Based on the outline of **Advanced Computer Programming Course Outline** (focused on Java, CS3623), here's a detailed **16-week lab content plan** extracted and structured according to the course's lecture topics and practical requirements.

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# Advanced Java Programming – 16 Week Lab Plan

Each lab aligns with weekly topics and integrates theory with hands-on coding using **Java SE**, covering GUI, JDBC, threading, networking, and more.

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### Week 1: Java Setup and IDE Familiarization

- **Lab Title**: Java Environment Setup
- **Objective**: Set up JDK, configure IDE (NetBeans/IntelliJ), compile and run basic programs.
- **Tasks**:
  - Install JDK and IDE.
  - Write a simple Java program.
  - Compile and run via terminal and IDE.

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### Week 2: Java Basics and Data Types

- **Lab Title**: Java Basics and Console I/O
- **Objective**: Learn variables, data types, operators, and console input/output.
- **Tasks**:
  - Use `Scanner` and `JOptionPane`.
  - Arithmetic operations, string manipulation.

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### Week 3: Object-Oriented Programming (OOP) Review

- **Lab Title**: Classes, Objects, and Inheritance
- **Objective**: Reinforce OOP concepts: inheritance, polymorphism.
- **Tasks**:
  - Define base and derived classes.
  - Demonstrate method overriding.

## Week 4: Abstraction and Interfaces

- **Lab Title**: Abstract Classes & Interfaces
- **Objective**: Use interfaces and abstract classes in real scenarios.
- **Tasks**:
    - Implement multiple interfaces.
    - Show interface vs abstract class difference.

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## Week 5: Exception Handling

- **Lab Title**: Exception Handling
- **Objective**: Work with try-catch, finally, and custom exceptions.
- **Tasks**:
    - Create and throw custom exceptions.
    - Handle runtime and compile-time exceptions.

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## Week 6: File Handling and Serialization

- **Lab Title**: File I/O and Serialization
- **Objective**: Read/write files and serialize objects.
- **Tasks**:
    - Use `FileInputStream`, `FileOutputStream`.
    - Serialize and deserialize an object.

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## Week 7: GUI Programming with Swing - Part I

- **Lab Title**: Swing Components
- **Objective**: Create basic GUI using Swing.
- **Tasks**:
    - Use `JFrame`, `JButton`, `JLabel`, `JTextField`.
    - Simple calculator layout.

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## Week 8: GUI Programming with Swing - Part II

- **Lab Title**: Event Handling in GUI
- **Objective**: Add functionality with event listeners.
- **Tasks**:
    - Handle events using inner and anonymous classes.
    - Build an interactive form.

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## Week 9: GUI Builders and String Handling

- **Lab Title**: Drag-and-Drop GUI + String Functions
- **Objective**: Use GUI builders, apply string operations.
- **Tasks**:
    - Build UI using IDE GUI Designer.
    - Practice Java `String`, `StringBuilder`.

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## Week 10: JDBC - Database Integration I

- **Lab Title**: Database Connection
- **Objective**: Connect Java app to MySQL using JDBC.
- **Tasks**:
    - Establish connection.
    - Perform insert/update operations.

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## Week 11: JDBC - Database Integration II

- **Lab Title**: CRUD Operations with JDBC
- **Objective**: Execute complete CRUD with user interaction.
- **Tasks**:
    - Implement add, delete, update, and view operations.
    - Use PreparedStatement and ResultSet.

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## Week 12: Lambda Expressions

- **Lab Title**: Functional Interfaces and Lambdas
- **Objective**: Use lambda expressions for concise coding.
- **Tasks**:
    - Write lambdas for List sorting, filtering.
    - Implement custom functional interface.

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## Week 13: Threads and Concurrency

- **Lab Title**: Multithreading in Java
- **Objective**: Understand and use threads.
- **Tasks**:
    - Create threads using `Runnable` and `Thread`.
    - Synchronization example.

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## Week 14: Networking in Java

- **Lab Title**: TCP and UDP Sockets
- **Objective**: Build client-server communication.
- **Tasks**:
    - Create TCP chat server and client.
    - Create a UDP message sender and receiver.

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## Week 15: RMI and Application Packaging

- **Lab Title**: Remote Method Invocation and Packaging
- **Objective**: Call remote methods and package apps.
- **Tasks**:
    - Implement basic RMI server-client.
    - Create a `.jar` file and use Javadoc.

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## Week 16: Final Project Lab

- **Lab Title**: Project Implementation
- **Objective**: Design and build final application.
- **Tasks**:
    - Work on GUI + JDBC + Threads/Networking-based mini-project.
    - Prepare for presentation and documentation.