

S.Y.B.Sc.(Computer Science) (Semester – IV)

Syllabus (2022 Pattern)

(Wef. Academic Year 2023-2024)

Semester – III (2019 Pattern)			Semester – IV (2022 Pattern)		
Paper Code	Paper Title	Credits	Paper Code	Paper Title	Credits
CSCO2401	Object Oriented Concepts using Java	3	UCSCO241	Object Oriented Concepts using Java	3
CSCO2402	Software Engineering	3	UCSCO242	Software Engineering Principles and Techniques	3
CSCO2403	Lab Course I: Based On 2401	2	UCSCO243	Lab Course based on UCSCO241	2
CSCO2404	Lab Course II : Based On CSCO2402 with Mini Project	Grade	UCSCO244	Lab Course based on UCSCO242 with Mini Project	2

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Computer Science) (Semester- IV)
(w.e.f from Academic Year 2023-2024)

Subject: Computer Science

Paper Code: UCSCO241

Title of Paper: Object Oriented Concepts using Java

Paper: I

Credit: 3 (4 Lectures/Week)

No. of lectures: 45

Prerequisites:

- ✓ Knowledge of C Programming Language.
- ✓ Knowledge of CPP will be added benefit

Course Objectives:

1. To learn Object Oriented Programming language
2. To Read Input from users by different ways
3. To Define classes with different access modifiers
4. To handle complex problems using object-oriented concepts
5. To handle abnormal termination of a program using exception handling
6. To handle string using String & String Buffer Class
7. To understand file handling using java

Course Outcomes: On completion of the course, student will be able to

CO1: Understand Object Oriented Concepts

CO2: Read input from different ways.

CO3: Define class with different access modifiers and create object.

CO4: Write implement real world problems using Java

CO5: Handle exceptions during programs

CO6: Handle String efficiently

CO7: Handle file with different modes and formats

Unit	Title and Contents	No. of Lectures
1.	An Introduction to Java 1.1 A Short History of Java 1.2 Features or buzzwords of Java 1.3 Comparison of Java and C++ 1.4 Java Environment 1.5 Simple java program 1.6 Java Tools – jdb, javap, javadoc 1.7 Java IDE – Eclipse/NetBeans (Note: Only for Lab Demo.)	6
2.	An Overview of Java 2.1 Types of Comments 2.2 Data Types 2.3 Final Variable 2.4 Declaring 1D, 2D array 2.5 Accepting input using Command line argument 2.6 Accepting input from console (Using Buffered Reader class)	6

3.	Objects and Classes 3.1 Defining Your Own Classes 3.2 Access Specifiers (public, protected, private, default) 3.3 Array of Objects 3.4 Constructor, Overloading Constructors and use of ‘this’ Keyword 3.5 static block, static Fields and methods 3.6 Predefined class – Object class methods (equals (), toString(), hashCode(), get Class()) 3.7 Creating, Accessing and using Packages 3.8 Wrapper Classes 3.10 Garbage Collection (finalize () Method)	09
4.	Inheritance and Interface 4.1 Inheritance Basics (extends Keyword) and Types of Inheritance 4.2 Superclass, Subclass and use of Super Keyword 4.3 Method Overriding and runtime polymorphism 4.4 Use of final keyword related to method and class 4.5 Use of abstract class and abstract methods 4.6 Defining and Implementing Interfaces 4.7 Runtime polymorphism using interface 4.7 Object Cloning	09
5.	Exception Handling 5.1 Dealing Errors 5.2 Exception class, Checked and Unchecked exception 5.3 Catching exception and exception handling 5.4 Creating user defined exception 5.5 Assertions	6
6.	Strings, Streams and Files 6.1 String class and StringBuffer Class 6.2 Formatting string data using format () method 6.2 Using the File class 6.3 Stream classes Byte Stream classes Character Stream Classes 6.4 Creation of files 6.5 Reading/Writing characters and bytes 6.6 Handling primitive data types 6.7 Random Access files	09

References:

- 1) Complete reference Java by Herbert Schildt (5th edition)
- 2) Java 2 programming black books, Steven Horlzner
- 3) Programming with Java , A primer ,Fourth edition , By E. Balagurusamy
- 4) Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

Mapping of this course with Programme Outcomes

Course Outcomes	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	2	3	3
CO2	2	3	3	2	2	2	3
CO3	2	3	3	2	2	2	2
CO4	3	3	3	2	2	2	3
CO5	3	3	3	2	2	2	3
CO6	2	3	3	2	2	2	3
CO7	3	3	3	2	2	2	3

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Computer Science) (Semester- IV)
(w.e.f from Academic Year 2023-2024)

Subject: Computer Science

Paper Code: UCSCO242

Title of Paper: Software Engineering Principles and Techniques

Paper: II

Credit: 3 (3 Lectures/Week)

No. of lectures: 45

Prerequisites:

- Basic knowledge of DBMS, RDBMS and pl/pgSql.
- Knowledge of HTML5, CSS, JAVASCRIPT and BOOTSTRAP.

Course Objectives:

1. To learn system, its elements and system types.
2. To acquire the complete and thorough knowledge of software engineering principles and practices.
3. To understand various process models used in software engineering.
4. To know about the requirement engineering and structured analysis.
5. To develop skills of collecting, analyzing and evaluating end user requirement data.
6. To understand relevant methods and procedures to be used while doing their software project.
7. To build complete software documentation and applications with the help of concepts, principles and techniques learnt from this course.

Course Outcomes:

- CO1:** Identify the type of system and its solution from the real-life problems or case studies.
- CO2:** Implement the complete and thorough knowledge of software engineering principles and practices.
- CO3:** Master over the complete process of Software Development Life Cycle (SDLC).
- CO4:** Explore all the Process Models of software engineering in detail.
- CO5:** Identify and Apply requirement engineering concepts for solving the real-life problems or case studies.
- CO6:** Identify and apply structured analysis and data flow analysis techniques.
- CO7 :** Explore agility concept and XP process model in detail.

Unit	Title and Contents	No. of Lectures
Unit 1	System Concepts 1.1 System Definition 1.2 Characteristics of a System: Organization, Subsystem, Interaction, Interdependence, Integration, Central objective, Standards, Black box.	05

	<p>1.3 Elements of a system: Outputs, Inputs, Processor(s), Control, Feedback, Environment, Boundaries, Interface.</p> <p>1.4 Types of Systems: Physical & Abstract Systems, Open & Closed Systems, Computer-based Systems (MIS : Management Information System & DSS : Decision Support System)</p>	
Unit 2	<p>Software and Software Engineering</p> <p>2.1 The Nature of Software</p> <p>2.1.1 Defining Software</p> <p>2.1.2 Software Application Domains</p> <p>2.1.3 Legacy Software</p> <p>2.2 Software Engineering</p> <p>2.3 Software Engineering Practice</p> <p>2.3.1 The Essence of Practice</p> <p>2.3.2 General Principles</p>	05
Unit 3	<p>System Development Life Cycle (SDLC)</p> <p>3.1 Introduction</p> <p>3.2 Activities of SDLC</p> <p>3.2.1 Preliminary Investigation (Request Clarification, Feasibility Study, Request Approval)</p> <p>3.2.2 Determination of System Requirements</p> <p>3.2.3 Design of System</p> <p>3.2.4 Development of Software</p> <p>3.2.5 System Testing (Unit Testing, Integration testing, System Testing)</p> <p>3.2.6 System Implementation &Evaluation</p> <p>3.2.7 System Maintenance</p>	09
Unit 4	<p>Process Models</p> <p>4.1 A Generic Process Model</p> <p>4.2 Prescriptive Process Models</p> <p>4.2.1 The Waterfall Model</p> <p>4.2.2 Incremental Process Models</p> <p>4.2.3 Evolutionary Process Models</p> <p>4.2.3.1 Prototyping</p> <p>4.2.3.2 Spiral Model</p> <p>4.2.4 Concurrent Models</p>	09
Unit 5	<p>Requirements Engineering</p> <p>5.1 Introduction</p> <p>5.2 Requirements Engineering Tasks</p> <p>5.2.1 Inception</p> <p>5.2.2 Elicitation</p> <p>5.2.3 Elaboration</p>	

	<p>5.2.4 Negotiation</p> <p>5.2.5 Specification</p> <p>5.2.6 Validation</p> <p>5.2.7 Requirements Management</p> <p>5.3 Initiating the Requirements Engineering Process</p> <p>5.3.1 Identifying the Stakeholders</p> <p>5.3.2 Recognizing Multiple Viewpoints</p> <p>5.3.3 Working toward Collaboration</p> <p>5.4 Fact Finding Techniques(R3 : Chapter 3)</p> <p>5.4.1 Interview</p> <p>5.4.2 Questionnaire</p> <p>5.4.3 Record Review</p> <p>5.4.4 Observation</p>	08
Unit 6	<p>Structured Analysis and Agility</p> <p>6.1 Structured Analysis</p> <p>6.2 Physical Data Flow Diagram</p> <p>6.2.1 Notations</p> <p>6.2.2 Drawing a Context Diagram</p> <p>6.2.3 Exploding a Context diagram into Greater detail (1st level, 2nd Level DFD etc.)</p> <p>6.3 A Data Dictionary</p> <p>6.3.1 Concepts of Data Dictionary</p> <p>6.3.2 Importance of Dictionary</p> <p>6.3.3 Function of Data Dictionary</p> <p>6.4.4 Creation of Data Dictionary</p> <p>6.4 Introduction to Agile Process</p>	09

Reference Books:

1. Elias M. Awad. *System Analysis and Design (Second Edition)*. Galgotia Publications Pvt. Ltd.
2. Roger Pressman. *Software Engineering: A Practitioner's Approach (Seventh Edition)*. McGraw Hill International Edition.
3. James A. Senn. *Analysis and Design of Information Systems (Second Edition)*. McGraw Hill International Editions.

Mapping of this course with Programme Outcomes

Course Outcomes	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	1	1	3	3
CO2	3	3	3				3
CO3	3	3	3			3	3
CO4	1	1	1				3
CO5	2	2				3	3
CO6	2	2	3			3	3
CO7	1	3	2				3

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Computer Science) (Semester- IV)
(w.e.f from Academic Year 2023-2024)

Subject: Computer Science

Paper Code: UCSCO243

Title of Paper: Lab Course based on UCSCO241

Paper: III (Practical)

Credit: 2 (3 Hour Practical/Week/batch)

No. of Practical: 12

Prerequisites:

- ✓ Knowledge of C Programming Language.
- ✓ Knowledge of CPP will be added benefit

Objective:

8. To learn Object Oriented Programming language
9. To Read Input from users by different ways
10. To Define classes with different access modifiers
11. To handle complex problems using object-oriented concepts
12. To handle abnormal termination of a program using exception handling
13. To handle string using String & String Buffer Class
14. To understand file handling using java

Learning Outcomes: On completion of the course, student will be able to

- Understand Object Oriented Concepts
- Read input from different ways.
- Define class with different access modifiers and create object.
- Write implement real world problems using Java
- Handle exceptions during programs
- Handle String efficiently
- Handle file with different modes and formats

Sr. No	Assignment Name	No Of Hours
1	Java Tools	3
2	Array of Objects	3
3	Packages	3
4	Single Inheritance	3
5	Multilevel Inheritance	3
6	Interfaces	3
7	Exception Handling and Assertions	3
8	Input Output	3
9	File Handling	3
10	File Handling	3

References:

- 1) Complete reference Java by Herbert Schildt (5th edition)
- 2) Java 2 programming black books, Steven Horlzner
- 3) Programming with Java , A primer ,Forth edition , By E. Balagurusamy

4) Core Java Volume-I-Fundamentals, Eighth Edition, Cay S. Horstmann, Gary Cornell, Prentice Hall, Sun Microsystems Press

Mapping of this course with Programme Outcomes

Course Outcomes	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	2	2	2	2	1
CO2	2	2	2	2	2	2	3
CO3	2	3	3	2	2	2	2
CO4	3	2	2	2	2	2	3
CO5	3	2	3	2	2	2	1
CO6	2	2	3	2	2	2	1
CO7	3	3	3	2	2	2	3

SYLLABUS (CBCS) FOR S. Y. B. Sc. (Computer Science) (Semester- IV)

(w.e.f from Academic Year 2023-2024)

Subject: Computer Science

Paper Code: UCSCO244

Title of Paper: Practical on Software engineering with Mini project **Paper:** IV (Practical)

Credit: 2 (3 Hour Practical/Week/batch)

No. of Practical: 12

Prerequisites:

- Basic knowledge of DBMS & RDBMS.
- Knowledge of HTML5, CSS, JavaScript and Bootstrap.

Course Objectives:

1. To understand Problem Definition and Scope.
2. To learn how to do Feasibility Study.
3. To identify various Data Requirements and Functional Requirements of particular problem.
4. To design different kinds of Front-end screens as per the customers requirement.
5. To implement normalization techniques to database.
6. To implement validation techniques.
7. To practically implement overall process of Software Development Life Cycle.

Course Outcome:

CO1. Identify problem definition and problem scope of real-life case studies.

CO2. Master over the various feasibility studies like technical feasibility, economical feasibility and operational feasibility.

CO3. Collect and Analyse data requirements and functional requirements.

CO4. Implementation of database normalization.

CO5. Implementation of various validation techniques with the help of JavaScript and Bootstrap.

CO6. Master over the front-end screen designing with the help of HTML5, CSS, JavaScript and Bootstrap technology.

CO7. Build various real-life websites using HTML5, CSS, JavaScript and Bootstrap technology.

Sr. No.	Assignment Name	No Of Hours
1.	Surfing of Internet for various websites related to student: Problem Identification, Problem definition, Problem Scope, Statement of Problem, Feasibility Study	3
2.	Gathering Data Requirements and Functional Requirements, ER Diagrams, Designing the Normalization of Database	3
3.	Implementation of various Input Types - Different kinds of Login Screen Designing by using HTML5, CSS and Bootstrap	3
4.	Implementation of various kinds of Navigation Menu's - Different kinds of User Side Screen Designing by using HTML5, CSS and Bootstrap	3

5.	Implementation of radio buttons and checkboxes - Different kinds of User Side Screen Designing by using HTML5, CSS and Bootstrap	3
6.	Master Entry Form web page - Different kinds of Admin Side Screen Designing by using HTML5, CSS and Bootstrap	3
7.	Transaction Entry Form web page - Different kinds of Admin Side Screen Designing by using HTML5, CSS and Bootstrap	3
8.	Implementation of File Upload, Date Picker, Audio, Video and YouTube videos in webpage wherever necessary	3
9.	Implementation of Carousel, Dropdown, List and Table in webpage wherever necessary	3
10.	Validation of all Designed screens by using HTML5, CSS, Bootstrap and JavaScript	3
11.	Responsiveness of webpages on various devices and Enhancement (Various effects from CSS and Bootstrap) of Designed screens by using CSS and Bootstrap	3
12.	Final demonstration and Report writing	3

Note: Industrial study visits to enhance student's soft skills and entrepreneurship development skills.

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CO3	3	3	3			3	3
CO4	3	3	3			3	3
CO5	3	3	3				3
CO6	3	3	3				3
CO7	3	3	3				3

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related