APCS 2009 – Dr. Pais

OVERVIEW:
Students require computational knowledge in order to be successful in high school, in post-secondary education, and in this high technology world. This course will develop higher level programming skills, emphasize computer-based problem solving techniques, examine the necessity of computer science as it relates to career goals, and illustrate the connection to real-world application e.g. engineering, physical science, biotechnology and bioinformatics.

Learning takes place through many types of activities we engage in during each ninety-minute period we meet. While mastery of formal objectives may be measured through tests, quizzes, and projects, other important skills developed in class are not so easily measured in traditional assessments. Students who attend with the intent to learn will construct knowledge both formally and informally. When the entire group comes to the classroom prepared to learn, an environment conducive to growth is created.

CLASS EXPECTATIONS:
1. Always respect other people, property, and yourself.
2. Follow directions the first time they are given.
3. Be in your assigned seat, prepared and ready to work, when the bell rings.
4. Talk when it is appropriate - do not interrupt someone else who is speaking.
5. Cell phones should be turned off during the school day. Students should not listen to music during class.

GRADES & HOMEWORK:
Grades are determined on total points earned. Points are earned through tests, quizzes, warm-ups, homework checks, homework quizzes, projects, and in-class activities. A final exam is given at the end of each semester worth twenty percent of the semester grade. Homework will also be checked through homework quizzes. Unannounced homework quizzes will be given frequently, so it is very important to keep up with daily homework.

MATERIALS FOR CLASS & WEBSITE:
Course materials and activities will be posted on (linked to) the class website located at http://kinetigram.com/ladue. It is a **requirement of the course that the website be checked often**, since all course information will be posted there.

ATTENDANCE/TARDIES:
The school policy will be followed regarding absences and tardies (see your student planner). Please remember that, according to district policy, absences not cleared within twenty four hours of the absence are unexcused. Unexcused absences will result in a zero for the assignments and activities for that day.

MAKEUP WORK DUE TO ABSENCE:
A one week deadline is given to makeup all missed assignments and tests. Tests may be made up during Academic Lab. If assignments, quizzes, and tests are not completed within one week of an absence, students will receive a zero. If the absence has been an extended absence due to special circumstances, please see me and we'll make appropriate arrangements. Please remember that, according to district policy, you will not be allowed credit for any work due or assigned on the day of an unexcused absence.

COMMUNICATION:
I look forward to an exciting and successful school year! At any time if you have any questions or concerns, please ask me. I am usually available in the math office for help before or after school and during Academic Lab. In addition, the best way to reach me at school is via e-mail jpais@ladue.k12.mo.us.

AP Computer Science A

From the College Board Course Description:

The AP Computer Science courses are introductory courses in computer science. Because the development of computer programs to solve problems is a skill fundamental to the study of computer science, a large part of the course is built around the development of computer programs or parts of programs that correctly solve a given problem. The course also emphasizes the design issues that make programs understandable, adaptable, and, when appropriate, reusable. At the same time, the development of useful computer programs and classes is used as a context for introducing other important concepts in computer science, including the development and analysis of algorithms, the development and use of fundamental data structures, and the study of standard algorithms and typical applications. In addition, an understanding of the basic hardware and software components of computer systems and the responsible use of these systems are integral parts of the course. The topic outline on pages 7–11 summarizes the content typically covered in the two AP Computer Science courses.

Goals

The goals of an AP course in computer science are comparable to those in the introductory sequence of courses for computer science majors offered in college and university computer science departments. It is not expected, however, that all students in an AP Computer Science course will major in computer science at the university level. An AP Computer Science course is intended to serve both as an introductory course for computer science majors and as a course for people who will major in other disciplines that require significant involvement with technology. It is not a substitute for the usual college-preparatory mathematics courses.

The following goals apply to both of the AP Computer Science courses when interpreted within the context of the specific course. Students should be able to:

- design and implement computer-based solutions to problems in a variety of application areas
- use and implement commonly-used algorithms and data structures
- develop and select appropriate algorithms and data structures to solve problems
- code fluently in an object-oriented paradigm using the programming language Java. Students are expected to be familiar with and be able to use standard Java library classes from the AP Java subset

- read and understand a large program consisting of several classes and interacting objects. Students should be able to read and understand a description of the design and development process leading to such a program. (An example of such a program is the *AP Computer Science Case Study.*)
- identify the major hardware and software components of a computer system, their relationship to one another, and the roles of these components within the system
- recognize the ethical and social implications of computer use

Computer Language

The content of the college-level introductory programming course has evolved significantly over the years. Starting as a treatment merely of language features, it eventually incorporated first the notions of procedures and procedural abstraction, then the use of modules and data abstraction. At most institutions, the current introductory programming course takes an object-oriented approach to programming that is based on encapsulating procedures and data and creating programs with interacting objects. The AP Computer Science courses have evolved to incorporate this approach.

Current offerings of the AP Computer Science Exam require the use of Java. Those sections of the exam that require the reading or writing of actual programs will use Java. The exam will not cover all the features of Java; it will be consistent with the AP Java subset. (See Appendix A.) The AP Java subset can be found in the Computer Science section of AP Central (apcentral.collegeboard.com). **Students who study a language other than Java during an AP Computer Science course will need to be prepared to use standard Java, as specified in the AP Java subset, on the AP Computer Science Exams.**

Prerequisites

The necessary prerequisites for entering either of the AP Computer Science courses include knowledge of basic algebra and experience in problem solving. A student in either AP Computer Science course should be comfortable with functions and the concepts found in the uses of functional notation, such as `f(x) = x + 2` and `f(x) = g(h(x))`. It is important that students and their advisers understand that any significant computer science course builds upon a foundation of mathematical reasoning that should be acquired before attempting such a course.

Course Specific Ability Outcomes:

- A basic understanding of hardware, software, and the Internet
- Discussion and understanding of ethical and social issues related to the use of computers
- Understand the main principles of object-oriented software design and programming
- Learn to code fluently in Java in a well-structured fashion and in good style; learn to pay attention to code clarity and documentation
- Learn to use Java library packages and classes within the scope of the AP/A Java subset
- Understand the concept of an algorithm; implement algorithms in Java using conditional and iterative control structures and recursion
- Learn common searching and sorting algorithms: Sequential Search and Binary Search; Selection Sort, Insertion Sort, and Mergesort
- Understand arrays and the `ArrayList` class
- Acquire skills in designing object-oriented software solutions to problems from various application areas
- Learn the GridWorld case study and accompanying exercises and questions provided by the College Board
- Prepare for the A-level AP exam in computer science.

Required Texts and Supplementary Materials:

Litvin, Maria, and Gary Litvin. *Java Methods A&AB: Object-Oriented Programming and Data Structures, AP Edition*, Andover, Mass.: Skylight Publishing, 2006.

Litvin, Maria, and Roger Frank, Judy Hromcik, Gary Litvin, Dave Wittry. *Be Prepared for the AP Computer Science Exam in Java*, *3rd Edition*, Andover, Mass.: Skylight Publishing, 2007.

The College Board's *GridWorld* case study.

Litvin, Maria, and Gary Litvin. *175 Multiple-Choice Questions in Java.* Andover, Mass.: Skylight Publishing, 2003.

Current magazine and Internet articles discussing ethical and social issues related to computer use.

Ancillary materials: *Java Methods Student Disk, Teacher Disk, PowerPoint* slides, *Test Package*, additional resources at `http://www.skylit.com/javamethods` and `http://www.skylit.com/oop`. The College Board's GridWorld Teacher Manual.

Reference Text: Cay Horstmann, *Big Java*, John Wiley & Sons, Inc., 2006. ISBN: 0-471-69703-6