



VIRGINIA BEACH CITY PUBLIC SCHOOLS
CHARTING THE COURSE

Department of Teaching & Learning
Parent/Student Course Information

Electronics and Robotics Technology I
(VO8547)
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

In this two-year program, students receive instruction in robotic applications, power systems in robotics, the proper use of hand tools and test equipment, soldering techniques, interpretation of schematic diagrams, basic electronic theory, solid-state theory, communication theory, microcomputer and microprocessor theory and digital electronics. The course is broken into three distinct phases: lesson demonstration and/or discussions, lab activities and projects. The lesson demonstration and discussion phase provides students with a theoretical foundation of electronics and robotics. In the lab activity phase, students are challenged to solve electronic/robotic problems through the practical application of theoretical knowledge and the use of test equipment and trainers. During the student project phase, students will apply their acquired knowledge and skills to produce a working electronic/robotic device. Many of the projects constructed will be student designed. During this two year program, students will prepare to achieve certification with the Electronics Technicians Association of America.

CERTIFICATION

Electronics Technicians Association (ETA) Student Electronics Technician Associate Certification
National Occupational Competency Testing Institute (NOCTI) Assessment: Electronics

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

Electronics and Robotics Technology II

REQUIRED STUDENT TEXTBOOK

None

COMPETENCIES FOR ELECTRONICS AND ROBOTICS TECHNOLOGY I

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.

Applying Basic Construction Safety Standards (Core Safety)

- 34 Comply with federal, state and local safety legal requirements, including OSHA, VOSHA and EPA.
- 35 Inspect and maintain a safe working environment.
- 36 Explain safe working practices around electrical hazards.
- 37 Identify emergency first aid procedures.
- 38 Identify the types of fires and the methods used to extinguish them.
- 39 Identify personal protective equipment (PPE) requirements.

- 40 Inspect course-specific hand and power tools to visually identify defects.
- 41 Demonstrate lifting and carrying techniques.
- 42 Demonstrate safe laddering techniques.
- 43 Report personal injuries, environmental, and equipment safety violations to the appropriate authority.
- 44 Pass safety exam.

Orienting Students in Electronics/Robotics Technology

- 45 Describe the skills and characteristics of a good technician.
- 46 Identify job opportunities available in the field of electronics/robotics.

Exploring Electronics/Robotics Technology Careers

- 47 Investigate community industrial and technical resources.
- 48 Explore occupations related to electronics and robotics technology.

Explaining Robotics Applications

- 49 Explain the use of robotics in various industrial applications.
- 50 Explain the use of robotics in the inspection and quality-assurance process.

Applying Electronics Fundamentals

- 51 Explain the nature of electricity.
- 52 List ways to produce electrical energy.
- 53 Identify electric/electronic components and symbols.
- 54 Identify properties of conductors and insulators.
- 55 Determine the properties of resistance.
- 56 Explore the theory of electromotive force (voltage).
- 57 Outline the path of electron flow.
- 58 Determine the properties of power.
- 59 Explain the construction and operation of circuit protective devices.
- 60 Describe types of circuit control devices.
- 61 Apply soldering and desoldering techniques.

Working with DC Circuits

- 62 Construct series circuits.
- 63 Construct parallel circuits.
- 64 Construct series-parallel circuits.
- 65 Evaluate the difference in voltage between loaded and unloaded voltage divider circuits.
- 66 Examine magnetic properties of a circuit or component.
- 67 Construct circuits with (electro) magnetic properties.
- 68 Examine meter movement, using analog and digital multimeters.
- 69 Determine characteristics of inductance.
- 70 Determine characteristics of capacitance.

Introducing Robotics

- 71 Identify types of robot geometry, manipulators, and end effectors.
- 72 Identify various types of robot control and drive systems.

Understanding Physics

- 73 Perform measurements, using the English and metric systems.
- 74 Explain and apply various principles of the mechanics of robotics.

Local Competencies

- 75 Identify and describe atomic structure and the law of charges.
- 76 Define and apply basic electrical terms, symbols and components.
- 77 Explain methods of generating electricity, power and EMF Theory

- 78 Read and draw electrical symbols and circuit diagrams.
- 79 Describe and define AC current and voltage
- 80 Explain and determine values for RL and RLC circuits
- 81 Demonstrate Transformer action and explain operation
- 82 Identify types of robot geometry and manipulators.
- 83 Identify various types of robot control and drive systems.
- 84 Describe basic fundamentals of electricity and electronics (AC and DC).
- 85 Calculate the electrical characteristics of basic AC and DC circuits.
- 86 Demonstrate an understanding of resistor color codes and other component descriptions.
- 87 Analyze AC and DC circuits, using a variety of electronic testing equipment.
- 88 Demonstrate troubleshooting techniques.
- 89 Construct an electronic kit/project.
- 90 Assemble a project, using basic hand and power tools.
- 91 Demonstrate the use of compatible solder-less connections.
- 92 Use data books and cross reference/technical manuals to specify and order parts.
- 93 Document a technical procedure.
- 94 Create schematics, technical drawings, and flowcharts.
- 95 Use listening skills or assistive devices to assess signs and symptoms of equipment malfunctions.
- 96 Explain general maintenance procedures relating to the field of robotics.
- 97 Investigate community industrial and technical resources.
- 98 Explore occupations related to robotics technology.
- 99 Prepare and present a report about a future career in robotics.
- 100 Write programs to control robots, using the C++ computer language.
- 101 Manipulate a robot trainer, using a Teach pendant.
- 102 Manipulate a robot, using a PC host computer.
- 103 Program a robot trainer, using a Teach pendant.
- 104 Program a robot, using a PC host computer.
- 105 Differentiate between servo and non-servo electrical drive systems.
- 106 Describe motor control systems.
- 107 Demonstrate troubleshooting techniques for electrical motor control systems.
- 108 Explain the use of robots in various industrial applications.
- 109 Explain the use of robots in the inspection and quality-assurance process.
- 110 Perform measurements, using the English and metric systems.
- 111 Explain and apply various principles of the mechanics of robotics.
- 112 Write a computer program to solve physics problems.

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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.

Alternative formats of this publication which may include taped, Braille, or large print materials are available upon request for individuals with disabilities. Call or write The Department of Teaching and Learning, Virginia Beach City Public Schools, 2512 George Mason Drive, P.O. Box 6038, Virginia Beach, VA 23456-0038. Telephone 263-1070 (voice); fax 263-1424; 263-1240 (TDD) or email at Brandon.Martin@vbschools.com.

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