

EDW 749 Advanced Placement (AP) Java Programming I for Educators

Course Description:

This workshop will cover the beginning components of the Advanced Placement (AP) requirements for Computer Science Exam in Java. This course will provide educators with effective course materials in computer science that will help high-school students to pass the Advanced Placement™ (AP) Computer Science College Board exams in Java. Participants will design and write simple Java programs. Topics include: Using Javac, using the Java Development Kit, Object Oriented programming in Java, Java class methods, Java Objects, Control statements, Arrays, Recursion, Using Abstract Data Types, Implementing Abstract Data Types, Stacks, Linked Lists, Queues, Files, and simple Java applets. Straightforward techniques teach participants how to convert their elementary C++ programs to Java. This course will provide clear, practical explanations to guide teachers through the initial AP Java programming topics. This class is intended primarily for secondary teachers who teach computer programming, the AP Computer Science course or any teacher who wants to learn how to program in Java.

Course Credits: 3 s. h.

Prerequisites:

Some computer programming experience (not necessarily Java) or permission from the Instructor.

Course Objectives:

The objectives of this workshop are consistent with the goals of the MU Professional Education Unit (PEU) Conceptual Framework and specifically address the “Knowledge of Content”, “Application of Theory and Professional Knowledge to the Practice”, and the “Pedagogical Content Knowledge” areas of proficiency.

Students who complete this course will be able to:

- Utilize course materials from this workshop effectively to develop a secondary class for the Advanced Placement™ (AP) Computer Science College Board exams in the Java programming language,
- Design AP Java computer programs that perform various problem-solving algorithms,
- Apply the theory and professional knowledge of Java programming to practice during hands-on laboratories,
- Write and debug AP Java software programs that perform various problem-solving algorithms,
- Develop the programming skills to use the Java Object Oriented programming methodology to produce quality computer-based solutions to real problems,
- Develop problem solving skills by combining technological knowledge and programming,

- Become experienced teachers of the Java programming language.

Evaluation:

- Through hands-on laboratory exercises workshop participants will be evaluated on the design and development of the Java software programs that they write. Daily laboratory exercises will include writing programs using the following Java programming constructs: Java objects, class methods, object inheritance, static and dynamic data structures, control structures, repetition, conditions, methods, one- and two-dimensional arrays, abstract data types, sorting and searching techniques, and recursion.
- Participants will also be required to write a lesson plan for one class in their home school using the Java programming language and the AP Computer Science criteria.
- Participants will also be evaluated on their ability to write and debug AP Java software programs that perform various problem-solving algorithms during the daily hands-on laboratory exercises,
- Participants will also be evaluated on their ability to apply the theory and professional knowledge of Java programming to practice during the daily hands-on laboratory exercises.
- This course will meet for 37.5 hours and will be graded on a Pass/Fail basis.

Course Rationale:

Many teachers are in charge of teaching Advanced Placement (AP) classes in high school. The current AP Computer Science course has recently changed from the C++ programming language to the Java Programming Language. There is a need to teach Java programming to educators within the EDW workshop umbrella, especially as it relates to the AP Computer Science course. This workshop will provide teachers with effective course materials in computer science that will help high-school students to pass the Advanced Placement™ (AP) Computer Science College Board exams in the newly specified Java programming language.

This workshop is specifically designed to respond to the immediate needs of teachers teaching programming classes in high school or middle school. This workshop focuses on a newer emphasis in a highly technology driven educational system, and provides a hand-on, practical, laboratory experience.

Workshop/Course Outline

1. Introduction to AP Java Programming.
 - How Java differs from C and C++
 - Javac, Java commands
 - Java class libraries,
 - JDK (Java Development Kit)
 - jdb (Java Debugger)
 - Using Visual J++ or NetBeans Compilers
 - Java Byte Codes.
 - Java Virtual Machine

- Syntax, Errors, Debugging
- Java Packages
- 2. Object Oriented Programming
 - Basic concepts of Object Oriented Programming
 - Classes and Objects
 - Class Variables
 - Class Methods
 - Inheritance
 - Interfaces
 - Object construction and destruction
 - Object-Oriented Analysis and Design
 - Object-Oriented Programming constructs
- 3. Programming Structures
 - Control Structures
 - If then Else Statements
 - While loops
 - For loops
 - Basic File I/O
 - Exception handling
 - Recursion
 - String Processing
- 4. Data Structures I
 - Arrays
 - Arrays of Objects
 - Simple Searching Techniques
 - Simple Sorting Techniques
- 5. Advanced Data Structures
 - Using Abstract Data Types
 - Implementing Abstract Data Types
 - Implementing Lists,
 - Implementing Stacks
 - Implementing Queues
- 6. Additional Topics
 - Java Utilities
 - JDK tools
 - System properties
 - JAR Files, Java archiver
 - Simple Java Applets

Resources:

Equipment: The Department of Computer Science Windows PC laboratory and facilities are Java-ready, and completely connected to all Internet resources and can be used for this course. In addition, almost any PC lab with Windows XP can be used, as the java JDK software needed to run this workshop is available free off the web.

Suggested Texts:

- Ken Lambert, "AP Computer Science with Java: Fundamentals of Java: Comprehensive, Second Edition", Course Technology Press, 2003.
- Harvey Deitel, "Simply Java Programming: An Application Driven Tutorial Approach", Prentice Hall, NJ, 2004.
- Harvey Deitel, "Java How to Program", Sixth Edition, Prentice Hall, NJ, 2005.
- Harvey Deitel, "The Complete Java Training Course, Fifth Edition, Prentice Hall, NJ, 2004.
- David Flanagan, "Java in a Nutshell", O'Reilly and Associates Publishing, Sebastopol, CA, 2001.
- David Flanagan, "Java Examples in a Nutshell ", O'Reilly and Associates Publishing, Sebastopol, CA, 1997.
- Gary Cornell, Cay Horstmann, "Core Java", SUN Soft Press Publishing, Mountain View, 1996.