MT. DIABLO UNIFIED SCHOOL DISTRICT
COURSE OF STUDY

COURSE TITLE:	**AP Computer Science A**
COURSE NUMBER:	**006030**
CBEDS NUMBER:	**8132**
DEPARTMENT:	**Mathematics/Career Technical**
LENGTH OF COURSE:	**Year**
CREDITS PER SEMESTER:	**5**
GRADE LEVEL(S):	**10-12**
REQUIRED OR ELECTIVE:	**Elective**

PREREQUISITES: **Concurrent enrollment in or completion of Algebra II**

BOARD OF EDUCATION ADOPTION: (DATE OF ACTION MEETING)

COURSE DESCRIPTION: Students learn Java, an object-oriented programming language. Instruction includes problem-solving and algorithm development, as well as data structures and design. This course is designed to provide the skills needed to develop a foundation for further studies in computer science at the college level.

COURSE PURPOSE: This course is aligned with the AP Computer Science A standards as outlined by the College Board. Upon completion, students will be prepared to take the AP Computer Science A exam. Students will use object-oriented software design to create computer programs in JAVA. The topics covered in this course correlate with the College Board Advanced Placement program. Students will also learn how to create Applets and GUI applications.

The students will be prepared for further studies in computer science at the college level. By the end of the course, students will be able to design and implement simple programs that incorporate a user interface. The students will be able to practice through a minimum of 20 hours is dedicated to hands-on labs.

COURSE OUTLINE:

Unit 1: An introduction to computers and software engineering (2 weeks)

1. An introduction to hardware, software, and the Internet (Week 1; duration 1 week)
2. An introduction to Software Engineering (Week 2; duration 1 week)

Unit 2: Objects algorithms, and syntax (7 weeks)

1. A first look at objects and classes (Weeks 3-5; duration 2.5 weeks)
2. Algorithms (Weeks 5-6; duration 2.5 weeks)
3. Java syntax and style (Week 7; duration 1 week)

Unit 3: Arithmetic, logic, and control statements (6 weeks)

1. Data types, variables, and arithmetic (Weeks 8-9; duration 2 weeks)
2. The if-else statement (Weeks 10-11; duration 2 weeks)
3. Iterative statements (Weeks 12-13; duration 2 weeks)

Unit 4: Classes and class hierarchies (7 weeks)

1. Details of defining classes and using objects (Weeks 14-16; duration 2.5 weeks)
2. Strings (Weeks 16-17; duration 1.5 week)
3. Class hierarchies, abstract classes, and interfaces (Weeks 18-20; duration 3 weeks)

Unit 5: Arrays, the List interface, the ArrayList class, searching and sorting, recursion (9 weeks)

1. One- and Two-dimensional Arrays (Weeks 21-22; duration 2 weeks)
2. ArrayList(Weeks 23-24; duration 2 weeks)
3. Searching and sorting, Introduction to analysis of algorthims. (Weeks 25-26; duration 2 weeks)
4. Recursion revisited. (Week 27; duration 1 week)

Unit 6: Enrichment (optional, duration varies)

1. Streams and files
2. Graphics and GUI

Unit 7: Review (1.5 weeks)

1. Review and practice for the AP exam (Weeks 28; duration 1 week)

Unit 8: After the AP exam (duration varies)

1. Final programming projects that focus on an area of the students' interest. The student should use JAVA from throughout the school year and apply it to an interest.

2. Also Student papers, presentations, and debates on ethical and social issues related to the use of computers, Internet, based on the readings from the current print media and the Internet.

KEY ASSIGNMENTS:

Unit 1: Students will demonstrate knowledge of the parts of a computer and their functions.

Unit 2: Students will write algorithms for their daily lives. Students will then document how well it worked, if there were any problems and why?

Unit 3: Students will use arithmetic and if/else statements to determine a variety of outputs.

Unit 4: Students will use Unified Modeling Language (UML) to show the relationships between several classes.

Unit 5: Students will use an enhanced for loop to traverse an array, finding the total sum of the array, as well as the average of the array. Students will then sort the array and determine if a specific number is located in the array.

Unit 6: Students will create a Graphical User Interface(GUI) that must display at least two of the following: buttons, check boxes, combination boxes, and/or menus; the GUI must allow a user to change aspects of a program without compiling the program.

Unit 7: Students will complete the three College Board approved labs (Elevens Lab, Magpie Chatbot Lab, and Picture Lab).

Unit 8: Students will use Java to create a program that focuses on an interest.

INSTRUCTIONS METHODS and/or STRATEGIES:

This course focuses on the details of writing computer software computer software using the Java programming language. An object-oriented programming perspective is emphasized throughout the course. The course also emphasizes basic ideas of software engineering and the goal of developing high-quality software. We will also consider social and ethical issues around computing through course discussion.

Students will experience new content through a combination of reading assignments, video tutorials, and direct instruction. Students will engage in class discussion, pair programming activities, unplugged activities, and labs. Labs include the CollegeBoard recommended Elevens, Magpie Chatbot, and Picture Labs. Unplugged activities include engaging in role-play exercises to understand how objects communicate with one another and developing pseudo code for and simulating sorting algorithms using Lego.

ASSESSMENTS INCLUDING METHODS and/or TOOLS:

Students will be evaluated with both formative and summative methods. Formative methods include monitoring in class for understanding, exit tickets, homework, classwork, labs and quizzes. Summative assessments include tests, exams, and projects.

INSTRUCTIONAL MATERIALS:

Bergin, Joseph. *Karel J Robot: A Gentle Introduction to the Art of Object-oriented Programming in Java*. Place of Publication Not Identified: Dream Songs, 2008. Print.

Lewis, John, William Loftus, and Cara Cocking. *Java Software Solutions for AP Computer Science*. Boston: Pearson Addison-Wesley, 2011. Print.

For CTE Pathway Distinction:

Sequence of Courses:

Computer Science Pathway

1) **AP Computer Science Principles**
2) **AP Computer Science A**

Committee Members:

1. **Christopher Gray, College Park High School Computer Science Instructor**
2. **John McGill, Northgate High School Computer Science Instructor**
3. **Heather Fontanilla, Administrator, Career Pathways and Linked Learning**
4. **Joseph Alvarez, College Park High School Principal**
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