

# Projects in Computer Science - Syllabus

Garfield High School, Fall 2011 semester

## Instructor Contact Information:

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## Description

This course will allow students who have completed the AP<sup>®</sup> computer science course to expand their programming knowledge and work on significant projects of their choice. Lessons on software development processes, project design & management, and other topics will assist in completing the projects as well as advance their programming skills. Students taking this course will be expected to be self directed and ambitious. Local computer scientists and programmers will be included to mentor students and provide relevant examples of how programming is used in their field and industry. These projects will allow students to experience the satisfaction in creating relevant projects of their own design to demonstrate the value and power of computer science.

## Prerequisite

Requires successful completion of AP CS, instructor approval, self-direction and ambition to program. Earns CTE/Occupational Education credits.

## Course Objectives:

Successful completion of this course will provide students with an understanding of project design and software development process. Students in this course will be able to:

- identify a problem or need and define a project specification to solve it
- follow a development process to efficiently build, test, release and support an application
- research and analyze different programming environments and code libraries to use appropriate ones for a project
- discover, study, use, and implement algorithms and data structures
- plan and manage a programming project schedule to meet its goals and deadlines
- write clear and efficient code that can be used in others' projects
- work on a team to contribute to a larger program consisting of many classes
- design, implement and debug computer-based solutions to problems in diverse application areas

## 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 other resources. In addition, students will be researching programming environments, algorithms, data sources, and other material to complete their projects. Project requirements and the rubrics we will develop to evaluate them will be presented and discussed in class as well as clearly posted on the course website.

Please be sure to have writing instruments (pens and/or pencils) and composition book or binder for class everyday to keep your class notes and notes for your journal. When you work on your projects outside of school, you will need a flash drive or access to an online repository to transport digital files for work outside of class.

We will be using many different software tools and finding new ones. Many are already installed on the computers in the lab and new one's can hopefully be added once identified. Most of the software is free and available for anyone to download and use on their own computers. So you can also work at home or anywhere you have full access to another computer.

### **Corporate Classroom Environment**

In this Career and Technical Education (CTE) course, the classroom culture will be that of a professional workplace, and students will be treated as responsible employees working together to produce quality products – their assignments and projects. Students will be taught standard industry software development processes and project planning. They will be given leadership roles in running their projects, and as the teacher I will act similar to a manager, meeting periodically to assess progress and make suggestions to keep on track. However, the final success of each project will be the responsibility of the student or the team. These are similar to the high expectations and distributed management of a real workplace. Collaboration, innovation, and critical thinking as well as safe technology practices will be stressed to ensure students continue to develop solid 21<sup>st</sup> Century skills. Detailed classroom standards, procedures and rules will be established together, discussed and clearly posted. These leadership, employability, and technology skills will be appraised in this CTE class.

### **Grading:**

This class will focus on self-driven individual and/or group projects following best practices for project planning and software development processes. Points will be distributed between categories in approximately this way:

50% - Project Planning & Software Development Processes

30% - Project Completeness & Client Satisfaction

20% - Exams: quizzes and Final Reflection on building Projects

Final grade will be based on your weighted score following the [Seattle Public School District Grading Policy](#) (PDF).

### **The Projects**

From its name, Projects are the focus of this class, but there is more to building a project than just writing code. You will be learning project planning and software development processes that will make your projects go much smoother and produce more bug-free and supportable applications. This class is designed to allow students to design their own projects and try out new coding environments. The actual number of projects, sizes of teams, deadlines and other details will need to be established as we select the products we choose to create. I will also be encouraging students to find “clients” within the school who need custom applications (i.e. a physics simulation tool or an App for students with special needs) to experience the challenge of working with a real client; if not, we will identify classmates for this role in each project.

#### **Project Planning & Software Development Processes**

As we learn about project design and software development, we will work together to assemble a detailed checklist of all the key items that go into effective project design, planning, development process and best practices. To assess the projects, we will create a rubric for every item on this overall Project Checklist to help guide them to completion. This Syllabus – Projects in Computer Science, Garfield High School, Fall 2011

Project Checklist rubric will be referenced repeatedly to see how it is progressing toward completion and points captured for measuring these checkpoints. And on the due date, the final results of the Project Checklist rubric will be determined. Each individual of a team project will be evaluated by his or her teammates and the project's mentor to provide feedback on their contribution and help me assess collaborative efforts.

### **Project Completeness & Client Satisfaction**

The final project will be compared with the versions of the project specification and user expectations. Your "client" will be asked to provide feedback on the final application and appraise their level of satisfaction. Since I have spent many years testing software in industry, your projects will also get a thorough evaluation of quality by your teacher. Delivering a project on its due date is not an easy task, even for seasoned professionals (ask Boeing about the 777). For the final grading, consideration will be made on the level of complexity and technical challenges encountered for each project when examining the final result. Identify, reporting, and document possible problems during the development process and consider triaging out features during development. There should not be any major functional surprises on the due date if our Project Checklist has been followed well.

### **Exams & Final Reflection**

There will be a few pencil and paper quizzes early in the semester to ensure that the project planning and software development processes are well understood. In addition, there will be a Final Reflection with several essay questions to determine what insights you have gained developing your projects. At several points in the semester, you will be asked to reflect on the project development process, and these will assist you greatly in creating an effective Final Reflection on your growth as a programmer.

### **Providing Help**

I will work with local computer scientists and programmers to provide appropriate mentors specific to the languages and development environments of your projects. I may not be able to find mentors for every technology you desire to use, and you may want to make design decisions on what support can be provided. These mentors will act as coaches to help guide your progress and assist in solving solve technical problems, but they are not another contributing programmer on your team. Their availability may be limited, and you will likely be communicating via email and perhaps phone conversations more than in person – just like many companies who uses team members around the globe.

In addition, as your overall manager/teacher, I will arrange regular meetings to track the progress of the project and discuss recent decisions. As always, if you get stuck and have exhausted your other resources – please ask me for help! I 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.

### **Collaboration**

The Projects in CS course is a cooperative corporation classroom, so you are encouraged to reuse software you created in earlier projects and talk to other class members to see if you can leverage their code – the only consideration is that you are required to clearly give credit to any code developed by other students by gaining their permission, citing the inclusion of their library in your code, and telling me of its use – I want to give them credit for creating reusable code. If you find a public Java library that does much of what you need for your project, propose using it to me and we will assess how it affects your plan and the scope of your project. However, you cannot have another student or person (i.e. parent or guardian)

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outside your team write code for your team without special permission from me – that will be considered cheating and dealt with accordingly.

### **Feedback**

This is a new class, and most of you already have great experience in creating computer projects. I want to give you every opportunity to shape the class into something you love by our discussions during class and your suggestions for the projects. If you have more to ideas or comments, 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.