

PROGRAM CONCENTRATION:
CAREER PATHWAY:
COURSE TITLE:

Engineering & Technology
Engineering Graphics & Design
3D Modeling & Analysis

Solid Modeling is a one-credit course designed to further the development of student knowledge and skills in engineering and related mechanical design drafting areas. Emphasis is placed on 3-D working and assembly drawings including rendering and animation. While the term computer-aided design (CAD) does not appear in each competency, CAD tools and software should be used extensively throughout the course. The standards are aligned with the drafting and design standards in Georgia's technical colleges, thus helping students qualify for advanced placement should they continue their education at the postsecondary level. Further, the standards are aligned with the national standards of the American Design Drafting Association (ADDA). Students who successfully complete this and other drafting courses should be prepared to take the Drafter Certification Examination from the ADDA. Competencies for the co-curricular student organization, SkillsUSA and/or TSA, are integral components of both the core employability skills standards and the technical skills standards. SkillsUSA and/or TSA activities should be incorporated throughout instructional strategies developed for the course.

FASTENERS

ENGR-MA-1. Students will draw fasteners using American National Standards Institute symbols.

- a. Identify and describe various types of fasteners.
- b. Specify threads and fasteners on a technical drawing.
- c. Draw various types of threaded fasteners.

ACADEMIC STANDARDS:

ELA9RL5. The student understands and acquires new vocabulary and uses it correctly in reading and writing.

MM1P3. Students will communicate mathematically.

MM1P4. Students will make connections among mathematical ideas and to other disciplines.

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

ADDA: Advanced CADD skills
Fundamental drafting skills

WORKING DRAWINGS

ENGR-MA-2. Students will create production-ready drawings of parts.

- a. Describe the various types of working drawings.
- b. Produce detail drawings.

ACADEMIC STANDARDS:

ELA9RL5. The student understands and acquires new vocabulary and uses it correctly in reading and writing.

MMIP3. Students will communicate mathematically.

MMIP4. Students will make connections among mathematical ideas and to other disciplines.

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

ADDA: Advanced CADD skills
Fundamental drafting skills

ASSEMBLY DRAWINGS

ENGR-MA-3. Students will create assembly drawings.

- a. Construct accurate drawing representations of a 3-D assembly model.

ACADEMIC STANDARDS:

ELA9RL5. The student understands and acquires new vocabulary and uses it correctly in reading and writing.

MMIP3. Students will communicate mathematically.

MMIP4. Students will make connections among mathematical ideas and to other disciplines.

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

ADDA: Advanced CADD skills
Fundamental drafting skills

RENDERING

ENGR-MA-4. Students will create a rendered image of a model communicating material and finish.

- a. Identify the purposes and uses of extracting geometric data from surfaces and wireframes.
- b. Identify the purposes and uses of rendering a model's image.
- c. Render an image of a model.
- d. Shade a rendered image of a model.

ACADEMIC STANDARDS:

ELA9RL5. The student understands and acquires new vocabulary and uses it correctly in reading and writing.

MM1P3. Students will communicate mathematically.

MM1P4. Students will make connections among mathematical ideas and to other disciplines.

SCSh4. Students will use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.

ADDA: Advanced CADD skills
Fundamental drafting skills

CTAE Foundation Skills

The Foundation Skills for Career, Technical and Agricultural Education (CTAE) are critical competencies that students pursuing any career pathway should exhibit to be successful. As core standards for all career pathways in all program concentrations, these skills link career, technical and agricultural education to the state's academic performance standards.

The CTAE Foundation Skills are aligned to the foundation of the U. S. Department of Education's 16 Career Clusters. Endorsed by the National Career Technical Education Foundation (NCTEF) and the National Association of State Directors of Career Technical Education Consortium (NASDCTEc), the foundation skills were developed from an analysis of all pathways in the sixteen occupational areas. These standards were identified and validated by a national advisory group of employers, secondary and postsecondary educators, labor associations, and other stakeholders. The Knowledge and Skills provide learners a broad foundation for managing lifelong learning and career transitions in a rapidly changing economy.

CTAE-FS-1 Technical Skills: Learners achieve technical content skills necessary to pursue the full range of careers for all pathways in the program concentration.

CTAE-FS-2 Academic Foundations: Learners achieve state academic standards at or above grade level.

CTAE-FS-3 Communications: Learners use various communication skills in expressing and interpreting information.

CTAE-FS-4 Problem Solving and Critical Thinking: Learners define and solve problems, and use problem-solving and improvement methods and tools.

CTAE-FS-5 Information Technology Applications: Learners use multiple information technology devices to access, organize, process, transmit, and communicate information.

CTAE-FS-6 Systems: Learners understand a variety of organizational structures and functions.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

CTAE-FS-8 Leadership and Teamwork: Learners apply leadership and teamwork skills in collaborating with others to accomplish organizational goals and objectives.

CTAE-FS-9 Ethics and Legal Responsibilities: Learners commit to work ethics, behavior, and legal responsibilities in the workplace.

CTAE-FS-10 Career Development: Learners plan and manage academic-career plans and employment relations.

CTAE-FS-11 Entrepreneurship: Learners demonstrate understanding of concepts, processes, and behaviors associated with successful entrepreneurial performance.