

Introduction to Computer Science (Creative Computing) Syllabus

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Introduction:

Computers are ever-present in our daily lives and continue to bring us innovations and challenges personally and professionally. From the computing power in our cell phones to the personal computer used to access the Internet and do business, from microprocessors that keep our cars running efficiently to the multiprocessors that control and analyze data in hospital instruments, computers are used in practically every industry: communications, medicine, retail, manufacturing, transportation, entertainment and education. It is amazing what computers have been able to accomplish and the future will surely hold many innovations that will continue to improve our lives and the workplace. Gaining an understanding of the concepts of computer science and how these devices can be applied to solve problems is essential to building 21st century skills, productively participating in our society and becoming an effective employee.

Description:

This course is an introduction to programming for students who are comfortable with algebra and are looking for an opportunity to become technology creators. We will complete a number of interesting and challenging projects to demonstrate that programming provides a powerful set of tools for creative expression.

Class will begin with Scratch, a visual block programming environment, to discover the main principles of programming. Then we will transition to App development using App Inventor from MIT, which also allows us to build our own functions to break down complexity in our program. The product design and problem-solving skills you gain in this course will be helpful to you no matter what field you choose to pursue and experience writing programs will make you a more savvy software user. We will also have regular lessons on App Product Development that will have students design the necessary material to create an App to solve a problem of their choosing; they will then go on and build a prototype of the App in Android App Inventor. Industry professional will periodically review student team work and provide constructive feedback to help them succeed. Android App development will require one team member to have an active Google Account and students may contribute to a webpage to share team project learning and demonstrate their prototype app design. Students will be encouraged to submit their final class projects to the Technology Alliance's Youth Apps Challenge later in April (<http://www.technology-alliance.com/stemchallenge/youthapps.html>)

Course Objectives & Standards:

Successful completion of this course and its projects will provide students with a broad understanding of the computing fields. In addition, several objectives have been enhanced adding the App Product Design goals (as designated by an asterisk *).

Skills: Students in this course will be able to:

- think algorithmically, how a computer program processes data
- identify common problems and determine if a possible solution can be made by an App
- discuss App design in various fields
- *work successfully in a team, trying several roles over the development of their App

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- *brainstorm, refine, screen and select computer-based App solutions to problems
- use repeat (loops) and conditional decision controls in your programs
- *perform market and user research to better understand the need of their App, select best candidates and identifying ‘user personas’ to help guide product design.
- *develop project “pitches” to clearly promote the key features and benefits of an App
- break problems down into a series of functions when building programs
- *create App prototypes and solicit feedback on their design to perfect your App
- *regularly perform “Retrospectives” to reflect on your progress and determine how best to make adjustments to your approach, process and design while working on your Apps
- employ variety of variables to track data in programs and as inputs & outputs of functions
- use data structures like arrays and lists
- understand the basics of object oriented and parallel design within programs
- *iterate & incrementally build Apps, testing, debugging, and integrating user feedback along the way
- *develop a business strategy and marketing plan for your app to better insure its success
- assess whether a career in App design and/or a computing field is interesting to you

Core Standards: our class will include application of mathematics standards for every class unit.

Technical readings will be required as well as occur while researching some assignments. In addition to a technical paper assignment, students will document their app design process as a team, demonstrating further writing and communications skills.

Prerequisite

Required: completion in Algebra I and continued success in further math classes. Strongly recommended: good writing skills and curiosity on how computers, programs and digital devices work. No previous programming course or experience needed! Earns CTE/Occupational Education credits through Tech Prep program.

Grading

Over the course of the semester, you will complete several individual and larger programming projects as well as shorter lab exercises. That’s where the learning happens, so these are weighed heavily. Each assignment will be graded according to the criteria listed in its write-up. Paper exams are also an important opportunity for you to demonstrate learning. Points will be distributed between the different categories approximately as follows:

- 35% Daily Class & Team Work: introductory worksheets, lab exercises & focus, attendance, collaboration in your team, respect, leadership and participation in “Warm Up Exercises” and class activities
- 40% Projects: individual and group projects applying the knowledge and skills learned during class work, including material related to your app. Can be affected by lack of attendance.
- 25% Tests and Quizzes: periodic exams that will cover essential content to ensure students are retaining programming and design concepts and can apply all skills. Usually one per quarter. App Project Team project reflections may serve as some summative quizzes this semester.

Exams

There will be pencil and paper quizzes and exams during each unit, approximately quarterly. These will include programming and project design questions as well as short essay questions on topics covered.

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Class Text and Required Supplies

We will not be using a paper textbook in this class. Instead, I will use the course website to link to readings, lecture summaries and presentations. Assignment descriptions will also be posted on the website. It will be your responsibility to make sure you either download materials ahead of time or have access to the Internet when you need them. Copies can also be printed from the classroom. Please be sure to have writing instruments (pens and/or pencils) and a composition book or binder for the class everyday to keep your notes and maintain a journal. If you intend to work on your projects outside of school, you will need a flash drive to transport digital files back and forth. Periodically we will be using many different software tools in the course. All of them are installed on the computers in the lab. Most of the software is free and available for anyone to download and use on most any computer. So you can also work at home or anywhere you have full access to another computer.

Programming Projects

You will have a programming assignment regularly, after mastering a collection of skills. It will be up to you to budget your time – I will give you lots of time to work in class but it will be your responsibility to complete the projects for homework as need be. If you need to work outside of class, instructions for getting your own machine set up are on the course website or I will make the lab available for use after school most days. It is your responsibility to talk to me ahead of time if you need access to the lab.

I expect you to turn in programming projects on time or talk to me for alternative arrangements; late assignments will be penalized unless for excused absences.

App Product Team Projects

Students will be working in together in teams to identify, research, design and implement a smartphone app. This may be documented on our Project site to share with Experts, other students and judges. All will be required to follow the Professional Code of Conduct to insure online safety as well as learn effective team development. Attendance will be important in this teamwork and missed classes, excused or not, may result in missed opportunities to contribute, make decisions and represent your team. Permission to share student images and videos will be requested of parents and guardians to insure respect of student privacy.

Getting Help

You may sometimes get stuck while working on an assignment for this class – please ask for help! Team & Class members may be able to assist you; I will try to make myself available most days after school and you can also usually find me in the room during lunch and 5th period. I encourage you to make an appointment to make sure I'll be there. I will also answer all e-mail within 24 hours.

Feedback

You have a great opportunity to shape the class into something you enjoy by providing lots of suggestions. You can always talk to me before/after class or send me e-mail. If you'd prefer to remain anonymous, I have posted a form on the website.