# Advanced Programming Topics - Syllabus

NCHS - Stride

2023 - 24

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**Course Description**

Advanced Programming Topics is a year-long course covering Data Structures, Algorithms, Interfaces, Graphics, Event Driven Programming and Project Management. Students who enroll for a single semester will have a valuable experience. However, students who enroll for the entire year, across both semesters, will be more prepared and have the best experience. The class will be project based with an emphasis on independent study, exploration, and collaboration.

**Optional Reading**

Reges, Stuart, and Marty Stepp: 2016, *Building Java Programs: A Back to Basics Approach (4th Edition)*, Addison Wesley, Boston.

**Schoology**: Schoology has links to all resources and assignments.

## Units and Projects

| Unit | # Weeks | Topics | Projects |
|---|---|---|---|
| *First Semester* | | | |
| 1 - Review | 3 | Review of all of AP topics, JavaDoc, abstract, PrintStream | Review<br>Console-based Tic Tac Toe |
| 2 - SwingUI | 3 | OOP, interfaces, methods as parameters, method pointers, UI Thread, event driven programming, event handling, lambda expressions, switch-statement | Fractions<br>Calculator |
| 3 - Drawing | 3 | drawing, animation, multi-threading, volatile, menus, mouse listener, anonymous inner class | Animation |
| 4 - Shunting Yard | 4 | queue, stack, prefix notation, postfix notation, JUnit Testing, shunting yard algorithm, separation of concerns | Stack Game<br>Shunting Yard<br>Better Calculator |
| 5 - Collections | 2 | Sets, Maps, HashMaps, boxing, Zipf's Law, sorting maps, Comparable<>, | Zipf's Law<br>Sorting Maps |

| | | | |
|---|---|---|---|
| | | Comparator<>, Big-O, **Files**, Streams | |
| 6 - Trees | 2 | Trees, Binary Tree, recursion, traversing trees | Graphical Tic Tac Toe (trees only) |
| *Second Semester* | | | |
| 7 - Integration | 5 | Tic Tac TWO, Artificial Intelligence | Graphical Tic Tac Toe (play AI) |
| 8 - Projects | 13 | Project Management, Independent Study, Design Documents | Your Project(s) |

**Software for Class: Eclipse for Java Developers**

This course depends on you having regular access to a computer to write and test your code. Programming is often developed in an integrated development environment (IDE). The IDE for this course is both **Replit** and **Eclipse**.

1. Before installing Eclipse, make sure your version of Java on your personal computer is up to date with Java Developer Kit 17 (JDK17) or greater. When installing be sure you select the correct operating system, (MacOS vs Windows). http://www.oracle.com/technetwork/java/javase/downloads/index.html
2. To install the Eclipse framework, you will need two things: the Java JDK and the Eclipse IDE for Java Developers. Use these links to download and install the requisite software: http://www.eclipse.org/downloads/. Installation is fairly automatic. If you have problems, please contact Mr. Stride and he'll help you get things up and running. Our computers at school will already have Eclipse and Java installed.

**Conduct**

While the rewards of this course are very high, so are its demands. Since one of our primary objectives is to create a substantial, group project in the second semester, it is imperative that you approach the course with maturity, self-driven diligence and your utmost effort. Nearly all projects are done in small groups where every member is expected to contribute code. There is a need for high integrity, teamwork, time management and accountability.

Our other classroom policies include:

1. No cell phones or other electronic devices.
2. Use of school computers in our class will be limited to our course work.

**Demos**

You will demonstrate progress on nearly every project to the class. Nearly all demos are intended to be short, LOW STRESS and require ZERO preparation. They may seem stressful at the start, but you'll get used to them. You may volunteer for a more in-depth demo to improve/fulfill your Professionalism grade (as needed).

The second semester final project will require lots of preparation and will be longer.

**Notebooks**

You want to learn, you need to take notes. Notes in your notebook will be required to qualify for any quiz retake. You can use your paper notebook during quizzes; no online notes.

**Late Policy**

While there will be lots of time to do the assignments in class, some students will require more time. Students who cannot complete their projects in class must complete their work at home. This is easiest when coding in Replit which keeps the code in the cloud, but Replit isn't always the best option. Mr. Stride will help students roam their files upon request.

The late policy will follow district guidelines (1 day late incurs no penalty). No projects will be accepted after the "Final Cutoff Date".
Students are highly encouraged to complete projects and turn them in, even if late.
Late projects turned in before the Final Cutoff Date will incur a penalty depending on the specific project and student circumstances.

**Professionalism**

This course requires you to be self-motivated and driven to do investigations, some of which are not directed by the instructor because you may pick and choose technology that appeals to you. You will be expected to work in groups, annotate your contributions, and to document your plans. You will be expected to actively participate in activities with others, both in the classroom and online, and to deliver upon your expectations punctually. You will be expected to give presentations about your work and your group's work. And, you are expected to do all the above with high integrity.

Professionalism is positive behavior and putting forth your best effort by being actively involved and engaged. Professionalism is a combination of conduct in the classroom and presentations. Classroom professionalism includes things such as leadership, helping others, integrity, proactivity, and persevering with independent study. You will be expected to present your work and some things you've learned in the classroom in a professional manner.

Professionalism is worth 20% of your grade. For full credit you must accomplish:

- Present demos to the class on-time (as scheduled or when asked)
- One of either
  - AP CS A After School Session -OR-
  - A longer in-depth classroom presentation
- Quality notebook of classroom/study notes
- No inappropriate phone use in class
- Appropriate use of classroom time (CS work only)

- Projects turned in on-time

**Quizzes/Exam**

There will be quizzes for every unit, mostly multiple choice, but some free response. There is no Exam for the first semester. The second semester will include an Exam. Most quizzes and the exam are open notebook. Students may retake the quizzes without their notebook and retake scores are capped at a maximum of 85% (rounding down).

**Course Grading**

| | |
|---|---|
| Projects/Homework: | 50% |
| Quizzes/Exams: | 30% |
| Professionalism: | 20% |

**Grading Scale**

The North Creek High School grading scale is listed below. Grades are rounded to the nearest whole number.

| | |
|---|---|
| A: 93 – 100% | C+: 77 – 79% |
| A-: 90 – 92% | C: 73 – 76% |
| B+: 87 – 89% | C-: 70 – 72% |
| B: 83 - 86% | D: 60 – 69% |
| B-: 80 – 82% | F: 50 – 59% |

**Homework**

There will be continuous projects that will require you to design, implement, and test. Each and every project will require you to contribute code. When working in a group, you are expected to contribute at an individual level, to work both collaboratively and independently, and to own up to the quality and completion of your group project.

All semester one projects will be prescribed and fixed. There will be a second semester “Capstone Programming Project.” There will be some projects that students can pick from. If approved by the instructor, students can choose their own design and functionality.