

# AP Computer Science A

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## Overview

Welcome to AP Computer Science A! This is a fast-paced introduction to computer science using Java. This class treats most of the same topics as the Introductory-level class, but more systematically, with greater rigor, and applied to more difficult programming problems. It is also designed to prepare students for the AP Exam, which dictates much of the content of the class.

Some of the general areas we will cover are as follows:

- Understand (at a high level) the basic hardware and software architecture of a computer.
- Review the basics of Java syntax (variables and assignment, arithmetic operators, conditionals and loops, writing methods, creating classes).
- Learn to use basic data structures (arrays vs. ArrayLists, two-dimensional arrays, HashMaps).
- Learn common searching and sorting algorithms and basic algorithm efficiency analysis.
- Understand the main principles of object-oriented programming: designing and implementing classes that are re-usable, modifiable, and extensible.
- Learning to code fluently in Java in a well-structured fashion, in good style, and with attention to clarity of thinking in code and documentation.
- Developing critical thinking and problem-solving skills
- Using a variety of techniques for finding compiler and run-time errors such as code-traces, print statements, commenting, and use of a debugger.

Topics that are not part of the AP material, but which we may dip into, time permitting, include:

- SWING
- More advanced data structures such as trees and graphs
- Tree and graph search algorithms (both heuristic and non-)
- Other topics of student interest that anyone suggests

## Materials to Bring to Class

**Binder.** Since we will only loosely be following several online texts, it is very important that students keep and bring our in-class handouts to class every day!

**Flash drive.** Students should keep their code on a usb flash drive. 1 gb is (way) more than enough space. I will have flash drives which students can check out for the school year for a \$10 deposit in the first week. If students have a cloud-backup they prefer, that's also ok, but be aware that student accounts don't have administrator privileges on lab computers so students cannot install any additional software.

**(Pen or pencil) and paper.**

## At Home

While many homework assignments can be completed without a computer, it will be of great use for students to have a computer they can program on at home. You can program Java on all major platforms and operating systems, and the software we use is freely available.

## Software

Free Software to Install at Home	Location	Instructions
JDK 7	<a href="http://www.oracle.com/technetwork/java/javase/downloads/index.html">http://www.oracle.com/technetwork/java/javase/downloads/index.html</a>	Mac: Macs come with a JDK pre-installed. So you don't need to do anything! Pc: Download JDK 7 (the left-

		hand link) for your platform and install.
Eclipse	<a href="http://www.eclipse.org/downloads/packages/eclipse-classic-37/indigor">http://www.eclipse.org/downloads/packages/eclipse-classic-37/indigor</a>	Select the appropriate download. There is no "installer". Just unzip the file in your root folder. The application (eclipse.exe) is in the root directory.
Processing	<a href="http://processing.org/download/">http://processing.org/download/</a>	Select the appropriate download. (Do not download the version without Java). As with Eclipse, unzip it in your root folder.
If you need more help installing these programs, please email me. I'm happy to help.		

## Grading

Basic knowledge of the java language (quizzes)	35%
Midterm + Final	10% each
Support work (hw/classwork)	10%
Programming ability (projects)	35%
Final project	10%

Quizzes will be drawn from homework and classwork problems with minor variations. The goal is to test if you have basic skills and knowledge of Java constructions.

The midterm and final exam will both be practice AP Tests. The Midterm practice AP Test will only include material we have covered up to that point.

Support work includes the homework and classwork you complete to make sure you will do well on quizzes, tests, and projects. You will be graded mostly on effort unless there are gross mistakes, but you are allowed to correct those.

Programming ability is the extent to which you are able to use your knowledge of java to solve problems and create effective, well-written programs. This will be assessed using a rubric that includes both correctness and coding style - the assessment criteria for each project can be found on the assignment page when the project is first given. I will allow everyone to select several pieces of code they think show off their abilities particularly well, but I will also make random (or not-so-random) selections from among your work as well to get a balanced view of your abilities.

You are always welcome to re-write and re-submit your code with the caveat that you can only re-submit one item per week.

Your final project is a project of your own interest and will be 10% of your grade. It will be evaluated similarly to your other projects.

### How to improve your grade

I am very happy to give you opportunities to raise your grade. This may not be easy. In the end, your grade should reflect your mastery of programming. Going from a B to an A means that you have attained a higher level of mastery. Doing a lot of extra assignments that are either too easy, or only show a B-level of mastery is not sufficient for getting an A. Let me say it again: you cannot raise your grade simply by doing more assignments. To get an A, you need to work hard enough, and do enough programming that you become a better programmer, and create work which demonstrates this.

## Lab Policies

No food or beverages except bottled water.

Do not plug or unplug anything without asking me first. Even if you are trying to fix something, ASK ME FIRST.

Do not alter anything about the software on the computer. This includes things like the desktop.

You must be programming while on the computers. It's ok to use the web to reference documentation, but other non-

programming activities will result in you having to complete programming assignments without the computer, and an escalating series of consequences. The good news is that programming is fun, so this shouldn't be a problem.

## A Note About Collaborating

I encourage you to collaborate with each other. This is, in fact, different from copying. Because copying can result in very serious consequences, if in doubt, just ask me if you have a question about whether it's "ok" to do something and I'll let you know. Here is a rough guide to help.

Collaborating -- encouraged!	Copying -- very serious
Talking about ideas. Sketching out code on paper or the whiteboard.  Letting someone point out some fixes to the code on your computer and YOU type the actual changes.	Copy-and-pasting other people's code, even if you intend to modify it. (note: I may sometimes instruct you to use someone else's code for a specific purpose; if I've said to, then it's ok).  Letting someone else type something at your keyboard.

## Readings

We will loosely draw from three different online resources:

- An excellent free introductory online textbook called *Think Java* which can be found at <http://greenteapress.com/thinkajava/>
- A more thorough textbook called *Introduction to Java Programming, Sixth Edition* found at: <http://math.hws.edu/javanotes/>
- Princeton's introductory cs website: <http://introcs.cs.princeton.edu/java/home/>
- If you wish to have a physical book to reference on your own, I recommend *Java: How to Program* by Deitel & Deitel as a comprehensive and clear guide. We will not, however, be referring to this book in class.

## Resources & Other Things

An excellent website to search if you have a programming question is StackOverflow: [stackoverflow.com](http://stackoverflow.com)

We will be using the *Processing* environment a lot in this course. It's a Java framework to facilitate the rapid development of simple graphical interfaces and data visualizations. Their site is very well organized with lots of examples and tutorials. It can be found at: [processing.org](http://processing.org)

## Information About The AP Test

**The AP Test is Tuesday May 6, 2013 at 8:00am**

You can read information about it at the College Board page for the Computer Science A exam:

[http://www.collegeboard.com/student/testing/ap/sub\\_compscia.html?compscia](http://www.collegeboard.com/student/testing/ap/sub_compscia.html?compscia)

We will be taking a number of practice exams, but I recommend that students purchase a test prep book at the beginning of the year. I particularly recommend both Barron's prep book, as well as:

*Be Prepared for the AP Computer Science Exam in Java 3rd ed.* by Maria Litvin.