Research; Language Arts; Sociology; Psychology; Math; English; Social Studies; Problem Solving; Interpersonal Skills; Employability Skills; Critical-Thinking skills; Secretary's Commission on Achieving Necessary Skills (SCANS); Chamber of Commerce; Colleges; Universities; Technology Centers; Secretary's Commission on Achieving Necessary Skills (SCANS)

COMPUTER AIDED DRAFTING II

STANDARD 3.0

Students will integrate reading, writing, math, and science skills and understand the impact of academic achievement in the workplace.

LEARNING EXPECTATIONS

The student will:

- 3.1** Be responsible for accomplishing classroom assignments and workplace goals within accepted time frames.
- 3.2** Develop advanced study skills.
- 3.3** Demonstrate and use written and verbal communication skills.
- 3.4** Read and understand technical documents, such as regulations, manuals, reports, forms, graphs, charts, and tables.
- 3.5** Apply the foundations of mathematical principles, such as algebra, geometry, and advanced math to solve problems.
- 3.6** Apply basic scientific principles and methods to solve problems and complete tasks.
- 3.7** Demonstrate and understanding of computer operations and related applications to input, store, retrieve, and output information as it relates to the course.
- 3.8** Research, recognize, and understand the interactions of the environment and green issues as they relate to the course work and to a global economy.

PERFORMANCE STANDARDS: EVIDENCE STANDARD IS MET

The student:

- 3.1A** Uses appropriate time management to achieve goals.
- 3.1B** Arrives at class at an acceptable time each day.
- 3.1C** Completes assignments and meets deadlines.
- 3.1D** Arrives properly dressed and prepared.
- 3.2A** Assesses current personal study skills.
- 3.2B** Demonstrates advanced note-taking ability.
- 3.2C** Formulates appropriate study strategies for given tasks.
- 3.3A** Communicates ideas, information, and messages in a logical manner.
- 3.3B** Fills out forms, reports, logs, and documents to comply with class and project requirements.
- 3.4A** Reads and understands technical documents and uses industry jargon, acronyms, and terminology appropriately.
- 3.4B** Recognizes the meaning of specialized words or phrases unique to the career and industry.
- 3.5A** Utilizes computation, both manually and electronically, in adding, subtracting, multiplying, and dividing whole numbers, fractions, decimals, and percents.
- 3.5B** Chooses the right mathematical method or formula to solve a problem.
- 3.5C** Performs math operations accurately to complete classroom and lab tasks.
- 3.6A** Demonstrates and understanding of scientific principles critical to the course.
- 3.6B** Applies scientific principles and technology to solve problems and complete tasks.
- 3.6C** Demonstrates knowledge of the scientific method (e.g., identifies the problem, collects information, forms opinions, and draws conclusions).

- 3.7A** Uses basic computer hardware (e.g., PC's, printers) and software to perform tasks as required for the course work.
- 3.7B** Demonstrates an understanding of capabilities of computers and common computer terminology (e.g., program, operating system).
- 3.7C** Applies the appropriate technical solution to complete tasks.
- 3.7D** Inputs data and information accurately for the course requirements.
- 3.8A** Researches and recognizes green trends in career area and industry.
- 3.8B** Examines current environmentally friendly trends.
- 3.8C** Applies sustainability practices by understanding processes that are non-polluting, conserving of energy and natural resources, and economically efficient.

SAMPLE PERFORMANCE TASKS

- Examine and compile different learning styles for portfolios.
- Create calendars containing all activities and obligations for one month. Discuss how to handle conflicting or competing obligations, then, complete daily and weekly plans showing tasks, priorities, and scheduling.
- Complete self-assessments of study habits.
- Compute precise and exact measurements.
- Explore study strategies for different subjects and tasks, then, analyze two homework assignments and select the best strategies for completing them.
- Create “life maps” showing necessary steps or “landmarks” along the path to personal, financial, educational, and career goals.
- Take notes during counselor classroom visits and work in small groups to create flow charts of the path options.
- List ethics that lead to success, then, rate individually in these areas. Work together to suggest strategies for overcoming the weaknesses identified (own and partners’ self-assessments) then share with the class the strategies developed.
- Research the Internet and other technology to collect and analyze data concerning climate change.
- Keep a data file of alternative energy sources and the sources’ impact on the environment.
- Develop a recycling project at home or for the school environment.

INTEGRATION LINKAGES

SkillsUSA, Professional Development Program; SkillsUSA; Communications and Writing Skills; Teambuilding Skills; Research; Language Arts; Sociology; Psychology; Math; English IV; Social Studies; Problem Solving; Interpersonal Skills; Employability Skills; Critical-Thinking Skills; Secretary’s Commission on Achieving Necessary Skills (SCANS); Chamber of Commerce; Colleges; Universities; Technology Centers; Secretary’s Commission on Achieving Necessary Skills (SCANS)

COMPUTER AIDED DRAFTING II

STANDARD 4.0

Students will use the functions of a software program to draw advanced two-dimensional and basic three-dimensional objects.

LEARNING EXPECTATIONS

The student will:

- 4.1** Use advanced software operations.
- 4.2** Use a software program to draw and dimension advanced two-dimensional objects.
- 4.3** Use a software program to draw and dimension advanced orthographic projections of three-dimensional objects.
- 4.4** Use a software program to draw basic three-dimensional scale drawings and introduce solid modeling processes.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 4.1** Performs advanced software operations.
- 4.2A** Makes scale drawings of advanced two-dimensional objects using a software program.
- 4.2B** Annotates, dimensions, and titles scale drawings of advanced two-dimensional objects using a software program.
- 4.3A** Makes an orthographic projection to scale of complex three-dimensional objects using a software program.
- 4.3B** Annotates, dimensions, and titles scale drawings of complex three-dimensional objects with a software program.
- 4.4A** Use a software program to produce isometric drawings.
- 4.4B** Use a software program to produce basic solid models.

SAMPLE PERFORMANCE TASKS

- Create a scale drawing of a floor plan of a house using a software program.
- Create a scale drawing of a mechanical object with multiple parts.
- Create a solid model drawing of a flashlight.

INTEGRATION/LINKAGES

Foundation for Industrial Modernization (FIM). *National Occupational Skill Standards for Computer Aided Drafting and Design (CADD)*. Washington, DC: FIM, 1995. International Technology Education Association. *Standards for Technological Literacy: Content for the Study of Technology*. International Technology Education Association. Reston, VA, 2000. Manufacturing Skill Standards Council. Mathematics concepts and skills. Computer Science concepts and skills.

COMPUTER AIDED DRAFTING II

STANDARD 5.0

Students will demonstrate proficiency in creating sectional, auxiliary, and pictorial drawings using a software program.

LEARNING EXPECTATIONS

The student will:

- 5.1** Create sectional and auxiliary views of moderately complex solid objects using a software program.
- 5.2** Create pictorial drawings of a group of objects using a software program.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 5.1A** Creates sectional and auxiliary views of solid objects using a software program.
- 5.1B** Creates sectional and auxiliary views of assemblies using a software program.
- 5.1C** Combines plane and sectional and auxiliary views to show interior and exterior details of objects in software program.
- 5.1D** Selects appropriate scales and grids for drawings using a software program.
- 5.2A** Creates pictorial representation of placement and relative position of a group of objects in software program drawings.
- 5.2B** Creates readily identifiable pictorial representation of objects by way of size, shape, shading, and color using a software program.

SAMPLE PERFORMANCE TASKS

- Draw sectional view of a tape dispenser.
- Draw sectional view of wood-frame wall.
- Draw sectional view of bookcase with shelves and doors.
- Draw interior and exterior sectional views of a stapler.
- Create pictorial drawing of computer components of desk.
- Create pictorial drawing of assorted furniture in room.
- Create pictorial drawing of placement of computer card inside computer case.

INTEGRATION/LINKAGES

Foundation for Industrial Modernization (FIM). *National Occupational Skill Standards for Computer Aided Drafting and Design (CADD)*. Washington, DC: FIM, 1995. International Technology Education Association. *Standards for Technological Literacy: Content for the Study of Technology*. International Technology Education Association. Reston, VA, 2000. Manufacturing Skill Standards Council. Mathematics concepts and skills. Computer Science concepts and skills.

COMPUTER AIDED DRAFTING II

STANDARD 6.0

Students will use software skills to produce complete sets of project drawings.

LEARNING EXPECTATIONS

The student will:

- 6.1** Draw individual components of a project using a software program.
- 6.2** Make assembly drawings including exploded assemblies, for a project, using a software program.
- 6.3** Create a bill of materials for a project using a software program.

PERFORMANCE INDICATORS: EVIDENCE STANDARD IS MET

The student:

- 6.1A** Identifies the unique components of a project.
- 6.1B** Chooses the best representation (e.g., plan, orthographic, or pictorial) for each component in a project and completes the drawings using a software program.
- 6.1C** Draws individual components of a project.
- 6.2A** Draws the completed assembly for a project using a software program.
- 6.2B** Draws the exploded assembly for a project using a software program.
- 6.3A** Makes a list of types and quantities of raw materials required for a project.
- 6.3B** Makes a list of types and quantities of finished-goods components required for project.

SAMPLE PERFORMANCE TASKS

Based on a proposed, moderately complex project, the student will (in groups):

- Decide how many and what types of drawings are needed and which group member will be responsible for each drawing.
- Produce the assigned drawing.
- Collectively examine the drawings for consistency, compatibility, and accuracy.
- Make a presentation to a prospective client and defend the design and quality of the drawing set.

Example projects might include an executive desk, a battery-powered electric car, a folding chair, a bookshelf or storage building.

INTEGRATION/LINKAGES

Foundation for Industrial Modernization (FIM). *What Manufacturing Workers Need to Know and Be Able to Do: National Voluntary Skill Standards for Advanced High Performance Manufacturing*. Washington, DC: National Coalition for Advanced Manufacturing, 1995. Foundation for Industrial Modernization (FIM). *National Occupational Skill Standards for Computer Aided Drafting and Design (CADD)*. Washington, DC: FIM, 1995. International Technology Education Association. *Standards for Technological Literacy: Content for the Study of Technology*. International Technology Education Association. Reston, VA, 2000. Manufacturing Skill Standards Council. *A Blueprint for Workforce Excellence (draft skill standards for manufacturing.)* Manufacturing Skill Standards Council, 2001. Mathematics concepts and skills. Computer Science concepts and skills.