El Camino College

COURSE OUTLINE OF RECORD - Official

I. GENERAL COURSE INFORMATION

Subject and Number: **Computer Science 23**
Descriptive Title: **Advanced Java Programming and the Android Operating System**

Course Disciplines: **Computer Science**

Division: **Mathematical Sciences**

Catalog Description: This course is an advanced Java programming language course that will include topics such as Graphical User Interface (GUI) development, multimedia, exception handling, network programming, multithreading, database manipulation, and Java servers and servlets. There will also be discussion about the Android operating system, including understanding the origins as well as how interaction is done with it. Students will complete a major Java programming project based on the topics taught in this course.

Conditions of Enrollment: **Prerequisite**

Computer Science 3
with a minimum grade of C or equivalent skill

Course Length: ☒ **Full Term** □ **Other (Specify number of weeks):**
Hours Lecture: **3.00 hours per week** □ **TBA**
Hours Laboratory: **3.00 hours per week** □ **TBA**
Course Units: **4.00**

Grading Method: **Letter**
Credit Status **Associate Degree Credit**

Transfer CSU: ☒ **Effective Date: Proposed**
Transfer UC: □ **No**

General Education:

El Camino College: **4B – Language and Rationality – Communication and Analytical Thinking**

Term: Other:

CSU GE:

IGETC:

II. OUTCOMES AND OBJECTIVES

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

1. Design, code, compile, test and document programming solutions to problems requiring the development of Java classes (by inheritance, by composition; templates), requiring multimedia, graphics, multithreading, client/server programming, and network programming.
2. When given a code segment involving use of a class, trace the construction and destruction of multithreaded programs, multimedia, and graphics, verify whether memory leaks have occurred, and trace the connections of networks and databases.
3. When given Java code with errors, identify what those errors are and modify the Java code to eliminate those errors.
4. Explain the concept of Java multimedia, graphics, multithreading, client/server programming, and network programming.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at http://www.elcamino.edu/academics/slo/.

B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

1. Develop Graphical User Interfaces to create Java applications using lightweight and platform-independent Java Swing components

   Laboratory reports

2. Build multithreaded Java applications that allow several processes occurring simultaneously to be threaded into a single Java application

   Other (specify)

   Write computer programs and large applications

3. Build Java applications to create databases, database connectivity, and manipulate such databases

   Laboratory reports

4. Write Java programs to handle program and application exceptions to improve robustness and reliability

   Other (specify)

   Objective exams
   Laboratory reports

5. Write web and intranet enabled Java applications running on Java servers and servlets, that serve the clients interacting with the server

   Other (specify)

   Write computer programs and large applications

6. Write Java applications that include multimedia, graphics, and animation software.

   Laboratory reports

7. Use Remote Method Invocation (RMI) to implement three-tier client/server distributed applications

   Other (specify)

   Objective exams
   Laboratory reports

8. Create Java applications using enterprise classes, datagrams, and programming sockets via network protocols such as TCP/IP and UDP to communicate with Local Area Networks (LANs)

   Laboratory reports

9. Explain how the Android Operating System was developed, including how Java relates to it.

   Objective Exams

III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	3	I	Review of Java A. Classes B. Inheritance/Polymorphism
Lecture	9	II	Graphics and Multimedia A. Graphical User Interfaces (GUIs) 1. Swing Interface Development B. Audio 1. Output of Sound Files C. 2D Graphics 1. Drawables 2. Property Animation
Lecture	3	III	Exception Handling A. Overview of exception handling B. Exception handling in Java
Lecture	6	IV	Networking A. Overview of Networking 1. Protocols (TCP/IP, UDP, etc.) 2. Topology B. Network programming in Java
Lecture	6	V	Database Connectivity A. Overview of Databases 1. Structured Query Language Lite (SQLite) 2. Object-Oriented Database (DB) 3. Java Connectivity to DB B. Persistence

			C. Cloud Storage D. Application Security
Lecture	6	VI	Multithreading A. Overview of multithreading B. Multithreaded programming in Java
Lecture	6	VII	Client/Server Programming A. Servlets B. Java Server Pages C. Remote Method Invocation (RMI)
Lecture	3	VIII	Android Operating System A. Overview of Android OS B. Uses of Android OS
Lecture	6	IX	Android Programming in Java A. Overview B. Programming in Android vs. programming in Java C. Developer Tools 1. Android Studio 2. Gradle 3. Emulators D. Understanding the Model-View-Controller (MVC) E. The Software Life Cycle in Android F. Debugging Android programs
Lecture	6	X	Group/Individual Project Presentations
Lab	3	XI	Review of Java A. Classes B. Inheritance/Polymorphism
Lab	9	XII	Graphics and Multimedia A. Graphical User Interfaces (GUIs) 1. Swing Interface Development B. Audio 1. Output of Sound Files C. 2D Graphics 1. Drawables 2. Property Animation
Lab	3	XIII	Exception Handling A. Overview of exception handling B. Exception handling in Java
Lab	6	XIV	Networking A. Overview of Networking 1. Protocols (TCP/IP, UDP, etc.)

			2. Topology B. Network programming in Java
Lab	6	XV	Database Connectivity A. Overview of Databases 1. Structured Query Language Lite (SQLite) 2. Object-Oriented Database (DB) 3. Java Connectivity to DB B. Persistence C. Cloud Storage D. Application Security
Lab	6	XVI	Multithreading A. Overview of multithreading B. Multithreaded programming in Java
Lab	6	XVII	Client/Server Programming A. Servlets B. Java Server Pages C. Remote Method Invocation
Lab	3	XVIII	Android Operating System A. Overview of Android OS B. Uses of Android OS
Lab	6	XIX	Android Programming in Java A. Overview B. Programming in Android vs. programming in Java C. Developer Tools 1. Android Studio 2. Gradle 3. Emulators D. Understanding the Model-View-Controller (MVC) E. The Software Life Cycle in Android F. Debugging Android programs
Lab	6	XX	Demonstration of Group/Individual Project Applications
Total Lecture Hours		54	
Total Laboratory Hours		54	
Total Hours		108	

IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

A. **PRIMARY METHOD OF EVALUATION:**

Problem solving demonstrations (computational or non-computational)

B. **TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:**

Write an activity that presents the user with a graphical interest calculator interface and calculates continuous compound interest for the given deposit, rate and time.

C. **COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:**

1. This assignment has three parts: download a contact file, add data to Phone Contacts using code (not by Contact software), show the people's positions with their names on Google Map(you can only query the Contacts to get the data in this step). The Project should be named "MapOfContacts".

Detail:

a. Fetch the contact file "contact.txt" from the url:
http://www.elcamino.edu/faculty/eambrosio/docs/cs45/contacts.txt
The data will look like

```
Dan dan@columbia.edu 40010787 116257324
John john@gmail.com 23079732 79145508
Daniel daniel@gmail.com 37985339 23716735
Johnny johnny@gmail.com 40774042 -73959961
Makiyo makiyo@gmail.com 36155618 139746094
```

Add first column to Name in the Contacts. Add second column to Email in the Contacts. Add third column to Mobile Number in the Contacts. (the number will be used as latitude in the Map) Add fourth column to Home Number in the Contacts. (the number will be used as longitude in the Map)

b. You have to set up API keys in order to use Google Map API.
You may use the following tutorial to set up your API keys:
http://remwebdevelopment.com/dev/a35/Android-How-To-Set-Up-an-API-Key-for-Google-Maps.

c. Just showing markers on GoogleMap is not enough to show which person in what place, so I recommend you to use AlertDialog to show the name of the person when you tap it.

d. This assignment has no restriction on what features you must use and also no restriction on what user interface you design. However, you must implement those three functions in code and be able to demonstrate that the results are correct.

2. Write a menu driven application with one method that allows the user to input an Integer and prints out all factors of the argument and another method that allows the user to input an Integer and determines if the number is a prime number.

D. **OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:**

Other exams

Quizzes

Homework Problems

Multiple Choice

Completion

Matching Items

True/False

Other (specify):

Computer programs written to specifications.

Design of a computer assignment.

Write, test, and run program that meets assignment specifications.

Free response to program design questions.

V. INSTRUCTIONAL METHODS

Demonstration
Discussion
Guest Speakers
Laboratory
Lecture
Simulation

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.

VI. WORK OUTSIDE OF CLASS

Study
Required reading
Problem solving activities

Estimated Independent Study Hours per Week: 6

VII. TEXTS AND MATERIALS

A. **UP-TO-DATE REPRESENTATIVE TEXTBOOKS**
Y. Daniel Liang. Introduction to Java Programming and Data Structures, Comprehensive Edition. 11th ed. Pearson, 2017.

B. **ALTERNATIVE TEXTBOOKS**

C. **REQUIRED SUPPLEMENTARY READINGS**

D. **OTHER REQUIRED MATERIALS**

VIII. CONDITIONS OF ENROLLMENT

A. Requisites (Course and Non-Course Prerequisites and Corequisites)

Requisites	Category and Justification
Course Prerequisite Computer Science-3	Sequential

B. Requisite Skills

Requisite Skills
Develop algorithms using the Java programming language that involve translation of mathematical and algebraic steps, selection statements, iteration statements, and manipulate primitive data types and objects. CSCI 3 - Identify Java data types. CSCI 3 - Develop programming code using control and iteration statements.
Use Java single and multi-dimensional arrays, List type data structures, and builtin algorithms to design programming solutions requiring the storage and manipulation of large amounts of data (with random access ability during execution) CSCI 3 - Develop programming code using strings and arrays, both single and multidimensional.
Use Java File manipulation and Data formatting Objects to format and store application result. CSCI 3 - Construct and use objects from predefined classes. CSCI 3 - Construct classes to encapsulate data and methods. CSCI 3 - Develop programming code using Input/Output files.
Understand Graphical User Interfaces and Event driven program design. CSCI 3 - Write and use static (class) and instance methods. CSCI 3 - Demonstrate ability to use inheritance and polymorphism in program code. CSCI 3 - Declare and use graphical components for user interfaces; handle basic mouse and keyboard events. CSCI 3 - Create and use applets with threads in world wide web applications.

C. Recommended Preparations (Course and Non-Course)

Recommended Preparation	Category and Justification

D. Recommended Skills

Recommended Skills

E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact

Course created by Greg Scott on 09/07/2015.

BOARD APPROVAL DATE:

LAST BOARD APPROVAL DATE: 04/16/2018

Last Reviewed and/or Revised by Edwin Ambrosio on 09/07/2015

20122