DATA STRUCTURES

COURSE DESCRIPTION

This course follows AP Computer Science A. It covers a more formal and in-depth study of algorithms, data structures, design and abstraction. The topics include Big-O analysis, exceptions, and advanced data structures (such as linked lists, stacks, queues, trees, heaps, sets and maps). It is equivalent to a second semester college course in Computer Science. Students who enroll in this course need to also enroll in AP Computer Science A 1-2.

This course meets the UC/CSU "G" requirement (Math elective).

MAJOR UNITS OF STUDY (Level AB)

This course must be linked with "AP Computer Science A". This course combined with the linked course is informally referred to as "Level AB" and is a year-long (two term) class. The course is taught using the Java programming language.

"Level AB" covers the equivalent of the first two semester courses taken by computer science majors, as follows:

- Unit 1: Intro to Object-Oriented Programming
- Unit 2: Variables, Methods, Decisions (if-else)
- Unit 3: Loops
- Unit 4: Strings, Inheritance, Recursion
- Unit 5: Arrays and ArrayLists
- Unit 6: Case Study
- Unit 7: Sorting and Searching Algorithms
- Unit 8: Linked Lists and Iterators
- Unit 9: Binary Trees
- Unit 10: Stacks, Queues, Maps, Sets, Hash Tables, Priority Queue, HeapSort

STUDENT BACKGROUND (Level AB)

- Pre-requisites: Concurrently enrolled in or completed Calculus or AFA. (Exception: previous programming experience and permission of teacher).
- It is assumed that you have never programmed before. That said, any previous programming experience can be helpful - for example, taking CS Principles prior to this course. (See "possible course sequencing" chart below.)
- It is helpful to be able to think logically (like when you solve math word problems) and pay attention to details.

- Because this course covers more material than the "Level A" course in the same amount of time, it goes at a much faster pace than the "Level A" course.

ADDITIONAL INFORMATION (Level AB)

- You may articulate with Palomar College and receive 8 credits.
- Quarters 2 and 3 receive a weighted AP grade.
- You are given a significant amount of lab time to do programming assignments in class.
- After the AP Exam, students work in groups on a Final Project. Most students choose to create a computer game. Completed games are posted in the Student Gallery at: http://powayusd.sdcoe.k12.ca.us/teachers/tneuhaus
- Some reasons to choose "Level AB" over "Level A":
    - You are planning to major in computer science or other technology-based field in college
    - You are interested in a more in-depth knowledge of computer science
    - You have done some programming before and you know how well you pick up the concepts
    - You tend to grasp new concepts quickly. You like more challenging courses.
    - More advanced courses look better on a transcript.

(continued)

READINESS PROFILE & COURSE EXPECTATIONS

WHY LEARN COMPUTER SCIENCE?

- If you plan to major in computer science, this class gives you a head start
- Computer science is also applicable to many other majors, such as the sciences, math and business
- Even if you don't major in any of these fields, chances are you will be using computers in your future job; and you may be interacting with others who are developing software, so it helps to understand what they're talking about
- A rewarding aspect of programming is that one you have done a program correctly, you get to see it work.

POSSIBLE COMPUTER SCIENCE COURSE SEQUENCING