VIRGINIA BEACH CITY PUBLIC SCHOOLS
CHARTING THE COURSE

Department of Teaching & Learning
Parent/Student Course Information

Engineering Design
(AT 8530)
Three Credits, One Year
Grades 9 - 12

Counselors are available to assist parents and students with course selections and career planning. Parents may arrange to meet with the counselor by calling the school's guidance department.

COURSE DESCRIPTION
Students receive extensive training in the techniques of engineering and mechanical design; developing the assembly drawings, parts lists and detail sheets essential to the design and manufacture of the products we take for granted every day. This course provides students with the essential CADD skills required to advance in this field.

CERTIFICATION
Autodesk Inventor Certification
AutoCAD Certification
NOCTI Technical Drafting Assessment

STUDENT ORGANIZATION
SkillsUSA is a co-curricular organization for all students enrolled in trade and industrial education programs. SkillsUSA is a partnership of students, teachers and industry working together to ensure America has a skilled workforce. SkillsUSA helps students excel by providing educational programs, events and competitions that support career and technical education (CTE) in the nation’s classrooms. Students are highly encouraged to participate.

PREREQUISITE
None

OPTIONS FOR NEXT COURSE
Architectural Design, Naval Architecture and Ocean Engineering

REQUIRED STUDENT TEXTBOOK
None

COMPETENCIES FOR ENGINEERING DESIGN

Demonstrating Workplace Readiness Skills: Personal Qualities and People Skills

1 Demonstrate positive work ethic.
2 Demonstrate integrity.
3 Demonstrate teamwork skills.
4 Demonstrate self-representation skills.
5 Demonstrate diversity awareness.
6 Demonstrate conflict-resolution skills.
7 Demonstrate creativity and resourcefulness.

Demonstrating Workplace Readiness Skills: Professional Knowledge and Skills

8 Demonstrate effective speaking and listening skills.
9 Demonstrate effective reading and writing skills.
10 Demonstrate critical-thinking and problem-solving skills.
11 Demonstrate healthy behaviors and safety skills.
12 Demonstrate an understanding of workplace organizations, systems and climates.
13 Demonstrate lifelong-learning skills.
14 Demonstrate job-acquisition and advancement skills.
15 Demonstrate time-, task- and resource-management skills.
16 Demonstrate job-specific mathematics skills.
17 Demonstrate customer-service skills.

Demonstrating Workplace Readiness Skills: Technology Knowledge and Skills

18 Demonstrate proficiency with technologies common to a specific occupation.
19 Demonstrate information technology skills.
20 Demonstrate an understanding of Internet use and security issues.
21 Demonstrate telecommunications skills.

Examining All Aspects of an Industry

22 Examine aspects of planning within an industry/organization.
23 Examine aspects of management within an industry/organization.
24 Examine aspects of financial responsibility within an industry/organization.
25 Examine technical and production skills required of workers within an industry/organization.
26 Examine principles of technology that underlie an industry/organization.
27 Examine labor issues related to an industry/organization.
28 Examine community issues related to an industry/organization.
29 Examine health, safety and environmental issues related to an industry/organization.

Addressing Elements of Student Life

30 Identify the purposes and goals of the student organization.
31 Explain the benefits and responsibilities of membership in the student organization as a student and in professional/civic organizations as an adult.
32 Demonstrate leadership skills through participation in student organization activities, such as meetings, programs and projects.
33 Identify Internet safety issues and procedures for complying with acceptable use standards.

Practicing Safety

34 Follow general safety procedures.
35 Adjust equipment for maximum comfort and usability.
36 Describe ergonomic considerations.

Preparing for a Career in Drafting

37 Describe career options for those with drafting skills.
38 Identify educational experience and personal traits that benefit a drafter.
39 Describe potential barriers to career advancement and strategies for removing them.

Getting Oriented to Drafting

40 Describe various types of drawings.
41 Care for basic drafting equipment and tools.
42 Use basic drafting equipment and tools.

Using Mathematics in Drafting

43 Perform metric-U.S. system conversions.
44 Perform conversions within a measurement system.
45 Apply basic mathematical skills to drafting operations.
46 Apply mathematical calculations involving practical geometry and trigonometry.

Performing Basic Drafting Operations

47 Demonstrate techniques of scale usage.
48 Prepare freehand sketches.
49 Perform freehand lettering.
50 Apply line conventions.
51 Adjust manual drafting equipment.
52 Apply geometric construction principles.
53 Prepare orthographic projections.
54 Create pictorial views from orthographic projections.
55 Dimension mechanical drawings.
56 Revise existing drawings.
57 Prepare full, half and offset sectional views.

Performing Basic CADD Operations

58 Identify basic components of a CADD system.
59 Perform fundamental computer skills.
60 Use CADD set-up commands.
61 Use CADD drawing commands.
62 Use CADD modifying commands.
63 Use CADD dimensioning commands.
64 Use CADD 3-D modeling commands.
65 Use CADD file commands.
66 Prepare basic CADD drawings.

Performing Mechanical Drafting and Design Operations with Extensive Use of CADD

67 Reproduce bluelines.
68 Use reference materials.
69 Use basic drafting standards.
70 Add general notes to a drawing.
71 Select the appropriate types of projections to represent objects.
72 Apply mechanical symbols to a drawing.

Preparing a Career Portfolio

73 Plan a portfolio.
74 Gather material for a portfolio.

Locally Developed Competencies

75 Prepare primary auxiliary views.
76 Prepare secondary auxiliary views.
77 Create a 3-D model, using CADD.
78 Document a 3-D CADD model design.
79 Plot a documented 3-D CADD model.
80 Prepare removed, revolved, aligned and broken-out sectional views.
81 Prepare drawings of threads and fasteners.
82 Use reference materials.
83 Identify welding symbols and processes.
84 Apply welding symbols to a drawing
85 Apply dual dimensioning to a drawing.
86 Apply datum (ordinate) dimensioning to a drawing.
87 Identify symbols for geometric dimensioning and tolerancing.
88 Apply geometric dimensioning and tolerancing to a drawing.
89 Apply formulas for gear design.
90 Prepare a drawing of a gear.
91 Prepare a drawing of a cam.
92 Prepare a line drawing of a linked mechanism.
93 Identify the difference between parametric and non-parametric CADD models.
94 Create a 3-D model, using CADD.
95 Document a 3-D CADD model design.
96 Plot a documented 3-D CADD model.
97 Prepare an exploded assembly drawing.
98 Prepare a working drawing, to include assembly and detail drawings, of a multi-component mechanical device.

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