

IT CENTER SCHOOL OF TECHNOLOGY: JAVA PROGRAMMING MODULE

COURSE TITLE: COMPREHENSIVE INTRODUCTION TO JAVA PROGRAMMING

TUTOR:

MR REEKELITSOE NKHABU

The Java Programming Module at IT Center School of Technology provides a thorough foundation in Java for beginners. Covering everything from basic syntax and control structures to advanced topics like object-oriented programming and the Java Standard Library, this course prepares students to develop robust and efficient Java applications. Key learning outcomes include understanding core programming concepts, mastering object-oriented design, and implementing data structures and algorithms.



JAVA PROGRAMMING COURSE OUTLINE

COURSE TITLE: COMPREHENSIVE INTRODUCTION TO JAVA PROGRAMMING

COURSE DURATION: 12 WEEKS

COURSE DESCRIPTION

This course is designed to provide students with a comprehensive introduction to Java programming. It covers fundamental programming concepts, object-oriented programming, GUI development using JFrame, database integration, data structures, algorithms, and advanced Java features. By the end of the course, students will be equipped with the skills to develop robust and efficient Java applications.



COURSE OBJECTIVES

- Understand and apply basic programming concepts using Java.
- Develop proficiency in using control structures and functions.
- Gain a solid foundation in object-oriented programming with Java.
- Learn to create graphical user interfaces (GUIs) using JFrame.
- Integrate Java applications with databases using JDBC.
- Implement data structures and algorithms using Java.
- Develop problem-solving and debugging skills.



PREREQUISITES

- Basic understanding of computer operations.
- No prior programming experience is required.

Internal Assessment (%)	Final Assessment (%)	Weighted Internal (40%)	Weighted Final (60%)	Total (%)	Description	Outcome
100	100	40	60	100	Passed	Pass
80	70	32	42	74	Passed	Pass
70	60	28	36	64	Passed	Pass
60	50	24	30	54	Passed	Pass
50	50	20	30	50	Passed	Pass
40	60	16	36	52	Passed	Pass
30	50	12	30	42	Fail, eligible for Supplement	Supplementary Exam
40	40	16	24	40	Fail, eligible for Supplement	Supplementary Exam
20	40	8	24	32	Fail	Retake
30	30	12	18	30	Fail	Retake
20	20	8	12	20	Fail	Retake
10	10	4	6	10	Fail	Retake
0	0	0	0	0	Fail	Retake



Summary:

Pass: Total \geq 50%

Supplementary Exam: Total between 40% and 49%

Retake: Total $<$ 40%

WEEK 1: INTRODUCTION TO JAVA

TOPICS

Topics

- Course Overview
 - Objectives and structure
- Introduction to Java
 - History and features of Java
 - Setting up the development environment (JDK, IDE)
- Basic Syntax
 - Writing your first Java program
 - Understanding the structure of a Java program
- Variables and Data Types
 - Declaration and initialization
 - Primitive data types
- Input and Output
 - Using Scanner for input
 - Using System.out for output

Assignments

- Install and configure the Java development environment.
- Write a simple Java program to display a message.



ASSIGNMENTS

- Install and configure the Java development environment.
- Write a simple Java program to display a message.



WEEK 2: CONTROL STRUCTURES

TOPICS

- Conditional Statements
- If, If-Else, Nested If, and Switch statements
- Looping Constructs
- For loop
- While loop
- Do-While loop
- Control Flow
- Break and Continue Statements

ASSIGNMENTS

- Write programs using various control structures to solve simple problems.



WEEK 4: ARRAYS AND STRINGS

TOPICS

Arrays

- Declaration and initialization of arrays
- Multidimensional arrays
- Passing arrays to methods

Strings

- String class and its methods
- String manipulation and comparison

ASSIGNMENTS

- Write programs to manipulate arrays and strings.



WEEK 5: OBJECT-ORIENTED PROGRAMMING (OOP) - PART 1

TOPICS

Classes and Objects

- Defining and creating classes and objects
- Fields, methods, and constructors
- Access modifiers: public, private, protected

Encapsulation

- Getters and setters
- Benefits of encapsulation

ASSIGNMENTS

- Implement basic classes with constructors, fields, and methods.



WEEK 6: OBJECT-ORIENTED PROGRAMMING (OOP) - PART 2

TOPICS

Inheritance

- Basics of inheritance
- The super keyword
- Method overriding

Polymorphism

- Dynamic method dispatch
- Abstract classes and methods
- Interfaces

ASSIGNMENTS

- Write programs demonstrating inheritance and polymorphism.



WEEK 7: OBJECT-ORIENTED PROGRAMMING (OOP) - PART 3

TOPICS

Advanced OOP Concepts

- Static members and methods
- Nested and inner classes
- Anonymous classes

Exception Handling

- Try, catch, and finally blocks
- Creating custom exceptions

ASSIGNMENTS

- Implement programs using advanced OOP concepts and exception handling.



WEEK 8: GUI DEVELOPMENT WITH JFRAME

TOPICS

Introduction to Swing

- Overview of Swing components
- Creating a basic JFrame window

Layout Managers

BorderLayout, FlowLayout, GridLayout

Event Handling

ActionListener, MouseListener, KeyListener

Advanced GUI Components

JButtons, JTextFields, JLabels, JTables

ASSIGNMENTS

Create a basic GUI application using JFrame and Swing components.



WEEK 9: COLLECTIONS FRAMEWORK

TOPICS

Introduction to Collections

- List, Set, and Map interfaces
- ArrayList, LinkedList, HashSet, TreeSet, HashMap, TreeMap

Iterators

Using iterators with collections

Common Operations

Adding, removing, and searching elements

ASSIGNMENTS

Write programs using different collections and iterators.



WEEK 10: FILE I/O AND DATABASE INTEGRATION

TOPICS

File Handling

- Reading from and writing to files
- Using FileReader, FileWriter, BufferedReader, and BufferedWriter

Database Integration with JDBC

- Introduction to JDBC
- Connecting to a database
- Executing SQL queries
- Processing query results

ASSIGNMENTS

- Implement file I/O operations in Java programs.
- Create a Java application that connects to a database and performs CRUD operations.



WEEK 11: DATA STRUCTURES AND ALGORITHMS

TOPICS

Basic Data Structures

Arrays, linked lists, stacks, queues

Algorithms

- Sorting algorithms (bubble sort, quicksort, merge sort)
- Searching algorithms (linear search, binary search)

Complexity Analysis

- Time and space complexity
- Big O notation

ASSIGNMENTS

Implement basic data structures and algorithms in Java.



WEEK 12: ADVANCED TOPICS

TOPICS

Lambda Expressions and Stream API

- Introduction to lambda expressions
- Using Stream API for collections

Concurrent Programming

- Threads and Runnable interface
- Synchronization and thread safety

ASSIGNMENTS

Write programs using lambda expressions, Stream API, and concurrency.



FINAL PROJECT AND REVIEW TOPICS

Final Project

- Project guidelines and expectations
- Development, debugging, and testing support

Course Review

- Recap of key concepts and topics
- Q&A session

Final Assessment

- Final exam covering the entire course

ASSIGNMENTS

- Write programs using lambda expressions, Stream API, and concurrency.



ABOUT OUR VISION



The IT Center School of Technology is a premier educational institution dedicated to fostering technical expertise and innovation in the field of information technology. With a strong emphasis on practical learning, our programs are designed to equip students with the skills and knowledge needed to excel in the ever-evolving tech industry. Our experienced instructors, state-of-the-art facilities, and comprehensive curriculum ensure that students receive a high-quality education that prepares them for real-world challenges.



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THANK YOU