**COURSE PLAN GUIDE**

**SECTION I**

| Trimester | II | Class | MCA |
| --- | --- | --- | --- |
| Course Code | MCA272 | Course Title | Programming in Java |
| Hours | 90 | Hours per week | 8 (4+4) |
| Faculty name | Dr. Suresh K | Contact details | [suresh.kalaimani@christuniversity.in](mailto:suresh.kalaimani@christuniversity.in)  Central Block, 8th floor,  Room No - 810  9003310571 / |
| Class policies and guidelines | 1. Please ensure strict compliance with the class policies of the University/Department as outlined in the following link: <https://christuniversity.in/general-regulations>. 2. Students must adhere to the timetable and be present in their designated classrooms on time. 3. Attendance will be taken within the first 5 minutes, and latecomers will not be permitted for attendance. 4. All communications regarding the course will be posted in the Google Classroom/Moodle. 5. Go through the course content / resources shared in Google Drive/Moodle before coming to the class. 6. Prior permission must be sought for the use of Laptop in the classroom only if it is required. 7. All the programs must be uploaded to the GitHub account and the GitHub account must be associated with your official Christ mail ID. | | |
| Course Description | On completion of this course, a student will be familiar with object oriented programming, it’s implementation using Java programming language and developing web applications and enterprise applications using Servlets , JSP and Beans | | |
| Course Objectives | This course will help the learner to gain sound knowledge in object-oriented principles, GUI application design with database, and enterprise application design with Servlets. | | |
| Course Outcomes | CO1: Understanding and applying the principles of object-oriented programming in the construction of robust, maintainable programs.  CO2: Analyse the various societal and environmental problems critically to develop solutions using the features of programming language.  CO3: Develop sustainable and innovative solutions for real-time problems. | | |

| **SECTION II** | | | | | |
| --- | --- | --- | --- | --- | --- |
| **Module / Unit/ Topic number and title** | **Module/ Unit/ Topic details** | **Week (starting and end dates)** | **Hours per week** | **Pedagogy (teaching learning methods used)/ activities and or class trips/ dates for assessment** | **Resource/ Reference details** |
| Unit-I | **Introduction to Object Oriented Programming (OOP)**  Object - Oriented  Programming (OOP)  Principles - The Evolution  of Java - Buzzwords of  Java - Class Fundamentals  **Lab Exercise:**  1. Identify a domain of your choice, list out ten entities in the domain. For each entity, identify minimum 10 attributes and assign the data type for each attribute with proper justification. | Week -1  08/10 to 12/10 | 8 | PPT, Demonstration | Schildt Herbert,  Java : The Complete Reference, Tata McGraw- Hill, 11 th Edition,2019  Cay S Horstmann, Core Java Volume 1 Fundamentals, Prentice Hall, 11th Edition, 2018. |
| Unit-I | Declaring Objects - Introducing Methods - Overloading methods -Constructors-Parameterized Constructors - this Keyword  **Class Features**  Garbage Collection-the finalize() Method- Introducing Access Control - Understanding static  Introducing nested and inner classes - String class - String Buffer Class - Command Line Arguments.  **Lab Exercise:**  2. Implement the concept of class, data members, member functions and access specifiers.  3. Implement the concept of function overloading & Constructor overloading | Week-2  14/10 to 19/10 | 8 | PPT, Demonstration  **CIA**  **Component -I**  **MCQ Test** |
| Unit-II | **Inheritance in Java** Inheritance Basics - Multilevel Hierarchy- Using super - Method overriding - Dynamic Method Dispatch- Abstract keyword- Using final with inheritance - the Object Class.  **Interfaces and Packages**  Inheritance in java with Interfaces- Defining Interfaces - Implementing Interfaces – Extending Interfaces- Creating Packages - CLASSPATH variable - Access protection - Importing Packages - Interfaces in a Package.  **Lab Exercises:**  4. Implement String and String Buffer classes.  5. Implement the concept of inheritance, super, abstract and final keywords.  6. Implement the concept of package and interface. | Week-3  21/10 to 26/10 | 3 | PPT, Demonstration | Schildt Herbert,  Java : The Complete Reference, Tata McGraw- Hill, 11 th Edition,2019  Cay S Horstmann, Core Java Volume 1 Fundamentals, Prentice Hall, 11th Edition, 2018. |
| Unit-II | **Multithreading Java**  Thread Model - Life cycle of a Thread - Java Thread Priorities - Runnable interface and Thread Class- Thread Synchronization – Inter Thread Communication.  **Lab Exercise:**  7. Implement the concept of multithreading. | Week - 4  04/11 to 09/11 | 8 | PPT, Demonstration  **CIA**  **Component -II Practical Test** |
| Unit-III | **Generics**  Generics Concept - General Form of a Generic Class – Bounded Types – Generic Class Hierarchy - Generic Interfaces – Restrictions in Generics.  **Lambda Expression**  Introduction to Lambda expression- Block Lambda Expressions - Generic Functional Interfaces - Passing lambda expressions as arguments - Lambda expressions and exceptions- Lambda expressions and variable capture.  **Lab Exercise**:   1. Implement the concept of Generics 2. Implement the concept of the lambda expression | Week-5  11/11 to 16/11 | 6 | PPT, Demonstration |
| Unit-III | **The Collections Framework**  The Collections Overview - Collection Interface - List Interface -Set Interface - SortedSet Interface - Queue Interface - ArrayList Class - LinkedList Class-HashSet Class-Using an Iterator – The For Each Statement. Working with maps – The map interfaces, the map classes. Comparators- the collection algorithms | Week- 6  18/11 to 23/11 | 4 | PPT, Demonstration | Schildt Herbert,  Java : The Complete Reference, Tata McGraw- Hill, 11 th Edition,2019  Cay S Horstmann, Core Java Volume 1 Fundamentals, Prentice Hall, 11th Edition, 2018.  <https://www.javatpoint.com/java-tutorial>  <https://www.geeksforgeeks.org/java/> |
| Unit-III | **JDBC**  Introduction to JDBC- Connecting to the database-  **Lab Exercise:**  10. Implement the concept of a collection framework | Week-7  25/11 to 30/11 | 8 | PPT, Demonstration  **ESE - Component -I Practical Test** |
| Unit-IV | Basic JDBC Operations – Essential JDBC Classes – JDBC Drivers – JDBC-ODBC Bridge – Connecting to a database with driver manager – JDBC database URL.  **JAVA BEANS**  Java beans - Advantages of Beans – Introspection- Bound and Constrained Properties – Persistence – Customizers - The JavaBeans API.  **Lab Exercise:**   1. Implement the concept of JDBC   12. Implement the concept of java beans | Week-8  02/12 to 07/12 | 8 |  |
| Unit-IV | **JAVA SWING**  Swing Basics - Components and Containers-JLabel and ImageIcons-JTextField Swing Buttons-JTabbedPane-JScroll Pane-JList – Jcombo Box -JTable-Swing Menus.  **Lab Exercise:**  13. Implement the concept of java swing | Week-9  09/12 to 14/12 | 8 | PPT, Demonstration  **ESE - Component -II Theory Written Test** | Schildt Herbert,  Java : The Complete Reference, Tata McGraw- Hill, 11 th Edition,2019  Cay S Horstmann, Core Java Volume 1 Fundamentals, Prentice Hall, 11th Edition, 2018.  The complete reference JSP 2.0, Tata McGraw- Hill, 2nd Edition, Phil Hanna  <https://www.javatpoint.com/java-tutorial>  <https://www.geeksforgeeks.org/java/> |
| Unit-V | **JAVA SERVLETS**  Servlets Basics -Life Cycle of a Servlet -A Simple Servlet - The Servlet API-Servlet Interfaces – Generic Servlet Class- HttpServletRequest Interface HttpServeltResponse  **Lab Exercise:**  14. Implement the concept of java servlets  Guest Lecture Talk from Industry Person | Week-10  16/12 to 21/12 | 8 | PPT, Demonstration |
| Unit-V | **JSP**  The JSP development model – component of jsp page – Page directive – Action – scriptlet – JSP expression, JSP Syntax and semantics, JSP in XML.  **Lab Exercise:**  15. Implement the concept of JSP | Week-11  30/12 to 04/01 | 8 | PPT, Demonstration |
| Unit-V | Summarization | Week-12  06/01 to 11/01 | 8 | PPT, Demonstration  **ESE - Component -III** |  |
| Unit-V | Repeat Examination | Week-13  13/01 to 15/01 | 5 | PPT, Demonstration |

**SECTION III**

**Course Outcomes and Programme Outcome Mapping**

| Course Outcomes | Programme Outcomes (please take up the strength mapping here, map your COs to POs at -, 1, 2, and 3) | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CO1 | 3 | 2 | 2 | 2 | - | - | 1 | 2 |
| CO2 | 2 | 2 | 2 | 1 | - | - | 2 | 2 |
| CO3 | 2 | 2 | 1 | 1 | - | - | 1 | 1 |

A template to map the Course Outcomes against the components of assessment is given below:

| **Weightage** | **Component** | **Marks** | **Description of the CIA component** | **Schedule** |
| --- | --- | --- | --- | --- |
| CIA  150 Marks | Component – I | 20 | MCQ | Week 2 |
| Component – II | 30 | Practical Test | Week 4 |
| Component – III | 40 | Regular Lab exercises evaluations | - |
| Attendance | 10 | Regularity and Punctuality | - |
|  | **Total** | **100** | The total mark will be converted to 75 |  |
| ESE  150 Marks | Component – I | 30 | Practical Test | Week 7 |
| Component – II | 30 | Theory Written Test | Week 9 |
|  | Component – III | 40 | Practical Test | Week 12 |
|  | **Total** | **100** | The total mark will be converted to 75 |  |

| **Course Outcomes** | **Components of assessment (with the breakup of marks)** | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **CIA**  **C – I**  MCQ  (20) | **CIA**  **C– II**  Practical Test  (30) | **CIA**  **C – III**  Regular Lab Exercises  (40) | **ESE**  **C – I**  Practical Test  (30) | **ESE**  **C – II**  Theory Written Test  (40) | **ESE**  **C – III**  Practical Test (30) |
| **CO1:**Understanding and applying the principles of object-oriented programming in the construction of robust, maintainable programs. | 10 | 10 | 10 | 5 | 15 | 10 |
| **CO2:**Analyze the various societal and environmental problems critically to develop solutions using the features of programming language. | 5 | 10 | 15 | 10 | 15 | 10 |
| **CO3:**Develop sustainable and innovative solutions for real-time problems. | 5 | 10 | 15 | 15 | 10 | 10 |
| **Total Marks** | 20 | 30 | 40 | 30 | 40 | 30 |

**SECTION IV**

| **Assessment Description** | **MCQ** |
| --- | --- |
| **Individual Assignment Details (such as CIA I A and B/II/III** | CIA - Component -I MCQ Test |
| **Date of Examination** | Week-2  14/10 to 19/10 |
| **Assignment description:** | Portion: Unit-I  No. of questions: 40 equally weighted questions  Marks: 40 (To be converted to 20 Marks) No Negative marks  Time Duration: 30 Minutes  Mode of Test: Online (Moodle / Google Classroom) |
| **Learning outcomes:** | **LO1:** Understand basic concepts of OOP  **LO2:** Design and create classes, objects to satisfy the given problem. |

| **Evaluation Rubrics** | | |
| --- | --- | --- |
| **Rubrics** | **Score** | **Impression** |
| R1 | 31-40 | Proficient |
| R2 | 21-30 | Good |
| R3 | 11-20 | Satisfactory |
| R4 | 0-10 | Poor |

| **Assessment Description** | **Applying the OOPs concept in real time scenario** |
| --- | --- |
| **Individual Assignment Details (such as CIA I A and B/II/III** | CIA - Component -II Practical Test |
| **Date of Submission** | Week - 4  04/11 to 09/11 |
| **Assignment description:** | Portion: Unit-I, Unit-II  Duration: 90 Minutes  Total Marks: 30 marks  No of questions: One Scenario based question  Mode of Submission: Online (GitHub/Moodle / Google Classroom) |
| **Learning outcomes:** | **LO1:** Apply the important OOPs concepts in Java (Inheritance, Interface) and Packages  **LO2**: Apply the Multithreading concepts in real-time scenario |

| **Evaluation Rubrics** | | |
| --- | --- | --- |
| **Rubrics** | **Components** | **Marks** |
| R1 | Successful completion all the concepts such as inheritance, interface, packages and multithreading | 10M |
| R2 | Partial application of multithreading or Packages | 5M |
| R3 | Partial application of packages and multithreading | 5M |
| R4 | Concepts and program writing part | 7M |
| R5 | Concept Clarity | 3M |

**Mapping the Learning Outcomes with components of the Evaluation Rubrics:**

| **Learning Outcomes of the assignment** | | **Method of assessment** | **Evaluation Rubrics** |
| --- | --- | --- | --- |
| **LO1** | Apply the important OOPs concepts in Java (Inheritance, Interface) and Packages | Review of the programs | R1, R2, R3, R4 & R5 |
| **LO2** | Apply the Multithreading concepts in real-time scenario |

| **Assessment Description** | **Console application, web application and enterprise application development** |
| --- | --- |
| **Individual Assignment Details (such as CIA I A and B/II/III** | CIA - Component -III Regular Lab exercises evaluations |
| **Date of Examination** | Portion: 10 Lab Exercises  Total Marks: 40 marks  Mode of Submission: Online (GitHub/Moodle / Google Classroom) |
| **Assignment description:** | CIA - Component -III Regular Lab exercises evaluation |
| **Learning outcomes:** | **LO1:** Understand concepts of GUI and Event handling concepts.  **LO2:** Design and create DBMS concepts for the given problem. |

| **Evaluation Rubrics** | | |
| --- | --- | --- |
| Each program carries 10 marks and evaluation rubrics for each program would be: | | |
| **Rubrics** | **Evaluation Criteria** | **Marks** |
| R1 | Execution/Implementation | 2 Marks |
| R2 | Concept Clarity | 2 Marks |
| R3 | Formatting & Validation | 2 Marks |
| R4 | Complexity/Self Learning | 2 Marks |
| R5 | Summary/Overall Impression | 2 Marks |

**Mapping the Learning Outcomes with components of the Evaluation Rubrics:**

| **Learning Outcomes of the assignment** | | **Method of assessment** | **Evaluation Rubrics** |
| --- | --- | --- | --- |
| **LO1** | Understand concepts of GUI and Event handling concepts | Logic and implementation of the program | R1, R2, R3 & R4 |
| **LO2** | Design and create DBMS concepts for the given problem. |

| **Assessment Description** | **Application development with OOPs, Generics and Lambda expressions** |
| --- | --- |
| **Individual Assignment Details (such as CIA I A and B/II/III** | ESE - Component -I Practical Test |
| **Date of Submission** | Week- 7  25/11 to 30/11 |
| **Assignment description:** | Portion: Unit-I, Unit-II and Unit-III  Duration: 120 Minutes  Total Marks: 30 marks  No of questions: One Scenario based question based on the 50% of the prescribed regular lab exercises.  Mode of Submission: Online (GitHub/Moodle / Google Classroom) |
| **Learning outcomes:** | **LO1: U**nderstand the concepts to be applied for the given challenge  **LO2**: Design an efficient solution. |

| **Evaluation Rubrics** | | |
| --- | --- | --- |
| **Rubrics** | **Components** | **Marks** |
| R1 | Successful completion all the concepts such as inheritance, interface, packages, multithreading, collections, Lambda expressions | 8M |
| R2 | Partial application of multithreading, collections, lambda expressions | 7M |
| R3 | Partial application of packages, multithreading, collections, lambda expressions | 5M |
| R4 | Concepts and program writing part | 7M |
| R5 | Concept Clarity | 3M |

**Mapping the Learning Outcomes with components of the Evaluation Rubrics:**

| **Learning Outcomes of the assignment** | | **Method of assessment** | **Evaluation Rubrics** |
| --- | --- | --- | --- |
| **LO1** | **U**nderstand the concepts to be applied for the given challenge | Review of the understanding level of OOPs concept understanding, collections and lambda expressions | R1, R2, R3, R4 & R5 |
| **LO2** | Design an efficient solution. |

| **Assessment Description** | **Theory Written Test** |
| --- | --- |
| **Individual Assignment Details (such as CIA I A and B/II/III** | ESE - Component -II Theory Written Test |
| **Date of Examination** | Week-9  09/12 to 14/12 |
| **Assignment description:** | Portion: Unit-I, Unit-II, Unit-III and Unit-IV  No of questions: 5 with internal choices  Each question is for 10 Marks  Total Marks: 50 marks and reduced to 40 Marks  Time Duration: 120 Minutes  Mode of Test: Offline |
| **Learning outcomes:** | **LO1:** Understand all the essential concepts of business applications  **LO2:** Apply database connectivity |

| **Evaluation Rubrics** | | |
| --- | --- | --- |
| **Rubrics** | **Score** | **Impression** |
| R1 | 41-50 | Proficient |
| R2 | 31-40 | Good |
| R3 | 21-30 | Satisfactory |
| R4 | 0-20 | Poor |

| **Assessment Description** | **Evaluate enterprise application and web application** |
| --- | --- |
| **Individual Assignment Details (Component -I/Component-II/Component- III)** | ESE - Component -III Lab Exam |
| **Date of Submission** | Week-12  06/01 to 11/01 |
| **Assignment Description** | **Total Marks:** 30 Marks.  **Question:** One Domain based web application (enterprise application) from any domain with 3/5 pages (HTML5, CSS, Database Connectivity, Form validation, Java Beans, Servlets, JSP)  **Team size:** 3  **Mode of Submission:** Website developed should be posted in GitHub |
| **Learning Outcomes** | **LO1:** Developing enterprise applications with front end technologies  **LO2:** Create web applications with database connectivity |

| **Evaluation Rubrics** | | |
| --- | --- | --- |
| **Rubrics** | **Components** | **Marks** |
| R1 | Innovative ideas | 7 Marks |
| R2 | Usage of Concepts | 10 Marks |
| R3 | Completeness | 5 Marks |
| R4 | Implementation of Database Connectivity | 10 Marks |
| R5 | Concept Clarity | 8 Marks |

**Mapping the Learning Outcomes with components of the Evaluation Rubrics:**

| **Learning Outcomes of the assignment** | | **Method of assessment** | **Evaluation Rubrics** |
| --- | --- | --- | --- |
| **LO1** | Developing enterprise applications with front end technologies | Review of Concept understanding and Connectivity with the database | R1, R2, R3, R4 &R5 |
| **LO2** | Create web applications with database connectivity |