{MAT 435} Computer Coding: SCOPE & SEQUENCE

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Date** | **Week** | **Units** | **Vocabulary** | **Standards Resources** | |  |  |  |
| September | 1-3 | **Unit 1: Introduction to Programming in JavaScript with Karel the Dog (3 weeks/15 hours)**  1.1 Introduction to Programming With Karel  1.2 More Basic Karel  1.3 Karel Can't Turn Right  1.4 Functions in Karel  1.5 The Start Function  1.6 Top Down Design and Decomposition in Karel  1.7 Commenting Your Code  1.8 Super Karel  1.9 For Loops  1.10 If Statements  1.11 If/Else Statements  1.12 While Loops in Karel  1.13 Control Structures Example  1.14 More Karel Examples and Testing  1.15 How to Indent Your Code  1.16 Programming with Karel Quiz | Commands  Defining vs. Calling Methods  Designing methods  Program entry points  Control flow  Looping  Conditionals  Classes  Commenting code  Preconditions and Postconditions Top Down Design  Function  Call a Function  Curly Bracket  Function body  Decomposition  For Loop  While Loop  Control Structure  Curly Bracket  Parentheses | 2-AP-10 Use flowcharts and/or pseudocode to address complex problems as algorithms. 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. 3A-AP-17 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 3A-AP-18 Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. 3A-AP-23 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. 3A-CS-01 Explain how abstractions hide the underlying implementation details of computing systems embedded in everyday objects. | <https://codehs.com/teacher/resources>  [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15)  [Textbook: Intro to JavaScript Textbook | CodeHS](https://codehs.com/textbook/introjs_textbook/) | |  |  |
|  | 4-5 | **Unit 2: Karel Challenges (2 weeks, 7-10 hours)**  2.1.1 Fetch  2.1.2 Racing Karel  2.1.3 Tower Builder  2.1.4 Super Cleanup Karel  2.1.5 Double Tennis Balls | Break Down (Decompose)  Programming Style  Comment  Decomposition  Fencepost Problem | 3A-AP-17 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 3A-AP-23 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. 3B-AP-14 Construct solutions to problems using student-created components, such as procedures, modules and/or objects. | [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15)  [Textbook: Intro to JavaScript Textbook | CodeHS](https://codehs.com/textbook/introjs_textbook/) | |  |  |
| October | 6 | **Unit 3: JavaScript & Graphics (1 week/5 hours)**  3.1 Hello World  3.2 Variables  3.3 User Input  3.4 Basic Math in JavaScript  3.5 Using Graphics in JavaScript  3.6 Programming with JavaScript Quiz | Variables  User Input  Arithmetic Expressions  Graphics  Println  Boolean  Declare a Variable  Integer  String  Initialize a Variable  Float  readLine  readInt  readFloat  Constant  Increment  Decrement  Coordinate system  getWidth()  getHeight()  Radius | 3A-AP-18 Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. 3A-AP-23 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. 3B-AP-14 Construct solutions to problems using student-created components, such as procedures, modules and/or objects. | [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15)  [Textbook: Intro to JavaScript Textbook | CodeHS](https://codehs.com/textbook/introjs_textbook/) | |  |  |
|  | 7 | **Unit 4: Graphics Challenges (1 week, 5 hours)**  4.1 Collaborative Programming  4.2 Graphics Challenges | All previous vocabulary | 2-AP-11 Create clearly named variables that represent different data types and perform operations on their values. 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse. 2-AP-19 Document programs in order to make them easier to follow, test, and debug. 3A-AP-17 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 3A-AP-23 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. 3B-AP-12 Compare and contrast fundamental data structures and their uses. 3B-AP-16 Demonstrate code reuse by creating programming solutions using libraries and APIs. | [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15)  [Textbook: Intro to JavaScript Textbook | CodeHS](https://codehs.com/textbook/introjs_textbook/) | |  |  |
| November | 8-10 | **Unit 5: JavaScript Control Structures (3 weeks/15 hours)**  5.1 Booleans  5.2 Logical Operators  5.3 Comparison Operators  5.4 If Statements  5.5 For Loops in JavaScript  5.6 General For Loops  5.7 For Loop Practice  5.8 Random Numbers  5.9 While Loops  5.10 Loop and a Half  5.11 JavaScript Control Structures Quiz | Booleans  For Loops  Conditionals  Nested Control Structures  While Loops  Logical operator  Or operator  And operator  Not operator  Negate  If Statement  If Else Statement  Randomize  Pseudorandom | 2-AP-11 Create clearly named variables that represent different data types and perform operations on their values. 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse. 2-AP-19 Document programs in order to make them easier to follow, test, and debug. 3A-AP-17 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 3A-AP-23 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. 3B-AP-12 Compare and contrast fundamental data structures and their uses. 3B-AP-14 Construct solutions to problems using student-created components, such as procedures, modules and/or objects. 3B-AP-16 Demonstrate code reuse by creating programming solutions using libraries and APIs. | [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15)  [Textbook: Intro to JavaScript Textbook | CodeHS](https://codehs.com/textbook/introjs_textbook/) | |  |  |
| November 11th |  | **10 WEEK MARKING PERIOD CLOSES** | **10 WEEK MARKING PERIOD CLOSES** | **10 WEEK MARKING PERIOD CLOSES** | **10 WEEK MARKING PERIOD CLOSES** | |  |  |
| November  **20 week making period** | 1-2 | **Unit 6: Control Structures Challenges (1-2 weeks, 5-8 hours)**  6.1.1 Guessing Game  6.1.2 Circles in Circles  6.1.3 Circles in Squares  6.1.4 Happy Birthday! | All previous vocabulary | 2-AP-11 Create clearly named variables that represent different data types and perform operations on their values. 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse. 2-AP-19 Document programs in order to make them easier to follow, test, and debug. | [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15) | |  |  |
|  |  |  |  |  |  | |  |  |
| Nov. 23-27 | **Thanksgiving Break** | | | |  | |  |  |
| Nov. – Dec. | 3-4 | **Unit 7: Functions and Parameters (2 weeks/10 hours)**  7.1 Functions and Parameters 1  7.2 Functions and Parameters 2  7.3 Functions and Parameters 3  7.4 Functions and Return Values 1  7.5 Functions and Return Values 2  7.6 Local Variables and Scope  7.7 Functions and Parameters Quiz | Functions with and without parameters  Functions with and without return values  Nested Control Structures  Local variables and scope  Argument  Function body  Parameter | 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse. 2-AP-19 Document programs in order to make them easier to follow, test, and debug. 3A-AP-13 Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. 3A-AP-17 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 3A-AP-18 Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. | [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15)  [Teacher Resources | CodeHS](https://codehs.com/teacher/resources) | |  |  |
| December | 5-6 | **Unit 8: Functions Challenges (1-2 weeks/5-8 hours)**  18.1.7 Hailstone Sequence  19.2.1 Balloons  17.1.4 Grades  8.1.4 Ghost Invasion! | All previous vocabulary | 3B-AP-12 Compare and contrast fundamental data structures and their uses. 3B-AP-14 Construct solutions to problems using student-created components, such as procedures, modules and/or objects. 3B-AP-16 Demonstrate code reuse by creating programming solutions using libraries and APIs. 3B-AP-19 Develop programs for multiple computing platforms. 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse. 2-AP-19 Document programs in order to make them easier to follow, test, and debug. | [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15) | |  |  |
|  |  |  |  |  |  | |  |  |
| Dec. 21-Jan 1 | **Christmas Break** | | | |  | |  |  |
| January 2-27 | 7-10 | **Final Project JavaScript (3-4 weeks/15-20 hours)**  Collaborative open-ended final project which encourages creativity  12.1.1 Planning and Design  12.1.3 Write the Code! | All previous vocabulary | 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse. 2-AP-19 Document programs in order to make them easier to follow, test, and debug. 3A-AP-13 Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. 3A-AP-17 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 3A-AP-18 Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. 3A-AP-23 Document design decisions using text, graphics, presentations, and/or demonstrations in the development of complex programs. | [Lesson Plans | Matsulavage Introduction to Computer Science in JavaScript (Golden) 2022 | CodeHS](https://codehs.com/lms/assignments/189659/lesson_plans?ref=15)  [Teacher Resources | CodeHS](https://codehs.com/teacher/resources) | |  |  |
| Jan. 27 |  | **20 WEEK MARKING PERIOD CLOSES** | **20 WEEK MARKING PERIOD CLOSES** | **20 WEEK MARKING PERIOD CLOSES** | **20 WEEK MARKING PERIOD CLOSES** | |  |  |
| Jan.- Feb  30 week marking period | 1-6 | **Unit 1: Welcome to Python**  **Unit 2: Intro to Programming with Turtle Graphics (6 weeks/30 hours)**  1.1 Welcome  2.1 Intro to Python with Tracy the Turtle  2.2 Tracy's Grid World  2.3 Turning Tracy  2.4 For Loops  2.5 Turning Tracy Using Angles  2.6 Comments  2.7 Naming Guidelines  2.8 Functions  2.9 Artistic Effects  2.10 Top Down Design  2.11 Variables  2.12 User Input  2.13 Parameters  2.14 Using i in For Loops  2.15 Extended Loop Control  2.16 If Statements  2.17 If/ Else Statements  2.18 While Loops  2.19 Putting Together Control Structures  2.20 Intro to Programming with Turtle Graphics Quiz | Command  Moving Tracy  Tracy’s Coordinate System  For Loops  Functions and Parameters  Top Down Design  Variables  User Input  If/else Statements  While Loops  left(angle)  right(angle)  speed (number 1-10)  Color("red") | 2-AP-11 Create clearly named variables that represent different data types and perform operations on their values. 3A-AP-13 Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. 3B-AP-15 Analyze a large-scale computational problem and identify generalizable patterns that can be applied to a solution. 3A-AP-16 Design and iteratively develop computational artifacts for practical intent, personal, expression, or to address a societal issue by using events to initiate instructions. 3A-AP-18 Create artifacts by using procedures within a program, combinations or data and procedures, or independent but interrelated programs. | [Lesson Plans | Matsulavage Intro to Computer Science in Python 3 2022 | CodeHS](https://codehs.com/lms/assignments/189660/lesson_plans?ref=15)  [Teacher Resources | CodeHS](https://codehs.com/teacher/resources) | |  |  |
| March | 7-8 | **Unit 3: Basic Python and Console Interaction (2-3 weeks/10-15 hours)**  3.1 Printing in Python  3.2 Variables and Types  3.3 User Input  3.4 Mathematical Operators  3.5 String Operators  3.6 Comments  3.7 Basic Python and Console Interaction Quiz | Printing  Variables  Types  User Input  Converting Input Types  Arithmetic Expressions  String Operators  Comments  Graphics in Python | 2-AP-11 Create clearly names variables that represent different data types and perform operations on their values. 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. 2-AP-13 Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs. 2-AP-14 Create procedures with parameters to organize code and make it easier to reuse. 2-AP-18 Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. 3A-AP-23 Document design decisions using text, graphics, presentation, and/or demonstrations in the development of complex programs. 3B-AP-12 Compare and contrast fundamental data structures and their uses. | [Lesson Plans | Matsulavage Intro to Computer Science in Python 3 2022 | CodeHS](https://codehs.com/lms/assignments/189660/lesson_plans?ref=15)  [Teacher Resources | CodeHS](https://codehs.com/teacher/resources) | |  |  |
| March 24th |  | **30 WEEK MARKING PERIOD CLOSES** | **30 WEEK MARKING PERIOD CLOSES** | **30 WEEK MARKING PERIOD CLOSES** | **30 WEEK MARKING PERIOD CLOSES** | |  |  |
|  |  |  |  |  |  | |  |  |
| March  40 week marking period | 1 | **Unit 4: Conditionals (2 weeks/10 hours)**  4.1 Booleans  4.2 If Statements  4.3 Comparison Operators  4.4 Logical Operators  4.5 Floating Point Numbers and Rounding  4.6 Conditionals Quiz | If Statements  Boolean Values  Logical Operators  Comparison Operators  Floating Point Numbers and “Equality” | 2-AP-18 Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. 3A-AP-23 Document design decisions using text, graphics, presentation, and/or demonstrations in the development of complex programs. | [Lesson Plans | Matsulavage Intro to Computer Science in Python 3 2022 | CodeHS](https://codehs.com/lms/assignments/189660/lesson_plans?ref=15)  [Teacher Resources | CodeHS](https://codehs.com/teacher/resources) | |  |  |
| April 1-16 | **Spring Break** | | | |  | |  |  |
| April 17 | 2 | Unit 4: Conditionals (2 weeks/10 hours)  ‘’ | ‘’ | ‘’ |  | |  |  |
| April -May | 3-4 | **Unit 5: Looping (2 weeks/10 hours)**  5.1 While Loops  5.2 For Loops  5.3 Break and Continue  5.4 Nested Control Structures  5.5 Looping Quiz | While Loops  For Loops  Break and Continue  Nested Control Structures | 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. 2-AP-13 Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs. 2-AP-18 Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. 3A-AP-14 Use lists to simplify solutions, generalizing computational problems instead of repeatedly using simple variables. 3B-AP-12 Compare and contrast fundamental data structures and their uses. | [Lesson Plans | Matsulavage Intro to Computer Science in Python 3 2022 | CodeHS](https://codehs.com/lms/assignments/189660/lesson_plans?ref=15)  [Teacher Resources | CodeHS](https://codehs.com/teacher/resources) | |  |  |
| May | 5-8 | **Unit 6: Functions and Exceptions (3 weeks/15 hours)**  6.1 Functions  6.2 Functions and Parameters  6.3 Namespaces in Functions  6.4 Functions and Return Values  6.5 Exceptions  6.6 Functions & Exceptions Quiz | Functions  Namespaces  Parameters  Return Values  Exceptions | 2-AP-10 Use flowcharts and/or pseudocode to address complex problems as algorithms. 2-AP-12 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. 2-AP-13 Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs. 3A-AP-13 Create prototypes that use algorithms to solve computational problems by leveraging prior student knowledge and personal interests. 3A-AP-14 Use lists to simplify solutions, generalizing computational problems instead of repeatedly using simple variables. 3A-AP-18 Create artifacts by using procedures within a program, combinations or data and procedures, or independent but interrelated programs. 3A-AP-23 Document design decisions using text, graphics, presentation, and/or demonstrations in the development of complex programs. 3B-AP-12 Compare and contrast fundamental data structures and their uses. | [Lesson Plans | Matsulavage Intro to Computer Science in Python 3 2022 | CodeHS](https://codehs.com/lms/assignments/189660/lesson_plans?ref=15)  [Teacher Resources | CodeHS](https://codehs.com/teacher/resources) | |  |  |
| June | 9 | **Final Exam (.5 weeks/2-3 hours)** | Students will be tested on all topics included in the course  Multiple choice, fill-in-the-blank, short answer, and coding questions included | 3A-AP-17 Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. 3A-AP-23 Document design decisions using text, graphics, presentation, and/or demonstrations in the development of complex programs. 3B-AP-12 Compare and contrast fundamental data structures and their uses. 3B-AP-14 Construct solutions to problems using student-centered component, such as procedures, module, and/or objects. 3B-AP-15 Analyze a large-scale computational problem and identify generalizable patterns that can be applied to a solution. | [Final Exam: Lesson Mapping Resource | CodeHS](https://codehs.com/library/resource/9578) | |  |  |
| June 16 marking period closes |  | **40 WEEK MARKING PERIOD CLOSES** | **40 WEEK MARKING PERIOD CLOSES** | **40 WEEK MARKING PERIOD CLOSES** | **40 WEEK MARKING PERIOD CLOSES** | |  |  |