Everett Public Schools Framework: Computer Programming II (Java)

CIP Code: 110201	**Total Framework Hours:** 180 Hours
Course: Computer Programming	**Type:** Preparatory
Career Cluster: Information Technology	**Date Last Modified:** Tuesday, June 01, 2010

Resources and Standard used in Framework Development:

Standards used in this framework come from recommended model framework from OSPI.

Unit 1 JAVA BASICS — Hours: 5

Performance Assessment(s)

Formative - Career exploration of Software Engineering, students will explore jobs currently posted for software engineers and identify skills, education, job related requirements and salary. As well as identify varieties of options by looking at inspiring individuals in the field [Randy Pausch]
Formative - students will complete NetBeans tutorial
Formative - After a classroom presentation and discussion students will complete an investigation of the Basic elements of Java, objects, classes, byte code, java coding standards.
Formative- Hello World
Summative - School Song - by creating a class that outputs the school song using println statements

Industry Standards and Competencies

C-1 Develop employability skills to secure and keep employment in chosen field
- 1.1 Evaluate industries, organizations, and careers based on multiple sources of research and information
- 1.2 Assess interest areas to determine potential career pathways, including career ladders
- 1.6 Apply job search skills to seek, evaluate, apply for, and accept employment
- 1.9 Assess alternative occupational choices (e.g. working conditions, benefits, and opportunities to change)

C-2 Communicate in multiple modes to address needs within the career and technical field
- 2.2 Apply reading skills and strategies to work-related documents
- 2.3 Locate information from books, journals, magazines, and the Internet

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

12.4 Develop work breakdown structures
12.5 Evaluate project requirements
12.6 Identify required resources and budget
12.7 Estimate time requirements
12.14 Develop method of evaluation
12.15 Formulate a task strategy
12.16 Prioritize tasks according to customer needs
12.17 Devise plan of action

C-13 Prepare and present documentation

13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct

C-14 Explain fundamental programming theory

14.3 Classify the various programming languages by communication level
14.4 Summarize the function and operation of compilers and interpreters
14.5 List the stages of program development
14.6 Analyze a problem identifying desired outputs for given inputs
14.7 Describe the fundamental data types and their operations (including arrays)
14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.10 Identify the use of program design tools
14.11 Explain structured/modular programming
14.12 Describe the information system (IS) life cycle
14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.4 Apply known information to the problem statement

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.1.A Select and justify functions and equations to model and solve problems.

1.8.A Analyze a problem situation and represent it mathematically.
1.8.B Select and apply strategies to solve problems.
1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.A Analyze a problem situation and represent it mathematically
7.B Select and apply strategies to solve problems.

Reading

Science

Social Studies

Writing

1.5.1 Publishes in formats that are appropriate for specific audiences and purposes.
2.1.1 Applies understanding of multiple and varied audiences to write effectively.

Other Skills

Leadership Skills

Leadership 3.0 Community and Career Skills
3.1 The student will analyze the roles and responsibilities of citizenship.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources
SCANS 4.0 The student understands complex systems and inter-relationships
4.3: Improves or Designs Systems - Suggests modifications to existing systems and develops new or alternative systems to improve performance.
SCANS 5.0 The student works with a variety of technologies
5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.
5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.
5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☑ Observe	☐ Cause/Effect	☐ Finding Evidence	☐ Reasoning	☐ Originality
☐ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☐ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☐ Classify	☑ Summary	☐ Inference	☐ Fluency	☐ Attending
☐ Compare/Constrast	☑ Point of View	☑ Conclusion	☐ Elaboration	☐ Persistence
☑ Predict	☐ Analysis	☐ Metacognition	☐ Flexibility	☐ Precision

Relevance to Work

Awareness of Career options and their requirements
Safety in work environment

Unit 2 COMPUTER SCIENCE AND OBJECTS | Hours: 5

Performance Assessment(s)

Formative - After class discussion and instructor presentation students will complete a questionaire about classification of copyright issues, laws.
Summative - Students will complete all 3 sections of the
http://library.thinkquest.org/26658/teacher-info.html
and present a certificate on Computer Ethics

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.1 Define scope of work to achieve individual and group goals
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.2 Analyze programming languages for uses, structure, and environment
- 14.4 Summarize the function and operation of compilers and interpreters
- 14.6 Analyze a problem identifying desired outputs for given inputs

14.7 Describe the fundamental data types and their operations (including arrays)
14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.10 Identify the use of program design tools
14.11 Explain structured/modular programming
14.12 Describe the information system (IS) life cycle

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.5 Explain and apply compound conditions
16.7 Explain and apply methods of calculating subtotals and final totals

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.28 Generate executable code
16.29 Provide internal documentation
16.30 Explain the importance of versioning and source code control
16.32 Annotate program and design and revision

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Communication 1.2: Understands, analyzes, synthesizes, or evaluates information from a variety of sources.

Health and Fitness

Mathematics

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.
1.8.B Select and apply strategies to solve problems.
1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically
7.B Select and apply strategies to solve problems.

Reading

Science

Social Studies

1.1.2 (11) Evaluates how well court decisions and government policies have upheld key ideals and principles in the United States.
1.1.2 (12) Evaluates relationships between key ideals and historical and current realities.

Writing

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills
1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work related) experiences.
Leadership 3.0 Community and Career Skills
3.7 The student will participate in the development of a program of work or strategic plan and will work to implement the organization's goals.

Employability Skills

SCANS 3.0 The student acquires and uses information
3.1: Acquires and evaluates information
3.2: Organizes and maintains information
3.3: Interprets and communicates information
3.4: Uses computers to process information
SCANS 5.0 The student works with a variety of technologies
5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.
5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.
5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☐ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☐ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☐ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☐ Classify	☐ Summary	☐ Inference	☐ Fluency	☐ Attending
☑ Compare/Constrast	☐ Point of View	☐ Conclusion	☐ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☐ Precision

Relevance to Work

Ethics in the workplace is an important element in the workplace

Unit 3 VARIABLE TYPES, INPUT AND OUTPUT METHODS, GRAPHICS | Hours: 10

Performance Assessment(s)

Students will complete worksheets to demonstrate understaning and classification of memory allocation and for the different variable types
Formative - Students will complete the Doodle project where they will draw a simple design using the drawing planel class.
Summative - Students will demonstrate understanding of the Scanner class and output methods by completing the Verses Project.
Summative - Students will create a Picasso project where they will create an object that uses at least 3 of the Drawing Panel methods and has at least 3 methods called to draw their design.
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.2 Analyze programming languages for uses, structure, and environment
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.7 Describe the fundamental data types and their operations (including arrays)
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.10 Identify the use of program design tools
- 14.13 List the characteristics and uses of batch processing

14.14 List the characteristics and uses of interactive processing
14.15 List the characteristics and uses of event-driven, object-oriented procession

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language

C-17 Implement and manage software

17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.
1.8.B Select and apply strategies to solve problems.
1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically
7.B Select and apply strategies to solve problems.
7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

Reading

Science

Social Studies

Writing

Writing 2.3: Writes in a variety of forms/genres.

2.3.1 Uses a variety of forms/genres.

Other Skills

Leadership Skills

Leadership 3.0 Community and Career Skills

3.7 The student will participate in the development of a program of work or strategic plan and will work to implement the organization's goals.

Employability Skills

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

4.3: Improves or Designs Systems - Suggests modifications to existing systems and develops new or alternative systems to improve performance.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☐ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☑ Classify	☐ Summary	☑ Inference	☐ Fluency	☐ Attending
☑ Compare/Constrast	☐ Point of View	☑ Conclusion	☐ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 4 BASIC DECISIONS, MORE ON STRINGS, ITERATION LOOPS (FOR , WHILE, DO-WHILE) | Hours: 15

Performance Assessment(s)

Formative - after instructor introduction and discussion student will correctly classify and implement mathematical formulas and Math class methods by completing worksheets
Formative - Students will complete a Temperature conversion class which will input a temperature in celsius and output a temperature in Farhenheit.
Summative - Students will modify the Temperature conversion class to include a menu that takes input and does calculations based on the user selected choice.
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking

- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation

- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

- 14.2 Analyze programming languages for uses, structure, and environment
- 14.6 Analyze a problem identifying desired outputs for given inputs

C-15 Plan programs

- 15.1 Develop a problem statement

15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.8 Explain and apply iterative and conditional loops
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.26 Explain and apply methods used to debug a program
16.28 Generate executable code
16.29 Provide internal documentation
16.30 Explain the importance of versioning and source code control

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.
1.8.B Select and apply strategies to solve problems.
1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.
1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.C Use deductive reasoning to prove that a valid geometric statement is true.
Geometry 7 Core Processes: Reasoning, problem solving, and communication
7.A Analyze a problem situation and represent it mathematically
7.B Select and apply strategies to solve problems.
7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

Reading

Science

Social Studies

Writing

Writing 2.4: Writes for career applications.
2.4.1 Produces documents used in a career setting.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 3.0 Community and Career Skills
3.7 The student will participate in the development of a program of work or strategic plan and will work to implement the organization's goals.

Employability Skills

SCANS 4.0 The student understands complex systems and inter-relationships
4.3: Improves or Designs Systems - Suggests modifications to existing systems and develops new or alternative systems to improve performance.
SCANS 5.0 The student works with a variety of technologies
5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.
5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.
5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☑ Classify	☑ Summary	☑ Inference	☐ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☑ Elaboration	☐ Persistence
☑ Predict	☐ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 5 BOOLEAN ALGEBRA / DO WHILE, ITERATION, NESTED LOOPS, SCANNER STRING, SCANNER | Hours: 20

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative students will complete the Odd or Even Lab
Formative students will complete the Greatest Common Divisor Lab
Formative students will complete the Reverse String Lab
Fomrative students will complete Example program analysis and modification
Formative - students will complete the Guessing Game Lab
Summative - Students will complete the Geometry Shapes Project
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking

- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

- 12.1 Define scope of work to achieve individual and group goals
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation

- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.10 Identify the use of program design tools

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.12 Create sequential files
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.30 Explain the importance of versioning and source code control
16.31 Compare and contrast revision control and version control
16.32 Annotate program and design and revision
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.2 Identify sources and techniques used to gather information needed for implementation
17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.C Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 6 Additional Key Content

6.A Derive and apply formulas for arc length and area of a sector of a circle.

6.B Analyze distance and angle measures on a sphere and apply these measurements to the geometry of the earth.

6.C Apply formulas for surface area and volume of three-dimensional figures to solve problems.

6.D Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and there- dimensional figures.

6.E Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

Reading

Science

Social Studies

Writing

1.5.1 Publishes in formats that are appropriate for specific audiences and purposes.

Writing 2.1: Adapts writing for a variety of audiences.

2.1.1 Applies understanding of multiple and varied audiences to write effectively.

Writing 2.3: Writes in a variety of forms/genres.

2.3.1 Uses a variety of forms/genres.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

1.2: Money - Uses or prepares budgets, makes forecasts, keeps records, and makes adjustments to meet objectives.

1.3: Materials and facilities - Acquires, stores, allocates, and uses materials or space efficiently.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills				
☐ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☐ Patterns	☐ Fact/Opinion	☐ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☑ Classify	☐ Summary	☑ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☑ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 6 ONE DIMENSIONAL ARRAYS | Hours: 10

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Word Sorter Lab
Formative - Fibonnaci Lab
Summative - Histogram Project
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.8 Develop initial project management flow chart
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.2 Analyze programming languages for uses, structure, and environment
- 14.8 Design program logic using graphical techniques (flow charts)

14.9 Design program logic using pseudocode techniques
14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.12 Create sequential files
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.32 Annotate program and design and revision
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.7 Document installation and configuration procedures
17.9 Identify the issues of security in programming and software implementation

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan

18.2 Implement a testing plan

18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.3.B Represent a function with a symbolic expression, as a graph, in a table, and using words, and make connections among these representations.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

1.C Use deductive reasoning to prove that a valid geometric statement is true.

6.C Apply formulas for surface area and volume of three-dimensional figures to solve problems.

6.D Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and there- dimensional figures.

6.E Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

Reading

Science

Social Studies

Writing

1.5.1 Publishes in formats that are appropriate for specific audiences and purposes.

2.1.1 Applies understanding of multiple and varied audiences to write effectively.

2.2.1 Demonstrates understanding of different purposes for writing.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☐ Classify	☑ Summary	☑ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☐ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 7 SORTING AND SEARCHING INTRODUCTION | Hours: 15

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment

Summative - Sort a list of words project
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.1 Define scope of work to achieve individual and group goals
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.10 Identify and track critical milestones
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs

14.7 Describe the fundamental data types and their operations (including arrays)
14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.32 Annotate program and design and revision

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan

18.2 Implement a testing plan

18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

6.E Use different degrees of precision in measurement, explain the reason for using a certain degree of precision, and apply estimation strategies to obtain reasonable measurements with appropriate precision for a given purpose.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

Reading

Science

Social Studies

Writing

Writing 2.3: Writes in a variety of forms/genres.

Writing 2.4: Writes for career applications.

Writing 3.1: Develops ideas and organizes writing.

Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Leadership 3.0 Community and Career Skills

3.1 The student will analyze the roles and responsibilities of citizenship.

3.2 The student will demonstrate social responsibility in family, community, and business and industry.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☑ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☐ Goal Setting	☐ Inquisitiveness
☑ Classify	☐ Summary	☑ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☑ Elaboration	☐ Persistence
☐ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 8 ARRAY LIST | Hours: 10

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Grade book lab
Summative - Averages Project
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.2 Explain the importance and dynamics of individual and teamwork approaches of problem solving
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.10 Identify and track critical milestones
- 12.11 Evaluate risks and prepare contingency plan
- 12.12 Participate in project phase review and report project status
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs

14.8 Design program logic using graphical techniques (flow charts)
14.9 Design program logic using pseudocode techniques
14.10 Identify the use of program design tools
14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.28 Generate executable code
16.29 Provide internal documentation

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan

18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

1.C Use deductive reasoning to prove that a valid geometric statement is true.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

Reading

Science

Social Studies

Writing

Writing 2.3: Writes in a variety of forms/genres.

Writing 2.4: Writes for career applications.

Writing 3.1: Develops ideas and organizes writing.

Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills

1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work related) experiences.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☑ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☑ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☑ Classify	☐ Summary	☐ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☑ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 9 REFERENCES / PARAMETERS | Hours: 10

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Word Boxes Lab
Formative - Word Printer Lab
Summative - Array Tools
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures

C-12 Demonstrate project management skills
- 12.3 Identify escalation procedures
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.8 Develop initial project management flow chart
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.12 Create sequential files
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.32 Annotate program and design and revision

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.C Use deductive reasoning to prove that a valid geometric statement is true.
Geometry 7 Core Processes: Reasoning, problem solving, and communication
7.A Analyze a problem situation and represent it mathematically
7.B Select and apply strategies to solve problems.
7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.
7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.
Algebra 1.8 Core Processes: Reasoning, problem solving, and communication
1.8.A Analyze a problem situation and represent it mathematically.
1.8.B Select and apply strategies to solve problems.
1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.
1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Reading

Science

Social Studies

Writing

Writing 2.2: Writes for different purposes.
Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.1: Develops ideas and organizes writing.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.
1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.
1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources
1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.
SCANS 3.0 The student acquires and uses information
3.1: Acquires and evaluates information
3.2: Organizes and maintains information
3.3: Interprets and communicates information
3.4: Uses computers to process information
SCANS 4.0 The student understands complex systems and inter-relationships
4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.
SCANS 5.0 The student works with a variety of technologies
5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☑ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☐ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☐ Classify	☐ Summary	☐ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☑ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 10 ADVANCED OOP | Hours: 10

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Sort by Vowels Lab
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures

C-12 Demonstrate project management skills
- 12.1 Define scope of work to achieve individual and group goals
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.10 Identify and track critical milestones
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs
- 15.1 Develop a problem statement
- 15.2 Define the assumptions that define the scope of the problem

15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.
1.8.A Analyze a problem situation and represent it mathematically.
1.8.B Select and apply strategies to solve problems.
1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.
1.8.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

1.C Use deductive reasoning to prove that a valid geometric statement is true.
Geometry 7 Core Processes: Reasoning, problem solving, and communication
7.A Analyze a problem situation and represent it mathematically
7.B Select and apply strategies to solve problems.
7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

Reading

Science

Social Studies

Writing

Writing 2.2: Writes for different purposes.
Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills
1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.
1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.
1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.
Leadership 3.0 Community and Career Skills
3.1 The student will analyze the roles and responsibilities of citizenship.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources
1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.
SCANS 3.0 The student acquires and uses information
3.1: Acquires and evaluates information
3.2: Organizes and maintains information
3.3: Interprets and communicates information
3.4: Uses computers to process information
SCANS 4.0 The student understands complex systems and inter-relationships
4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.
SCANS 5.0 The student works with a variety of technologies
5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.
5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.
5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☑ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☐ Classify	☐ Summary	☑ Inference	☐ Fluency	☐ Attending
☐ Compare/Constrast	☑ Point of View	☑ Conclusion	☐ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 11 ARRAYS OF REFERENCES | Hours: 10

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Summative - Tic Tac Toe Project
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.3 Identify escalation procedures
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.7 Describe the fundamental data types and their operations (including arrays)
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs
- 15.1 Develop a problem statement

15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.32 Annotate program and design and revision
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.
Algebra 1.8 Core Processes: Reasoning, problem solving, and communication
1.8.A Analyze a problem situation and represent it mathematically.
1.8.B Select and apply strategies to solve problems.
1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.
1.8.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.C Use deductive reasoning to prove that a valid geometric statement is true.
Geometry 7 Core Processes: Reasoning, problem solving, and communication
7.A Analyze a problem situation and represent it mathematically
7.B Select and apply strategies to solve problems.
7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Reading

Science

Social Studies

Writing

Writing 2.2: Writes for different purposes.
Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.1: Develops ideas and organizes writing.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills
1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☑ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☐ Classify	☐ Summary	☑ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☑ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 12 INHERITANCE | Hours: 20

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Summative - Pong Project
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.6 Identify required resources and budget
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.30 Explain the importance of versioning and source code control
16.31 Compare and contrast revision control and version control
16.32 Annotate program and design and revision
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function

17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures
C-18 Test and follow a Quality Assurance Process
18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.
1.7.B Find and approximate solutions to exponential equations.
1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.
Algebra 1.8 Core Processes: Reasoning, problem solving, and communication
1.8.A Analyze a problem situation and represent it mathematically.
1.8.B Select and apply strategies to solve problems.
1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.
1.8.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.
1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.
1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

1.C Use deductive reasoning to prove that a valid geometric statement is true.
Geometry 7 Core Processes: Reasoning, problem solving, and communication
7.A Analyze a problem situation and represent it mathematically
7.B Select and apply strategies to solve problems.
7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.
7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

Reading

Science

Social Studies

Writing

Writing 2.1: Adapts writing for a variety of audiences.
Writing 2.2: Writes for different purposes.

Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.1: Develops ideas and organizes writing.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 2.0 The student demonstrates interpersonal skills in working well with others.

2.3: Serves clients/customers

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☐ Classify	☐ Summary	☑ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☑ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 13 RECURSION	Hours: 20

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Factorial Lab
Summative - Recursive Cirlces
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills
- 12.4 Develop work breakdown structures
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.10 Identify and track critical milestones
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.7 Describe the fundamental data types and their operations (including arrays)
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs

15.1 Develop a problem statement
15.2 Define the assumptions that define the scope of the problem
15.3 List strategies used to gather known information
15.4 Apply known information to the problem statement
15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.25 Test and run a program for desired output
16.26 Explain and apply methods used to debug a program
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation
16.31 Compare and contrast revision control and version control
16.33 Explain release management
16.34 Explain and apply methods used to maintain application/program

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.5 List and apply methods used to troubleshoot compatibility issues of hardware and software
17.7 Document installation and configuration procedures

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

7.G Synthesize information to draw conclusions and evaluate the arguments and conclusions of others.

Algebra 1.1 Core Content: Solving Problems

1.1.A Select and justify functions and equations to model and solve problems.

1.1.B Solve problems that can be represented by linear functions, equations, and inequalities.

1.1.C Solve problems that can be represented by a system of two linear equations or inequalities.

1.1.D Solve problems that can be represented by quadratic functions and equations.

1.1.E Solve problems that can be represented by exponential functions and equations.

1.7.C Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

1.8.H Use inductive reasoning about algebra and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.

Reading

Science

Social Studies

Writing

Writing 2.1: Adapts writing for a variety of audiences.
Writing 2.2: Writes for different purposes.
Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.1: Develops ideas and organizes writing.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills

1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work related) experiences.

1.3 The student will demonstrate oral, interpersonal, written, and electronic communication and presentation skills and understands how to apply those skills.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

3.3: Interprets and communicates information

3.4: Uses computers to process information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills				
☐ Observe	☑ Cause/Effect	☑ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☐ Classify	☐ Summary	☑ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☐ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 14 ADVANCED SEARCHING AND SORTING | Hours: 10

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Insertion Sort Lab
Formative - Quick Sort Lab
Formative - Merge Sort Lab
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking
- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.3 Describe methods of researching and validating reliable information relevant to the problem
- 3.4 Explain strategies used to formulate ideas, proposals and solutions to problems
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics
- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures

C-12 Demonstrate project management skills
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action

C-13 Prepare and present documentation
- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory
- 14.6 Analyze a problem identifying desired outputs for given inputs
- 14.8 Design program logic using graphical techniques (flow charts)
- 14.9 Design program logic using pseudocode techniques
- 14.16 Illustrate characteristics of technical documentation associated with software development

C-15 Plan programs
- 15.1 Develop a problem statement
- 15.2 Define the assumptions that define the scope of the problem
- 15.3 List strategies used to gather known information
- 15.4 Apply known information to the problem statement

15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language
16.2 Develop programs that use arithmetic operations
16.3 Develop programs that use relational operators
16.4 Explain and apply the use of logical operators
16.5 Explain and apply compound conditions
16.6 Explain and apply control breaks
16.7 Explain and apply methods of calculating subtotals and final totals
16.8 Explain and apply iterative and conditional loops
16.9 Describe common development environments
16.10 Explain and apply the use of sort routines
16.11 Explain and apply the use of files in programming
16.12 Create sequential files
16.13 Create random files
16.14 Create, update, and delete records
16.15 Explain and apply methods used to incorporate menus
16.16 Develop interactive programs
16.17 Explain and apply the use of an array
16.18 Design and develop structures
16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects
16.21 Explain and apply methods of incorporating error handling routines
16.22 Define and apply built in functions
16.23 Create user defined functions
16.24 Apply language specific programming techniques
16.27 Utilize reference materials for problem solving
16.28 Generate executable code
16.29 Provide internal documentation

C-17 Implement and manage software

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures
17.8 Explain and demonstrate methods to verify software/program installation and operation

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.5.A Represent a quadratic function with a symbolic expression, as a graph, in a table, and with a description, and make connections among the representations.

1.7.C Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

1.8.H Use inductive reasoning about algebra and the properties of numbers to make conjectures, and use deductive reasoning to prove or disprove conjectures.

1.C Use deductive reasoning to prove that a valid geometric statement is true.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

7.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class of related problems to solve specific problems.

7.E Read and interpret diagrams, graphs, and text containing the symbols, language, and conventions of mathematics.

7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

Reading

Science

Social Studies

Writing

Writing 2.2: Writes for different purposes.

Writing 2.3: Writes in a variety of forms/genres.

Writing 2.4: Writes for career applications.

Writing 3.1: Develops ideas and organizes writing.

Writing 3.2: Uses appropriate style.

Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills

1.2 The student will identify and analyze the characteristics of family, community, business, and industry leaders.

1.4 The student will be involved in activities that require applying theory, problem-solving, and using critical and creative thinking skills while understanding outcomes of related decisions.

1.5 The student will demonstrate self-advocacy skills by achieving planned, individual goals.

1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources

1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.

SCANS 3.0 The student acquires and uses information

3.1: Acquires and evaluates information

3.2: Organizes and maintains information

SCANS 4.0 The student understands complex systems and inter-relationships

4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.

4.2: Monitors and Corrects Performance - Distinguishes trends, predicts impacts on system operations, diagnoses deviations in performance and makes corrections.

SCANS 5.0 The student works with a variety of technologies

5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.

5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.

5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☐ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☑ Goal Setting	☐ Inquisitiveness
☑ Classify	☐ Summary	☑ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☐ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code

Unit 15 MATRICES	Hours: 10

Performance Assessment(s)

Formative - After instructor introduction and class discussion students will complete worksheets where they complete segments of code and predict output from a code segment
Formative - Pascals Triangle
Summative - Quiz over concepts

Industry Standards and Competencies

C-3 Solve problems using critical thinking

- 3.1 Demonstrate skills used to define and analyze a given problem
- 3.5 Select potential solutions based on reasoned criteria
- 3.6 Implement and evaluate solution(s)

C-9 Apply Problem Solving and Troubleshooting Basics

- 9.1 Define and document a problem
- 9.2 Define possible causes of a problem
- 9.3 Determine and discuss possible solutions to a problem
- 9.4 Explain and perform basic troubleshooting and maintenance tasks

C-10 Explain programming concepts

- 10.1 Define what a computer program is
- 10.2 Define how a computer program runs
- 10.3 Identify the applications appropriate for each programming language
- 10.4 Define functions/methods/procedures
- 10.5 Define programming structures
- 10.6 Differentiate between procedural and object oriented programming

C-12 Demonstrate project management skills

- 12.2 Identify stakeholders and decision makers
- 12.3 Identify escalation procedures
- 12.4 Develop work breakdown structures
- 12.5 Evaluate project requirements
- 12.7 Estimate time requirements
- 12.8 Develop initial project management flow chart
- 12.9 Identify interdependencies within a project management plan
- 12.10 Identify and track critical milestones
- 12.11 Evaluate risks and prepare contingency plan
- 12.12 Participate in project phase review and report project status
- 12.13 Identify project management software
- 12.14 Develop method of evaluation
- 12.15 Formulate a task strategy
- 12.16 Prioritize tasks according to customer needs
- 12.17 Devise plan of action
- 12.18 Identify means of managing change

C-13 Prepare and present documentation

- 13.1 Prepare a technical documentation report that is clear, concise, accurate, complete, appropriate, and grammatically correct
- 13.2 Describe the contents, characteristics and the purpose of network documentation, user documentation, troubleshooting logs, and maintenance logs

C-14 Explain fundamental programming theory

14.6 Analyze a problem identifying desired outputs for given inputs

14.8 Design program logic using graphical techniques (flow charts)

14.9 Design program logic using pseudocode techniques

C-15 Plan programs

15.1 Develop a problem statement

15.2 Define the assumptions that define the scope of the problem

15.3 List strategies used to gather known information

15.4 Apply known information to the problem statement

15.5 Hypothesize expected output

C-16 Develop programs (16.1 - 16.19)

16.1 Develop programs using desired language

16.2 Develop programs that use arithmetic operations

16.3 Develop programs that use relational operators

16.4 Explain and apply the use of logical operators

16.5 Explain and apply compound conditions

16.6 Explain and apply control breaks

16.7 Explain and apply methods of calculating subtotals and final totals

16.8 Explain and apply iterative and conditional loops

16.9 Describe common development environments

16.10 Explain and apply the use of sort routines

16.11 Explain and apply the use of files in programming

16.12 Create sequential files

16.14 Create, update, and delete records

16.15 Explain and apply methods used to incorporate menus

16.16 Develop interactive programs

16.17 Explain and apply the use of an array

16.18 Design and develop structures

16.19 Design and develop classes, subclasses

C-16 Develop programs (16.20 - 16.34)

16.20 Instantiate objects

16.21 Explain and apply methods of incorporating error handling routines

16.22 Define and apply built in functions

16.23 Create user defined functions

16.24 Apply language specific programming techniques

16.25 Test and run a program for desired output

16.26 Explain and apply methods used to debug a program

16.27 Utilize reference materials for problem solving

16.28 Generate executable code

16.29 Provide internal documentation

16.31 Compare and contrast revision control and version control

16.32 Annotate program and design and revision

C-17 Implement and manage software

17.1 Demonstrate ability to work on a software development team

17.3 Explain and demonstrate a program's use/function
17.4 Plan and write end user documentation
17.7 Document installation and configuration procedures
17.8 Explain and demonstrate methods to verify software/program installation and operation

C-18 Test and follow a Quality Assurance Process

18.1 Create a testing plan
18.2 Implement a testing plan
18.3 Demonstrate ability to provide feedback to the development process

EALRs AND GLEs Taught and Assessed in the Standards

Arts

Communications

Health and Fitness

Mathematics

1.C Use deductive reasoning to prove that a valid geometric statement is true.

6.C Apply formulas for surface area and volume of three-dimensional figures to solve problems.

6.D Predict and verify the effect that changing one, two, or three linear dimensions has on perimeter, area, volume, or surface area of two- and there- dimensional figures.

6.F Solve problems involving measurement conversions within and between systems, including those involving derived units, and analyze solutions in terms of reasonableness of solutions and appropriate units.

Geometry 7 Core Processes: Reasoning, problem solving, and communication

7.A Analyze a problem situation and represent it mathematically

7.B Select and apply strategies to solve problems.

7.F Summarize mathematical ideas with precision and efficiency for a given audience and purpose.

1.1.A Select and justify functions and equations to model and solve problems.

1.2.B Recognize the multiple uses of variables, determine all possible values of variables that satisfy prescribed conditions, and evaluate algebraic expressions that involve variables.

1.6.B Make valid inferences and draw conclusions based on data.

1.7.B Find and approximate solutions to exponential equations.

1.7.C Express arithmetic and geometric sequences in both explicit and recursive forms, translate between the two forms, explain how rate of change is represented in each form, and use the forms to find specific terms in the sequence.

1.7.D Solve an equation involving several variables by expressing one variable in terms of the others.

Algebra 1.8 Core Processes: Reasoning, problem solving, and communication

1.8.A Analyze a problem situation and represent it mathematically.

1.8.B Select and apply strategies to solve problems.

1.8.C Evaluate a solution for reasonableness, verify its accuracy, and interpret the solution in the context of the original problem.

1.8.D Generalize a solution strategy for a single problem to a class of related problems, and apply a strategy for a class or related problems to solve specific problems.

1.8.G Synthesize information to draw conclusions, and evaluate the arguments and conclusions of others.

Reading

Science

Social Studies

Writing

Writing 2.2: Writes for different purposes.
Writing 2.3: Writes in a variety of forms/genres.
Writing 2.4: Writes for career applications.
Writing 3.2: Uses appropriate style.
Writing 3.3: Knows and applies writing conventions appropriate for the grade level.

Other Skills

Leadership Skills

Leadership 1.0 Individual Skills
1.1 The student will analyze, refine, and apply decision-making skills through classroom, family, community, and business and industry (work related) experiences.
1.6 The student will conduct self in a professional manner in practical career applications, organizational forums, and decision-making bodies.

Employability Skills

SCANS 1.0 The student identifies, organizes, plans and allocates resources
1.1: Time - Selects goal-relevant activities, ranks them, allocates time, and prepares and follows schedules.
SCANS 3.0 The student acquires and uses information
3.1: Acquires and evaluates information
3.2: Organizes and maintains information
3.3: Interprets and communicates information
3.4: Uses computers to process information
SCANS 4.0 The student understands complex systems and inter-relationships
4.1: Understands Systems - Knows how social, organizational, and technological systems work and operates effectively with them.
SCANS 5.0 The student works with a variety of technologies
5.1: Selects Technology - Chooses procedures, tools or equipment including computers and related technologies.
5.2: Applies Technology to Task - Understands overall intent and proper procedures for setup and operation of equipment.
5.3: Maintains and Troubleshoots Equipment - Prevents, identifies, or solves problems with equipment, including computers and other technologies.

Analytical, Logical, and Creative Thinking Skills

☐ Observe	☑ Cause/Effect	☐ Finding Evidence	☑ Reasoning	☐ Originality
☑ Patterns	☐ Fact/Opinion	☑ Evaluation	☑ Problem Solving	☐ Risking
☑ Sequence	☐ Main Idea	☐ Detect Bias	☐ Goal Setting	☐ Inquisitiveness
☐ Classify	☐ Summary	☑ Inference	☑ Fluency	☐ Attending
☐ Compare/Constrast	☐ Point of View	☑ Conclusion	☐ Elaboration	☐ Persistence
☑ Predict	☑ Analysis	☑ Metacognition	☐ Flexibility	☑ Precision

Relevance to Work

Project Planning Process - preplanning - implementation - evaluation - adjustment to plan
Communication of the programmers logical process applied in code