



VIRGINIA BEACH CITY PUBLIC SCHOOLS
CHARTING THE COURSE

Department of Teaching & Learning
Parent/Student Course Information

Naval Architecture and Ocean Engineering
(AT 8532)
Three Credits, One Year
Grades 10 - 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

Naval Architecture & Ocean Engineering will introduce students to the Naval/ Commercial Marine Engineering and Design Industry, and begin to prepare them for future career opportunities in this exciting field. Topics of instruction will include the differences between naval and commercial ship drafting and design formats and standards, types of drawings and an introduction to the primary design disciplines of the Marine Industry.

CERTIFICATION

Autodesk AutoCAD Certification

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

REQUIRED STUDENT TEXTBOOK

None

COMPETENCIES FOR NAVAL ARCHITECTURE AND OCEAN ENGINEERING

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.

Performing Mechanical Drafting and Design Operations with Extensive Use of CADD

- 37 Prepare primary auxiliary views.
- 38 Prepare secondary auxiliary views.
- 39 Prepare removed, revolved, aligned, and broken-out sectional views.
- 40 Prepare drawings of threads and fasteners.
- 41 Use reference materials.
- 42 Develop patterns, including radial and parallel line patterns.
- 43 Apply mechanical symbols to a drawing.
- 44 Apply dual dimensioning to a drawing.
- 45 Apply datum (ordinate) dimensioning to a drawing.
- 46 Identify symbols for geometric dimensioning and tolerancing.
- 47 Apply geometric dimensioning and tolerancing to a drawing.
- 48 Apply formulas for gear design.
- 49 Prepare a drawing of a gear.
- 50 Prepare a drawing of a cam.
- 51 Prepare a line drawing of a linked mechanism.
- 52 Identify welding symbols and processes.
- 53 Apply welding symbols to a drawing.
- 54 Identify manufacturing processes.
- 55 Prepare a parts list for an assembly drawing.
- 56 Prepare an orthographic assembly drawing.
- 57 Prepare an exploded assembly drawing.
- 58 Prepare a working drawing, to include assembly and detail drawings, of a multi-component mechanical device.
- 59 Identify the difference between parametric and non-parametric CADD models.
- 60 Prepare an electrical schematic.
- 61 Reproduce drawings.
- 62 Create a 3-D model, using CADD.
- 63 Document a 3-D CADD model design.
- 64 Plot a documented 3-D CADD model.

Preparing a Career Portfolio

- 65 Plan a professional drafting portfolio.
- 66 Gather material for a portfolio.
- 67 Organize a portfolio.
- 68 Present a portfolio.

Obtain an Industry Certification by Examination

- 69 Prepare for an industry-certification exam through review.
- 70 Take an industry-certification exam.

Local Competencies

Introduction to Naval Architecture and Ocean Engineering

- 71 Demonstrate proficiency in AutoCAD.
- 72 Demonstrate ability to develop orthographic projection views, dimensioning, and tolerance.
- 73 Demonstrate proficiency in using view ports and drawing views to scale.
- 74 Describe the basic engineering fundamentals of Marine Engineering and Design.
- 75 Identify the different disciplines of Marine Engineering and Design.
- 76 Understand the responsibility of each of the different disciplines of Marine Engineering and Design.
- 77 Understand the terminology used for ship design.
- 78 Identify and understand the use of abbreviations used by the ship design industry.

- 79 Demonstrate an understanding of ship layout and compartment design standards.
- 80 Identify the similarities and differences between naval and commercial ship design.
- 81 Describe the basic similarities/differences between naval and commercial ship design.
- 82 Identify examples of naval and commercial ship design.
- 83 Research and identify standards and specifications used in the naval and commercial ship design industry.
- 84 Understand the use of naval and commercial standards and specifications.
- 85 Explain the overlap of standards and specifications between naval and commercial design.
- 86 Identify the different types of drawings used for naval and commercial ship design industry.
- 87 Understand the use of the Ship Work Breakdown Structure (SWBS) with respect to Ship Drawing Development.
- 88 Describe potential resources for obtaining the different types of naval and commercial ship drawings.
- 89 Describe the review process for naval and commercial ship drawing packages.
- 90 Describe the approval process for naval ship drawing packages.
- 91 Describe the approval process for commercial ship drawing packages.
- 92 Discuss the use of Naval Sea Systems Command (NAVSEA) Technical Specification 9090-600.
- 93 Identify the different types of ship alterations (SHIPALT) drawings with respect to the SWBS.
- 94 Describe the use of the different types of SHIPALT drawings.
- 95 Project – Develop Naval SHIPALT Drawing Format Sheets.

Introduction to Electrical, Electronics and Interior Communications (IC) Engineering and Design

- 96 Describe the basic engineering fundamentals electric plant system.
- 97 Describe the engineering fundamentals of power distribution.
- 98 List the different types of power system mod drawings with respect to the SWBS.
- 99 Identify the various lighting systems.
- 100 Describe the function of lighting system modifications.
- 101 List the different types of lighting system modification drawings with respect to the SWBS.
- 102 Discuss the general engineering requirements for electronic systems.
- 103 Describe the function and electronic system block wiring diagram.
- 104 List the different types of electronic system block wiring diagrams with respect to the SWBS.
- 105 Describe the function of an electronic system cable run sheets.
- 106 Describe the differences between cable run sheets and elementary wiring diagrams.
- 107 Demonstrate the use of Cable base software to develop an electronic system cable run sheet.
- 108 Describe the function of an electronic system arrangement drawing.
- 109 Describe the relationship between the electronic system block wiring diagram and the arrangement drawing.
- 110 Describe the relationship between the electronic arrangement drawing and the hull foundation drawings.
- 111 Discuss the general engineering requirements for Interior Communications Systems.
- 112 Describe the function of IC system elementary wiring diagram.
- 113 List the different types of IC system drawings with respect to the SWBS.
- 114 Project – Develop a Power, Lighting, Block Wiring Diagram, Interior Communications System and Arrangement Drawing.

Introduction to Machinery, Piping and HVAC Engineering and Design

- 115 Describe the basic engineering fundamentals of machinery plants.
- 116 Describe the various types of machinery plant control systems.
- 117 List the types of drawings used to illustrate machinery arrangement and control systems.
- 118 Describe the basic engineering fundamentals of propulsion systems.
- 119 Describe the various types of propulsion systems.
- 120 List the types of drawings used to illustrate propulsion systems.
- 121 Project – Develop a Machinery Arrangement and Propulsion Control System Drawing.

- 122 Describe the basic engineering fundamentals of piping systems.
- 123 Describe the components and symbology used in piping systems drawings.
- 124 List the types of drawings used to illustrate piping diagrams with respect to the SWBS.
- 125 Describe the various types of water handling and drainage systems with respect to the SWBS.
- 126 Describe the various types of fuel handling systems with respect to the SWBS.
- 127 Describe the various types of steam handling systems with respect to the SWBS.
- 128 Describe the basic engineering fundamentals of heating systems.
- 129 Describe the components and symbology used in heating system drawings.
- 130 List the different types of drawings used to show heating systems with respect to the SWBS.
- 131 Describe the components and symbology used in cooling system drawings.
- 132 List the different types of drawings used to show cooling systems with respect to the SWBS.
- 133 Project – Develop Machinery, Piping and HVAC Drawings.

Introduction to Hull, Outfitting, and Habitability Engineering and Design

- 134 Describe the basic engineering fundamentals of hull structure.
- 135 Describe the function of hull structure and foundations.
- 136 List the different types of drawings used to show hull structure and foundations with respect to the SWBS.
- 137 Describe the function and use of various structural materials (aluminum, steel, FRP).
- 138 Demonstrate an understanding of mounting and fastening methods.
- 139 Identify Outfitting items such as ladders, handrails and safety equipment.
- 140 Demonstrate an understanding of equipment and workspace arrangements.
- 141 List the different types of crew living spaces and their arrangement with respect to the SWBS.
- 142 Describe the function of galleys, sculleries, and mess decks.
- 143 Describe the function of laundry, medical and other human services spaces.
- 144 Demonstrate an understanding of habitability requirements.
- 145 Project – Develop a Hull Structure, Outfitting and Habitability Drawings.

Aaron C. Spence, Ed.D., Superintendent
Virginia Beach City Public Schools
2512 George Mason Drive, Virginia Beach, VA 23456-0038

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For further information please call (757) 263-1070.

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To seek resolution of grievances resulting from alleged discrimination or to report violations of these policies, please contact the Title VI/Title IX Coordinator/Director of Student Leadership at (757) 263-2020, 1413 Laskin Road, Virginia Beach, Virginia, 23451 (for student complaints) or the Section 504/ADA Coordinator/Chief Human Resources Officer at (757) 263-1133, 2512 George Mason Drive, Municipal Center, Building 6, Virginia Beach, Virginia, 23456 (for employees or other citizens). Concerns about the application of Section 504 of the Rehabilitation Act should be addressed to the Section 504 Coordinator/ Executive Director of Student Support Services at (757) 263-1980, 2512 George Mason Drive, Virginia Beach, Virginia, 23456 or the Section 504 Coordinator at the student's school. For students who are eligible or suspected of being eligible for special education or related services under IDEA, please contact the Office of Programs for Exceptional Children at (757) 263-2400, Laskin Road Annex, 1413 Laskin Road, Virginia Beach, Virginia, 23451.

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