

COURSE OVERVIEW

Course Title: LEVEL 4: JAVA NINJA

Course Number:

Number of Units: 2.5 units

Total Hours of Instruction: 25

Course Description

During this course, students study the higher-level aspects of object oriented programming, and they gain mastery over the remaining features of the Java language. Upon completion of this level, students have a solid understanding of Java and are internship-ready. They have complete knowledge of the fundamental features of programming and have practiced that knowledge enough to work fluidly with code. At this point they are able to code at the level of a professional junior developer. At the League, we call them "Java Ninjas".

Content and Evaluation

The curriculum for this course is a proprietary set of coding challenges that incrementally build knowledge in a way that appeals to kids. We study object oriented programming topics, including inheritance, polymorphism, casting, composition, abstraction and encapsulation using zany diagrams and fun, project-based exercises. We also delve into some hefty array and String processing, using hacking challenges which are particularly popular with the students, as well as an application that encrypts files. Students become proficient with advanced Java topics such as lambdas, streams, exceptions, file i/o and reflection.

We continue to solve problems from previous College Board Advanced Placement Computer Science exams using proprietary templates to make the questions solvable using code, rather than answering them on paper.

The final exam for this course includes material from a mid-term exam for first year students of computer science at Stanford University.

Extra Credit

n/a

Methods of Instruction

- | | | | |
|--------------------------|------------------------------------|--------------------------|--------------------------------|
| X | CLASS DISCUSSION/DISCUSSION BOARDS | X | LECTURES |
| <input type="checkbox"/> | FIELD TRIPS | <input type="checkbox"/> | CASE STUDIES |
| X | GROUP WORK | X | OTHER: PROGRAMMING ASSIGNMENTS |

Out of Class Assignments

Total hours expected to complete assignments: n/a

- | | | | |
|--------------------------|--------------------|--------------------------|---|
| <input type="checkbox"/> | TEXTBOOK EXERCISES | <input type="checkbox"/> | READINGS |
| <input type="checkbox"/> | GROUP WORK | <input type="checkbox"/> | WRITTEN ASSIGNMENT/ESSAY(S) |
| <input type="checkbox"/> | STUDENT PROJECT | X | OTHER: EXPLORATION OF CONCEPTS BY PROGRAMMING AT HOME |

Evaluation/ Grading

- | | | | |
|--------------------------|---|--------------------------|---------------------------------------|
| X | EXAM(S) | <input type="checkbox"/> | CLASS PARTICIPATION/DISCUSSION BOARDS |
| <input type="checkbox"/> | WRITTEN ASSIGNMENT/ESSAY(S) | <input type="checkbox"/> | CLASS PROJECT(S) |
| X | OTHER: TWO PROGRAMMING EXERCISES FROM STANFORD UNIVERSITY | | |

Topical Outline

Each topic in this list is supported by a set of coding challenges that are practiced until the student gains mastery over that skill.

1. Strings & Arrays

- Using `compareTo` to compare and sort Strings alphabetically
- Reading, writing and inserting into a file using Java's File I/O library
- Language algorithms using Strings; anagrams, palindromes
- Visualizing an array with Processing
- Array manipulation: sorting, searching
- While loops
- Pre & post increment
- String manipulation using Java's String and StringBuilder APIs

2. Object Oriented Programming

- Inheritance & Polymorphism
- Encapsulation
- Exceptions
- Java's Reflection API
- Composition
- Interfaces & Abstract Classes
- Casting
- Lambdas & Streams
- Simulated Java job interview