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| Robotic Programming | | |
| **Description**  Robotics, as an organizer of content, offers students a unit of study that implicitly demonstrates the application of math, science, and technology as well as introduces students to technological literacy as they develop the following work related competencies: basic programming, project and time management, resource allocation, information accessing, systems understanding, team work, and problem solving. | | |
| **Course Overview** | | |
| **Course Goals**  Students should:   * Programming mobile robots * Applying measurement and geometry to calculate robot navigation Path planning using both geometry and multiple sensor feedback * Interpreting sensor feedback/calculating threshold values/understanding conditional statements * Systems and systems analysis * Experimental process * Documenting and explaining the results of their testing | **Essential Questions**   * What is the value of computers / robots in today's society? * What are the strengths and limitations of computers? * How does software affect our lives? * How do we breakdown a problem? | **Assessments**  ***Common Assessments***   * Projects |
| **Content Outline**   1. Fundamentals    1. Thinking about programming    2. ROBOTC Programming 2. Movement:    1. Moving Forward    2. Speed and Direction    3. Improved Movement 3. Sensing    1. Detection (Touch)    2. Detection (Sonar)    3. Forward Until Dark    4. Line Tracking    5. Volume and Speed 4. Variables    1. Automatic Thresholds    2. Line Counting    3. Patterns of Behavior | **Standards**  [State of Connecticut Curriculum Frameworks](http://www.sde.ct.gov/sde/cwp/view.asp?a=2618&q=320866)  Connecticut State Standards are met in the following areas:  CCRST2: Key Ideas and Details  CCRST4: Craft and Structure  CCRST7: Integration of Knowledge and Ideas  CCRST9: Integration of Knowledge and Ideas  CCWHST1: Text Types and Purposes  CCWHST2: Text Types and Purposes  CCWHST4: Production and Distribution of Writing  CCWHST8: Research to Build and Present Knowledge  CCWHST9: Research to Build and Present Knowledge | **Grade Level Skills**  Students will:   * Evaluate information and synthesize a conclusive belief. * Use analytical skills and support conclusions with specificity. * Access and research information using the Internet. * Display creative thinking, problem solving, and decision making. * Organize and maintain files. * Use computers to process information. |

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| |  |  | | --- | --- | | **Pacing Guide** | | | 1st Marking Period | 2nd Marking Period | | |  |  | | --- | --- | | Month 1-2 | Month 3-4 | | |  |  |  |  |  | | --- | --- | --- | --- | | Unit 1  Robotic Fundamentals  3 weeks | Unit 2  Movement  7 weeks | Unit 3  Sensing  5 weeks | Unit 4  Variables  5 weeks | |

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| **Unit** **1 - Robotic Fundamentals, 3 weeks,** **[top](#_top)** | | |
| Standards  21st Century Skills Crosswalk  1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks.  2. Work independently and collaboratively to solve problems and accomplish goals.  3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.  Connecticut Career and Technical Education – Computer Information Systems  Content Standard 1 – Impact on Society   * Assess the impact of information technology in a global society.   Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.   * Design hardware and software network security solutions * Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets).   National Standards: Information Technology  XI. Programming and Application Development:   * Achievement Standard: Design, develop, test, and implement programs   X. Systems Analysis and Design   * Achievement Standard: Analyze and design information systems using appropriate development tools | | |
| **Course Goals**  Students should:   * Programming mobile robots * Applying measurement and geometry to calculate robot navigation Path planning using both geometry and multiple sensor feedback * Experimental process * Documenting and explaining the results of their testing | **Essential Questions**   * What is the value of computers / robots in today's society? * What are the strengths and limitations of computers? * How does software affect our lives? * How do we breakdown a problem? | **Assessments**  Common Assessments   * Projects |
| **Skill Objectives**  Students will:   * Apply information they have read on their own to the topics at hand. * Use analytical skills and support conclusions with specificity. * Access and research information using the Internet. * Display creative thinking, problem solving, and decision making. * Organize and maintain files. * Use computers to process information. | | |
| **Technology Resources**   * Lego NXT Lego Kits * RobotC Software * Computers * Internet * Projector or Interactive Whiteboard | **Suggested Materials/Resources**   * Fundamentals   + Thinking about programming   + Robotics programming | |

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| **Unit 2 • Movement, 7 weeks,** **[top](#_top)** | | |
| Standards  21st Century Skills Crosswalk  1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks.  2. Work independently and collaboratively to solve problems and accomplish goals.  3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.  Connecticut Career and Technical Education – Computer Information Systems  Content Standard 1 – Impact on Society   * Assess the impact of information technology in a global society.   Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.   * Design hardware and software network security solutions * Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets).   National Standards: Information Technology  XI. Programming and Application Development:   * Achievement Standard: Design, develop, test, and implement programs   X. Systems Analysis and Design   * Achievement Standard: Analyze and design information systems using appropriate development tools | | |
| **Course Goals**  Students should:   * Programming mobile robots * Applying measurement and geometry to calculate robot navigation Path planning using both geometry and multiple sensor feedback * Systems and systems analysis * Experimental process * Documenting and explaining the results of their testing | **Essential Questions**   * What is the value of computers / robots in today's society? * What are the strengths and limitations of computers? * How does software affect our lives? * How do we breakdown a problem? | **Assessments**  ***Common Assessments***   * Labyrinth * Various Projects |
| **Skill Objectives**  Students will:   * Apply information they have read on their own to the topics at hand. * Use analytical skills and support conclusions with specificity. * Access and research information using the Internet. * Display creative thinking, problem solving, and decision making. * Organize and maintain files. * Use computers to process information. | | |
| **Technology Resources**   * Lego NXT Lego Kits * RobotC Software * Computers * Internet * Projector or Interactive Whiteboard | **Suggested Materials/Resources**   * Movement:   + Moving Forward   + Speed and Direction   + Improved Movement | |

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| **Unit 3 - Sensing, 5 weeks,** **[top](#_top)** | | |
| Standards  21st Century Skills Crosswalk  1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks.  2. Work independently and collaboratively to solve problems and accomplish goals.  3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.  Connecticut Career and Technical Education – Computer Information Systems  Content Standard 1 – Impact on Society   * Assess the impact of information technology in a global society.   Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.   * Design hardware and software network security solutions * Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets).   National Standards: Information Technology  XI. Programming and Application Development:   * Achievement Standard: Design, develop, test, and implement programs   X. Systems Analysis and Design   * Achievement Standard: Analyze and design information systems using appropriate development tools | | |
| **Course Goals**  Students should:   * Programming mobile robots * Applying measurement and geometry to calculate robot navigation Path planning using both geometry and multiple sensor feedback * Interpreting sensor feedback/calculating threshold values/understanding conditional statements * Systems and systems analysis * Experimental process * Documenting and explaining the results of their testing | **Essential Questions**   * What is the value of computers / robots in today's society? * What are the strengths and limitations of computers? * How does software affect our lives? * How do we breakdown a problem? | **Assessments**  ***Common Assessments***   * Various Projects |
| **Skill Objectives**  Students will:   * Apply information they have read on their own to the topics at hand. * Use analytical skills and support conclusions with specificity. * Access and research information using the Internet. * Display creative thinking, problem solving, and decision making. * Organize and maintain files. * Use computers to process information. | | |
| **Technology Resources**   * Lego NXT Lego Kits * RobotC Software * Computers * Internet * Projector or Interactive Whiteboard | **Suggested Materials/Resources**   * Sensing   + Detection (Touch)   + Detection (Sonar)   + Forward Until Dark | |

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| **Unit 4 - Variables, 5 weeks,** [**top**](#_top) | | |
| Standards  21st Century Skills Crosswalk  1. Use real-world digital and other research tools to access, evaluate and effectively apply information appropriate for authentic tasks.  2. Work independently and collaboratively to solve problems and accomplish goals.  3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes.  Connecticut Career and Technical Education – Computer Information Systems  Content Standard 1 – Impact on Society   * Assess the impact of information technology in a global society.   Content Standard 7 - Networking, Infrastructure, and Security Develop skills for networking and security.   * Design hardware and software network security solutions * Distinguish among network environments (e.g., peer-to-peer, client server, thin client, n-tier, Internetworks, intranets, extranets).   National Standards: Information Technology  XI. Programming and Application Development:   * Achievement Standard: Design, develop, test, and implement programs   X. Systems Analysis and Design   * Achievement Standard: Analyze and design information systems using appropriate development tools | | |
| **Course Goals**  Students should:   * Programming mobile robots * Applying measurement and geometry to calculate robot navigation Path planning using both geometry and multiple sensor feedback * Interpreting sensor feedback/calculating threshold values/understanding conditional statements * Systems and systems analysis * Experimental process * Documenting and explaining the results of their testing | **Essential Questions**   * What is the value of computers / robots in today's society? * What are the strengths and limitations of computers? * How does software affect our lives? * How do we breakdown a problem? | **Assessments**  ***Common Assessments Soccer Bot***   * Various Projects |
| **Skill Objectives**  Students will:   * Apply information they have read on their own to the topics at hand. * Use analytical skills and support conclusions with specificity. * Access and research information using the Internet. * Display creative thinking, problem solving, and decision making. * Organize and maintain files. * Use computers to process information. | | |
| **Technology Resources**   * Lego NXT Lego Kits * RobotC Software * Computers * Internet * Projector or Interactive Whiteboard | **Suggested Materials/Resources**   * Variables   + Automatic Thresholds   + Line Counting   + Patterns of Behavior | |