



SCHOLÉ ACADEMY
CLASSICAL ACADEMIC PRESS

An Interactive Introduction to Programming



Yearlong 2019/20

ELIGIBLE STUDENTS:

Grades 5th - 10th: This course is designed for middle school or beginning high school students who have taken a math class beyond arithmetic. No prior programming experience is needed or assumed.

Class Dates: Begin Tuesday, September 3, 2019; running through Thursday, May 20, 2020

Class Times: TTh 9:30am -10:45am (EST)

Instructor: John Dever

E-mail: jdever@scholeacademy.com

SCHEDULE FOR AN INTERACTIVE INTRODUCTION TO PROGRAMMING:

CLASS SESSIONS DATES:

The school year is 32 weeks and the class meets weekly TTh **except for the following days:** November 25-29, December 16 - January 3, February 17-21, April 6-10

**Please note the above dates and times are the anticipated class sessions for this course. However, all dates are subject to change as the instructor's circumstances might dictate (e.g. illness, family emergency). Any classes canceled by the instructor will be made up at an alternate time designated by the instructor.*

AN INTERACTIVE INTRODUCTION TO PROGRAMMING COURSE MAP:

Unit 1: Motion and drawing, commands, and procedures, creating procedures to draw geometric figures

Unit 2: Looks, sound, and animation in Scratch, detecting user input, sensing, creating a Pong game in Scratch

Unit 3: More on procedures and variables, logical and mathematical operations, adding an automated opponent to Pong game

Unit 4: Random numbers in programming, adding randomness to Pong game, dice simulator, random walk simulation, programming a maze solver

Unit 5: Loops and recursion, analog clock program, drawing fractals, projectile motion simulator

Unit 6: Decision and comparison operators, line follower program, triangle classification program, fraction comparison program, binary to decimal program

Unit 7: Strings and lists, sorting and search, plotting and analyzing data, creating a quiz application, creating an interactive tour

OFFICE HOURS: In addition to scheduled class times, teachers will generally designate an optional weekly session as needed. During “Office Hours” students may raise questions, seek assistance, or review class material.

REQUIRED MATERIALS:

- **Textbook:** *Learn to Program with Scratch: A Visual Introduction to Programming with Games, Art, Science, and Math* by Majed Marji
- **Digital writing tablet:** We recommend Wacom Intuos tablets although similar products may be used.



AN INTERACTIVE INTRODUCTION TO PROGRAMMING COURSE DESCRIPTION:

In this class students will learn the basics of programming concepts and techniques using the Scratch interactive programming environment and the Logo programming language. No prior programming experience is needed or assumed.

Scratch is a freely available programming environment that may be accessed online (<http://scratch.mit.edu/>). It allows students to assemble programs by using interactive blocks. By not requiring students to learn the detailed semantics of a particular language, Scratch allows students to dive directly into fundamental programming concepts. Since students will also need practice with typing programs and programming semantics, students will also learn in the second semester some of the semantics and have practice with the Logo language.

In addition to learning basic programming techniques that will serve as a foundation for further study of programming and coding, students will explore geometric concepts by programmed drawing using Scratch and Logo. In both the Scratch and Logo languages users can draw using programmed commands (this is called “turtle graphics”). For example a command “forward 100 left 30” moves the cursor (called the “turtle”) 100 paces forward and then turns it 30 degrees to its left. Students can thus interactively experiment with geometric concepts of length and angle used in plane geometry, such that the sum of the exterior angles of a polygon is always 360 degrees.

In addition to class discussion, students will learn through frequent guided programming assignments. For example students will learn how to draw fractals using recursion and make simple interactive games in Scratch. Exploration is encouraged, and many of the programming assignments will be open ended and meant to elicit creative solutions from the student.

The course is meant to provide an accessible foundation of computer science and programming techniques that may be useful for application and further study in computer science, programming, and STEM subjects. The class is designed for elementary or middle school students who have taken arithmetic or Pre-Algebra, although high school students are also welcome. No prior programming experience is needed or assumed.

STUDENT EXPECTATIONS: EXECUTIVE FUNCTION SKILLS

Students enrolling in Scholé Academy’s mathematics courses will be expected to show development of Executive Function Skills throughout the year. Executive Function Skills speaks to the following set of qualities and skill sets that students may develop and hone to better approach the courses, lectures, readings and teachers they will face in their future academic coursework.

1. An Engaged Student: One who is willing to step into the arena of class discussion, ask questions, supply answers, generate the internal dialogue necessary to determine if what's being discussed is important and necessary to himself.

2. Note Taking: A student who during and after being engaged with the class has been trained to note important and relevant content in an organized fashion. His notes would then be consulted, independently,

for application in assignments and assessments.

3. Attention to Detail & Preparedness: These students are ones who consistently adhere to deadlines, submission requirements, adhering to style guides and codes, confirm technology is working prior to the start of class, be responsible to determine how to proceed after an absence, be responsible for consulting his course syllabus and adjusting as the class proceeds, etc.

4. Employ Critiques: These students are ones who receive feedback to one of their submissions, and then are sure to apply that feedback to future assignments rather than repeating mistakes. Also, such students may modify study practices as needed or make adjustments to the way work is shown or presented on assignments in response to feedback.

5. Initiative/Maturity: This student stays abreast of course content by studying outside of class, keeping up to date with readings of the course texts and notes, and budgeting appropriate amounts of time to complete assignments. This student is able to seek out appropriate sources of assistance, such as contacting the instructor to possibly schedule office hours, if he finds that he continues to struggle with course content or an assignment. This student is able to focus during class and not engage in distractions to himself or others.

STUDENT EXPECTATIONS IN ACTION

In this class, students will be expected listen attentively and participate actively in class discussions and classwork. Students are expected to arrive to class on time and with all assigned material completed. The instructor will facilitate learning for the student, but the responsibility for staying up-to-date with classwork and assignments ultimately falls to the student.

Success in this class requires active learning. Students will learn through frequent programming assignments. Students will have opportunity to work on programming assignments during class time, but there may be times when students need to work on parts of an assignment outside of class or read relevant sections of the book outside of class. On average, students will need to spend about an hour or so a week outside of class working on programming assignments.

STUDENT EVALUATION: GRADING

While completing *An Interactive Introduction to Programming* through Scholé Academy will be “restful,” we also recognize the need to provide grades for students who will be using this course as part of their prepared college transcript. It’s a delicate balance to achieve both restful learning and excellent academic performance. Earning a specific grade should not overshadow achievement goals for mastery of this discipline. I may assign the following overall course grades, depending on your student’s level of achievement: *magna cum laude* (with great praise); *cum laude* (with praise); *satis* (sufficient, satisfactory) and *non satis* (not sufficient).

Ideally, every student working diligently should do praiseworthy work (*cum laude*). Those who excel beyond this expectation will be the *magna cum laude* students. Students who do adequate but not praiseworthy work are designated *satis*. *Non satis* means lacking sufficiency or adequacy.

Inasmuch as you might be fully on board with this grading method in theory, there will undoubtedly be the need to complete a college transcript with either a numeric or traditional letter grade. Traditional percentage grades will be provided and will be readily accessed on the *An Interactive Introduction to Programming* Schoology page. Additionally, the instructor will provide a transcript of that grade to the requesting parent at the end of the academic year.

STUDENT EVALUATION: ASSIGNMENTS, TYPES & WEIGHTS

Dr. Dever will communicate with students regarding assignment feedback and grading through the free online grading system, Schoology. The teacher will provide students with more detailed information on assignments and grading on the *An Interactive Introduction to Programming* Schoology course page.

Numerical grades will be determined from the following percentages:

Classwork: 30%

Programming Assignments: 70%

STUDENT EVALUATION: ACADEMIC DISHONESTY

Students will often work on programming assignments privately at home. Students are on their honor to abide by [Scholé Academy's Learning Philosophy](#) which assumes the personal cultivation of Student-Virtues described in the Student-Parent Handbook.

THE VIRTUAL CLASSROOM:

We will be using the free online “virtual classroom” software provided by Zoom, one of the leading companies that provides such software. The virtual classroom will provide students with interactive audio, text chat and an interactive whiteboard in which texts, diagrams, video and other media can be displayed and analyzed. We will provide students with a link (via email) that will enable students to join the virtual classroom.

Specific information regarding the technology used by Scholé Academy (including required technology) can be found by visiting the [Technology in the Classroom](#) section of the Student Parent Handbook.

Students will submit documents by scanning and uploading them to their personal computer, then attaching those files as .pdfs to an email. They will submit their work to the *An Inractive Introduction to Programming* assignment page (access granted after enrollment is secured).

ABOUT THE INSTRUCTOR:

Dr. John Dever earned a PhD in mathematics from Georgia Institute of Technology in 2018. Before that he earned both bachelor's and master's degrees in mathematics from the University of Mississippi. For the 2018-2019 school year he was a Visiting Assistant Professor at Bowling Green State University in Ohio. He has had over eight years of experience teaching a wide variety of mathematics courses at the college level. He has also taught middle school and high school mathematics for three years as a volunteer teacher and tutor at an Orthodox Christian school. He enjoys cultivating interest and curiosity in mathematics among students. He prioritizes student participation and discussion in class as means of helping students to build confidence and see the interconnections of the mathematical ideas under discussion. He hopes that students will begin to view mathematics as both a creative activity, in which they may be active participants, as well as a means of practical problem solving.