

# CURRICULUM OVERVIEW

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## Fundamentals of Programming and Software Development

Career and Technical Educations Series



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## Fundamentals of Programming and Software Development Course Overview

This course will provide students with an understanding of basic software development concepts and practices, issues affecting the software industry, careers within the software industry, and the skills necessary to perform well in these occupations.

Students will learn details about core concepts in programming using Java. Concepts include writing and debugging code, proper syntax, flow of control, order of operations, comparison operators, and program logic tools and models. They will learn the function of key program techniques, including if statements, looping, and arrays. They will also learn about web development using HTML and drag-and-drop development of user interfaces in an Integrated Development environment.

Students will also learn about the software development life cycle and the different variations used to create software. They will learn about different programming languages and paradigms. They will learn about the importance of usability and user-centered design processes. Students will also learn about careers in the software industry, the education and skills required to work in the industry, and related career resources. Finally, the capstone project will allow students to explore and state opinions on key issues and trends impacting the software industry, and to learn about the experience of working in the industry.

### Objectives

- Understand the relationship between computer hardware and software.
- Describe the purpose and high-level organization of the central processing unit.
- Understand categories of software and be able to properly assign software products into the correct category.
- Describe the key functions of systems software.
- Describe the functionality of popular software applications (e.g., word processing, database management, spreadsheet development).
- Understand the function and operation of compilers and interpreters.

For topics in this course, it is helpful for students to be familiar with the basics of using desktop and laptop computers as well as accessing websites over the Internet. If students are unfamiliar with these topics, it is recommended, though not required, that they familiarize themselves with creating and saving files in a text editing or word processing application and with using web browsers and conducting searches on the Internet.

Additionally, activities in this course require that the Java Software Development Kit (SDK) and the NetBeans Integrated Development Environment (IDE) is installed on students' computers. Instructions are included in the Unit 1 lesson titled "Introduction to Java Programming."

| Fundamentals of Programming and Software Development | Unit 1: Introduction to Computers                     |   |
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|  | Assignments   |   |
|  | 1. Course Overview                                    | 10. Project: Writing Your First Java Program            |
|  | 2. Computer History                                   | 11. Java Syntax Overview                                |
|  | 3. Project: Computer Generations                      | 12. Project: Hello World! Documentation                 |
|  | 4. Introduction to Computer Hardware                  | 13. Quiz 2: How Computers and Programs Think            |
|  | 5. Project: Understanding Hardware                    | 14. Special Project*                                    |
|  | 6. Introduction to Computer Software                  | 15. Test  |
|  | 7. Quiz 1: Perspective and Foundations                | 16. Course Project Part 1: The Impact of GUI Computing* |
|  | 8. Design and Function of the Central Processing Unit | 17. Glossary and Credits                                |
|  | 9. Introduction to Java Programming                   |   |

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| Fundamentals of Programming and Software Development | <b>Unit 2: Java</b>  |   |
|  | <b>Assignments</b>   |   |
|  | 1. Introduction to Java Variables  | 9. Switch and Case  |
|  | 2. Project: Using Variables in Java  | 10. Project: Using Switch-Case and Nested If Statements             |
|  | 3. Java Math Operations  | 11. User-Defined Methods  |
|  | 4. Project: Using Mathematical Operators in Java                                       | 12. Quiz 2: Branching and Methods                                   |
|  | 5. Operators and Escape Sequences  | 13. Special Project*  |
|  | 6. Quiz 1: Processing Data   | 14. Test  |
|  | 7. New Data Types and the If Statement   | 15. Course Project Part 2: Ethics in Programming*                   |
|  | 8. Project: Using If and If-Else Statements and Reading User Input                     | 16. Glossary and Credits  |
| Fundamentals of Programming and Software Development | <b>Unit 3: Programming</b>   |   |
|  | <b>Assignments</b>   |   |
|  | 1. Introduction to the For Loop  | 10. Parallel and Multidimensional Arrays                            |
|  | 2. Project: Grading on a Loop  | 11. Project: The Logic of Multidimensional Arrays                   |
|  | 3. Loops—Practice with the Do-While Loop   | 12. Quiz 2: Managing Complex Data                                   |
|  | 4. Loops—Practice with the While Loop  | 13. Special Project*  |
|  | 5. Project: Using Loops in a Guessing Game   | 14. Test  |
|  | 6. Quiz 1: Loops—Power and Simplicity  | 15. Course Project Part 3: The Life of a Software or Web Developer* |
|  | 7. Arrays—Syntax and Use   | 16. Glossary and Credits  |
|  | 8. Arrays—Passing by Reference   |   |
|  | 9. Project: Professional Associations Research   |   |
| Fundamentals of Programming and Software Development | <b>Unit 4: Advanced Programming</b>  |   |
|  | <b>Assignments</b>   |   |
|  | 1. Classes and Objects   | 9. HTML Images, Links, and Web Development Tools                    |
|  | 2. Project: The Importance of Usability  | 10. Project: Your Favorite Recipe – On a Web Page                   |
|  | 3. Constructors and Packages   | 11. Event-Driven Programming and Visual Basic                       |
|  | 4. Project: Creating Packages  | 12. Quiz 2: Interactive and Graphical Programming                   |
|  | 5. Flowcharts Mapping  | 13. Special Project*  |
|  | 6. Quiz 1: Program Components and Logic  | 14. Test  |
|  | 7. HTML Basics   | 15. Course Project Part 4: Open-Source Programming*                 |
|  | 8. Project: A Web Page Essay About the Web   | 16. Glossary and Credits  |
| Fundamentals of Programming and Software Development | <b>Unit 5: GUI Programming and Web Applications</b>                                    |   |
|  | <b>Assignments</b>   |   |
|  | 1. Software Development Life Cycle   | 9. Software Industry Careers  |
|  | 2. Project: Planning a Software Development Project                                    | 10. Project: Planning Your Computer Science Degree                  |
|  | 3. Programming Languages   | 11. New Trends and Technologies                                     |
|  | 4. User-Centered Software Design   | 12. Quiz 2: Preparing for a Career in Software Development          |
|  | 5. Project: User-Testing a Product Prototype   | 13. Special Project*  |
|  | 6. Quiz 1: Creating Software Products  | 14. Test  |
|  | 7. Skills and Interests for Software Careers   | 15. Course Project Part 5: Impacts of Future Technologies*          |
|  | 8. Project: Taking Stock   | 16. Glossary and Credits  |
| FPSD   | <b>Unit 6: Course Project, Review, and Exam</b>  |   |
|  | <b>Assignments</b>   |   |
|  | 1. Course Project Part 6: Issues and Experiences in the World of Software Development* | 2. Review   |
|  |  | 3. Exam   |

(\*) Indicates alternative assignment