



**Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore**  
**Shri Vaishnav Institute of Information Technology**  
 Choice Based Credit System (CBCS) in the light of NEP-2020  
 Diploma CSE/AI/DS/Cyber Security  
 SEMESTER-IV (2026-2029)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS	
			Marks	THEORY			PRACTICAL						
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*					
DTCS401	DCC	Database Management Systems	Max	60	20	20	30	20	3	1	2	5	
			Min	24	16		14	9					

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

<b>COURSE OBJECTIVES:</b>	
The student will have ability to:	
1.	To provide a strong foundation in database concepts, data modeling, and relational systems, enabling students to design and manage structured data efficiently.
2.	To develop skills in SQL programming and understanding of transaction management for real-world applications.
3.	To understand normalization techniques for designing efficient and consistent database schemas.
4.	To develop analytical skills for database design, querying, and data integrity management.
5.	To apply database concepts in practical applications and mini projects for real-world problem solving.
<b>COURSE ALIGNMENT WITH UNSDG:</b>	
The Course aims to fulfill the United Nations Sustainable Development Goals, <b>SDG 4 (Quality Education)</b> and <b>SDG 9 (Industry, Innovation and Infrastructure)</b> .	
<b>COURSE OUTCOMES:</b>	
After completion of the course, the student will be able to:	
CO1	Explain DBMS architecture and data models for structured data management
CO2	Design relational databases using ER modeling and normalization techniques.
CO3	Develop and execute SQL queries for data manipulation and retrieval.
CO4	Understand transaction management, concurrency, and recovery mechanisms in DBMS
<b>TEACHING PEDAGOGY:</b>	
T1	Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
T2	ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination
<b>ASSESSMENT TOOLS:</b>	
ATL1	Quiz
ATL2	Activity Based Learning

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ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination
ATL9	Industrial Visit Report

### PREREQUISITES:

- Basic Computer Knowledge
- Fundamentals of Programming Concepts
- Logical and Analytical Thinking Skills

### SYLLABUS:

Module	Descriptors / Topics	Hours	Assessment Tools
I	<b>Introduction to Database Systems:</b> Introduction to data, database, database management system (DBMS), characteristics and advantages of DBMS, limitations of file processing systems, file system versus DBMS, three-level DBMS architecture, schema and instances. Overview of data models including hierarchical, network, relational, and object-oriented models. Introduction to ER model concepts, entities, attributes, relationships, cardinality constraints, ER diagrams, and applications of DBMS in real-world systems.	9	ATL1, ATL3, ATL6
II	<b>Relational Data Model:</b> Concepts of relations, tuples, attributes, domains, and relational schema. Types of keys include primary key, foreign key, candidate key, alternate key, and super key. Relational algebra operations such as selection, projection, union, intersection, set difference, Cartesian product, and joins. Integrity constraints including domain integrity, entity integrity, and referential integrity. Applications of relational databases in information	9	ATL1, ATL3, ATL6

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	systems.		
III	<b>SQL Programming:</b> Introduction to Structured Query Language (SQL). Data Definition Language (DDL) commands: CREATE, ALTER, DROP, and TRUNCATE. Data Manipulation Language (DML) commands: INSERT, UPDATE, DELETE. Data Query Language (DQL) uses SELECT queries, filtering, sorting, grouping, joining, nested queries, aggregate functions, constraints, views, indexes, and introduction to stored procedures and triggers. Applications for SQL in database development and administration.	9	ATL1, ATL3, ATL6
IV	<b>Normalization:</b> Concept of database normalization and functional dependencies. Types of anomalies include insertion, deletion, and update anomalies. Normal forms: First Normal Form (1NF), Second Normal Form (2NF), Third Normal Form (3NF), Boyce-Codd Normal Form (BCNF), and introduction to higher normal forms. Schema decomposition, lossless decomposition, dependency preservation, and normalization applications in efficient database design.	9	ATL1, ATL3, ATL6
V	<b>Transaction Management:</b> Concepts of transaction processing, transaction states, and ACID properties. Concurrency control techniques, serializability, locking protocols, deadlocks, deadlock prevention and recovery techniques. Database recovery concepts include log-based recovery, checkpointing, shadow paging, and backup mechanisms. Transaction management applications in maintaining database consistency and reliability.	9	ATL1, ATL3, ATL6
<b>Total Hours</b>		<b>45</b>	

### ADDITIONAL RESOURCES

A.	<b>Value addition to course content/ Skill enhancement content:</b>
	<ul style="list-style-type: none"> <li>• <a href="#">Oracle Database Learning Library</a></li> <li>• <a href="#">MySQL Documentation</a></li> <li>• <a href="#">PostgreSQL Tutorials</a></li> </ul>
B.	<b>Remedial classes for slow learners:</b>

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As per the SVVV SOP for slow and fast learners.

### SUGGESTED READINGS:

#### Textbooks

1. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, *Database System Concepts*, 7th Edition, McGraw-Hill, 2019.
2. Ramez Elmasri and Shamkant B. Navathe, *Fundamentals of Database Systems*, 7th Edition, Pearson Education, 2016.
3. Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, 3rd Edition, McGraw-Hill, 2003.

#### Reference Books:

1. C. J. Date, *An Introduction to Database Systems*, 8th Edition, Pearson Education, 2004.
2. Thomas Connolly and Carolyn Begg, *Database Systems: A Practical Approach to Design, Implementation, and Management*, 6th Edition, Pearson, 2014.
3. Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom, *Database Systems: The Complete Book*, 2nd Edition, Pearson, 2008.

#### Suggested e- resources (Websites/e- books)

1. [NPTEL Database Management Systems Course](#)
2. [Oracle Live SQL](#)
3. [W3Schools SQL Tutorial](#)

### LIST OF PRACTICAL

S. No.	Practical Title	CO Mapping
1	To create and manage databases using SQL commands.	CO1
2	To perform CRUD operations using INSERT, UPDATE, DELETE, and SELECT statements.	CO1

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3	To implement integrity constraints such as primary key, foreign key, unique, and check constraints.	CO1
4	To design ER diagrams for real-world applications.	CO2
5	To perform SQL joins and nested queries for multi-table data retrieval.	CO2
6	To create and use views and indexes for data abstraction and performance optimization.	CO2
7	To normalize database schemas up to 3NF/BCNF.	CO2
8	To implement relational algebra queries using SQL statements.	CO2
9	To create stored procedures, functions, and triggers.	CO3
10	To implement transaction control commands and concurrency concepts.	CO4
11	To demonstrate backup and recovery operations in DBMS.	CO4
12	To develop a mini database project for a real-world application.	CO3, CO4

### COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	3	-	-	-	1	1	-	2	2	1	1
CO2	3	3	2	2	3	2	-	2	2	2	1	3	3	2	3
CO3	3	3	3	3	3	2	1	2	3	2	2	3	3	2	3
CO4	3	3	2	3	3	2	1	2	2	2	1	3	3	2	3

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DTCS402	DCC	Software Engineering	Max	60	20	20	30	20	3	0	2	4	
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### COURSE OBJECTIVES:

The student will have ability to:

- To introduce systematic approaches and methodologies for software development using various Software Development Life Cycle (SDLC) models.
- To develop skills in software requirement analysis, specification preparation, software design, testing, and maintenance activities.
- To understand software project management concepts including feasibility analysis, scheduling, risk analysis, and quality management.
- To apply UML-based design techniques and software engineering principles in developing reliable software systems.
- To enhance problem-solving and teamwork skills for developing high-quality software solutions in real-world applications.

### COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

### COURSE OUTCOMES:

After completion of the course, the student will be able to:

- |     |  |
|-----|--|
| CO1 | Explain software development life cycle models and software engineering principles.                |
| CO2 | Analyze software requirements and prepare Software Requirement Specification (SRS) documents.      |
| CO3 | Apply software design principles and UML diagrams for software modeling and development.           |
| CO4 | Perform software testing, quality assurance, maintenance, and configuration management activities. |

### TEACHING PEDAGOGY:

- |    |   |
|----|---|
| T1 | Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching |
| T2 | ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination                    |

### ASSESSMENT TOOLS:

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ATL1	Quiz
ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination
ATL9	Industrial Visit Report

**PREREQUISITES:**

- Basic Computer Knowledge
- Fundamentals of Programming Concepts
- Logical and Analytical Thinking Skills

**SYLLABUS:**

Module	Descriptors/Topics	Hours	Assessment Tools
I	<b>Introduction to Software Engineering:</b> Introduction to software engineering, software characteristics, software crisis, need for software engineering, and Software Development Life Cycle (SDLC) models including waterfall, incremental, spiral, prototype, and agile models. Project planning, project scheduling, feasibility analysis, cost estimation, and risk management techniques. Applications of software engineering principles in software development projects.	9	ATL1, ATL3, ATL6
II	<b>Requirement Engineering:</b> Requirement engineering process including requirement gathering, elicitation techniques, requirement analysis, feasibility study, and requirement validation. Software Requirement Specification (SRS), characteristics of a good SRS document, requirement modeling, functional and non-functional requirements, and applications of requirement	9	ATL1, ATL3, ATL6

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	engineering in software project development and management.		
III	<b>Software Design:</b> Introduction to software design principles including modularity, abstraction, cohesion, coupling, and architectural design concepts. UML diagrams include case diagrams, class diagrams, sequence diagrams, activity diagrams, and state diagrams for software modeling. Design strategies, user interface design principles, and applications of software design in system development.	9	ATL1, ATL3, ATL6
IV	<b>Software Testing:</b> Introduction to software testing, objectives and principles of testing, testing levels including unit testing, integration testing, system testing, and acceptance testing. Testing techniques including black-box testing, white-box testing, debugging methods, verification and validation processes, test case generation, and applications of software testing for quality assurance and software reliability.	9	ATL1, ATL3, ATL6
V	<b>Software Maintenance and Quality Management:</b> Software maintenance concepts including corrective, adaptive, perfective, and preventive maintenance. Software quality factors, software metrics, software reliability, quality assurance, and quality control techniques. Configuration management, version control systems, change management, software documentation, and applications in software project maintenance and management.	9	ATL1, ATL3, ATL6
	<b>Total Hours</b>	<b>45</b>	

### ADDITIONAL RESOURCES

<b>A.</b>	<b>Value addition to course content/ Skill enhancement content:</b>
	<ul style="list-style-type: none"> <li><a href="#">Atlassian Agile Tutorials</a></li> <li>IBM Software Engineering Fundamentals</li> </ul>
<b>B.</b>	<b>Remedial classes for slow learners:</b>
	As per the SVVV SOP for slow and fast learners.
<b>SUGGESTED READINGS:</b>	
<b>Textbooks</b>	

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1.	Roger S. Pressman and Bruce R. Maxim, Software Engineering: A Practitioner's Approach, 8th Edition, McGraw-Hill, 2015.
2.	Ian Sommerville, Software Engineering, 10th Edition, Pearson Education, 2016.
3.	Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing, 2005.

### Reference Books:

1. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International, 2008.
2. Rajib Mall, Fundamentals of Software Engineering, 5th Edition, PHI Learning, 2018.
3. Carlo Ghezzi, Mehdi Jazayeri, and Dino Mandrioli, Fundamentals of Software Engineering, 2nd Edition, PHI, 2003.

### Suggested e- resources (Websites/e- books)

1. [NPTEL Software Engineering Course](#)
2. [GeeksforGeeks – Software Engineering Tutorials](#)
3. [TutorialsPoint – Software Engineering](#)

### LIST OF PRACTICAL

S. No.	Practical Title	CO Mapping
1	To prepare a Software Requirement Specification (SRS) document for a software system.	CO1
2	To design use case diagrams for a software application.	CO1
3	To create class diagrams and activity diagrams using UML tools.	CO1
4	To design sequence diagrams and state transition diagrams.	CO2
5	To prepare functional and non-functional requirements for a project.	CO2
6	To prepare test cases for a software module.	CO4
7	To perform black-box testing techniques on software modules.	CO4

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8	To perform white-box testing techniques and calculate cyclomatic complexity.	CO4
9	To perform feasibility study and risk analysis for a software project.	CO3
10	To develop software documentation and project reports.	CO3
11	To implement version control using Git tools.	CO4
12	To develop a mini software project using SDLC methodology.	CO3, CO4

### COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	2	-	-	-	1	1	-	2	2	1	1
CO2	3	3	2	2	2	1	-	1	2	2	1	2	3	1	2
CO3	3	3	3	3	3	2	1	2	2	2	1	3	3	2	3
CO4	3	3	3	3	3	2	1	2	2	2	1	3	3	2	3

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTCS403	DCC	Design and Analysis of Algorithm	Max	60	20	20	30	20	3	1	2	5
			Min	24	16		14	9				

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

### COURSE OBJECTIVES:

The student will have ability to:

- To develop the ability to design efficient algorithms using standard algorithmic paradigms and evaluate their performance.
- To understand computational complexity concepts and apply algorithmic techniques to solve real-world computational problems.
- To analyze the efficiency of algorithms using asymptotic notations and complexity analysis methods.
- To apply divide-and-conquer, greedy, dynamic programming, and backtracking techniques for optimization and decision-making problems.
- To understand NP-complete problems and develop analytical thinking for selecting suitable algorithmic strategies in computing applications.

### COURSE ALIGNMENT WITH UNSDG:

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

### COURSE OUTCOMES:

After completion of the course, the student will be able to:

- |            |  |
|------------|--|
| <b>CO1</b> | Analyze time and space complexity of algorithms using asymptotic notations.                            |
| <b>CO2</b> | Apply algorithm design techniques such as divide-and-conquer, greedy, and dynamic programming methods. |
| <b>CO3</b> | Solve optimization and decision problems using suitable algorithmic strategies.                        |
| <b>CO4</b> | Evaluate and compare algorithm efficiency for different computational approaches.                      |

### TEACHING PEDAGOGY:

- |           |   |
|-----------|---|
| <b>T1</b> | Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching |
| <b>T2</b> | ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination                    |

### ASSESSMENT TOOLS:

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ATL1	Quiz
ATL2	Activity Based Learning
ATL3	Midterm Exams
ATL4	Flip Class
ATL5	Seminar Presentation
ATL6	Assignments
ATL7	Poster
ATL8	Oral Viva-voce examination
ATL9	Industrial Visit Report

**PREREQUISITES:**

- Basic Computer Knowledge
- Fundamentals of Programming and Data Structures
- Mathematical and Logical Reasoning Skills

**SYLLABUS:**

Module	Descriptors/Topics	Hours	Assessment Tools
I	<b>Introduction to Algorithms:</b> Introduction to algorithms, characteristics of algorithms, asymptotic notations including Big-O, $\Omega$ , and $\Theta$ notations, and analysis of time and space complexity. Best case, average case, and worst-case analysis of algorithms along with performance evaluation techniques. Applications of algorithm analysis in problem solving and computing.	9	ATL1, ATL3, ATL6
II	<b>Divide and Conquer Techniques:</b> Concept of divide and conquer strategy, binary search, merge sort, quick sort, recurrence relations, and methods for solving recurrences. Complexity analysis of divide and conquer algorithms using asymptotic notations.	9	ATL1, ATL1, ATL3, ATL6

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	Applications of divide and conquer techniques in sorting and searching problems.		
III	<b>Greedy Algorithms:</b> Introduction to greedy method, characteristics of greedy algorithms, and applications in optimization problems. Activity selection problem, Huffman coding, minimum spanning tree using Prim's and Kruskal's algorithms, and greedy approach for efficient problem solving. Complexity analysis and applications of greedy techniques in networks and data compression.	9	ATL1, ATL3, ATL6
IV	<b>Dynamic Programming:</b> Introduction to dynamic programming, principles of optimal substructure and overlapping subproblems, and comparison with divide and conquer. Applications including 0/1 knapsack problem, longest common subsequence, matrix chain multiplication, and shortest path problems. Complexity analysis and applications of dynamic programming in optimization problems.	9	ATL1, ATL3, ATL6
V	<b>Backtracking and NP Problems:</b> Introduction to backtracking technique, state space tree, and problem-solving using recursive approaches. Applications including N-Queen problem, subset sum problem, and concept of traveling salesman problem. Introduction to NP problems, NP-completeness, tractable and intractable problems, and importance in computational complexity theory.	9	ATL1, ATL3, ATL6
<b>Total Hours</b>		<b>45</b>	

### ADDITIONAL RESOURCES

<b>A.</b>	<b>Value addition to course content/ Skill enhancement content:</b>
	<ul style="list-style-type: none"> <li>• <a href="#">MIT OpenCourseWare – Introduction to Algorithms</a></li> <li>• <a href="#">GeeksforGeeks – Algorithms Tutorial</a></li> <li>• <a href="#">Visualgo Algorithm Visualizations</a></li> <li>• <a href="#">NPTEL Design and Analysis of Algorithms</a></li> </ul>

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<b>B.</b>	<b>Remedial classes for slow learners:</b>	
	As per the SVVV SOP for slow and fast learners.	
<b>SUGGESTED READINGS:</b>		
<b>Textbooks</b>		
1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, Introduction to Algorithms, 3rd Edition, MIT Press, 2009.	
2.	Ellis Horowitz, Sartaj Sahni, and Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, 2nd Edition, Universities Press, 2008.	
3.	Anany Levitin, Introduction to the Design and Analysis of Algorithms, 3rd Edition, Pearson Education, 2012.	
<b>Reference Books:</b>		
1.	Alfred V. Aho, John E. Hopcroft, and Jeffrey D. Ullman, <i>The Design and Analysis of Computer Algorithms</i> Pearson Education, 2006.	
2.	Sara Baase and Allen Van Gelder, <i>Computer Algorithms: Introduction to Design and Analysis</i> , 3rd Edition, Pearson Education, 2000.	
3.	Jon Kleinberg and Éva Tardos, <i>Algorithm Design</i> , Pearson Education, 2005.	
<b>Suggested e- resources (Websites/e- books)</b>		
<ul style="list-style-type: none"> <li>• <a href="#">NPTEL – Design and Analysis of Algorithms</a></li> <li>• <a href="#">MIT OpenCourseWare – Algorithms</a></li> <li>• <a href="#">Visualgo Algorithm Simulator</a></li> <li>• <a href="#">GeeksforGeeks – Algorithm Tutorials</a></li> </ul>		
<b>LIST OF PRACTICAL</b>		
S.	Practical Title	CO Mapping

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No.		
1	Implement asymptotic analysis for comparing algorithm efficiency.	CO1
2	Implement binary search and analyze its time complexity.	CO1
3	Implement merge sort and quick sort algorithms with performance comparison.	CO2
4	Solve recurrence relations using substitution and recursion tree methods.	CO2
5	Implement greedy algorithms for activity selection problems.	CO2
6	Implement Huffman coding for data compression.	CO2
7	Implement Prim's and Kruskal's algorithms for minimum spanning tree generation.	CO3
8	Implement dynamic programming solutions for 0/1 knapsack and longest common subsequence problems.	CO3
9	Implement matrix chain multiplication using dynamic programming.	CO3
10	Implement backtracking algorithms for N-Queen and subset sum problems.	CO3
11	Analyze shortest path algorithms and compare algorithmic efficiency.	CO4
12	Develop a mini project demonstrating optimization using algorithmic techniques.	CO4

### COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	3	-	-	-	1	1	-	3	2	1	1
CO2	3	3	2	2	3	2	-	3	2	2	1	3	3	1	3
CO3	3	3	3	3	3	2	1	2	3	2	2	3	3	2	3
CO4	3	3	3	3	3	2	1	2	2	2	1	3	3	2	3

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Choice Based Credit System (CBCS) in the light of NEP-2020

Diploma CSE/Cyber Security/AI/DS

SEMESTER-IV (2025-20228)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS	
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam					Teachers Assessment*
DTCS404	DCC	Web Technologies	Max	00	00	00	00	50	0	0	4	2
			Min	00	00		00	23				

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

<b>COURSE OBJECTIVES:</b>	
The student will have ability to:	
1.	To understand the basic concepts of Internet, WWW, and web architecture
2.	To develop skills in designing web pages using HTML and CSS
3.	To apply styling techniques for creating responsive and attractive web pages
4.	To introduce client-side scripting using JavaScript for dynamic web pages
5.	To understand basic server-side scripting and web hosting concepts
<b>COURSE ALIGNMENT WITH UNSDG:</b>	
The Course aims to fulfill the United Nations Sustainable Development Goals, <b>SDG 4 (Quality Education)</b> and <b>SDG 9 (Industry, Innovation and Infrastructure)</b> .	
<b>COURSE OUTCOMES:</b>	
After completion of the course, the student will be able to:	

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Diploma CSE/Cyber Security/AI/DS

SEMESTER-IV (2025-20228)

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DTCS404	DCC	Web Technologies	Max	00	00	00	00	50	0	0	4	2
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CO1	Explain the working of Internet, WWW, and web technologies
CO2	Design static web pages using HTML and CSS
CO3	Apply CSS concepts to create responsive and user-friendly web layouts
CO4	Develop interactive web pages using JavaScript and DOM manipulation
CO5	Explain the working of Internet, WWW, and web technologies
<b>TEACHING PEDAGOGY:</b>	
T1	Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
T2	ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination
<b>ASSESSMENT TOOLS:</b>	
ATL 1	Quiz
ATL 2	Activity Based Learning
ATL	Midterm Exams

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3	
ATL 4	Flip Class
ATL 5	Seminar Presentation
ATL 6	Assignments
ATL 7	Poster
ATL 8	Oral Viva-voce examination
ATL 9	Industrial Visit Report
<b>PREREQUISITES:</b>	
Basic knowledge of computer system.	

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### SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	<b>Introduction to Web Technologies:</b> Internet basics, World Wide Web (WWW), Web browsers, Web servers, Client-server architecture, HTTP/HTTPS protocol, URL structure, Domain names, Introduction to HTML, Basic structure of HTML document	9	ATL1, ATL2, ATL6
II	<b>HTML and CSS:</b> HTML elements and attributes, Headings, Paragraphs, Lists, Links, Images, Tables, Forms, Semantic HTML, Introduction to CSS, Types of CSS (inline, internal, external), Selectors, Colors, Backgrounds, Borders, Margins, Padding, Box model	9	ATL4, ATL5, ATL8
III	<b>Advanced CSS and Responsive Design:</b> CSS positioning, Flexbox, Grid layout, Media queries, Responsive web design, Bootstrap basics, Navigation bars, Cards, Forms styling, CSS animations and transitions	9	ATL2, ATL6, ATL8
IV	<b>JavaScript Fundamentals:</b> Introduction to JavaScript, Variables, Data types, Operators, Control statements, Functions, Arrays, Objects, DOM manipulation, Event handling, Form validation, Basic debugging	9	ATL1,

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	techniques.		ATL3, ATL8
V	<b>Server-side Basics and Web Hosting:</b> Introduction to server-side scripting, Basics of PHP or Node.js, Handling forms with server-side scripts, Database connectivity basics, Introduction to MySQL, CRUD operations, Web hosting concepts, FTP, Domain and hosting setup.	9	ATL2, ATL7, ATL9
	<b>Total Hours</b>	<b>60</b>	

### ADDITIONAL RESOURCES

<b>A.</b>	<b>Value addition to course content/ Skill enhancement content:</b>
	Development of logical thinking, coding standards, and industry-oriented programming skills.
<b>B.</b>	<b>Remedial classes for slow learners:</b>
	As per the SVVV SOP for slow and fast learners.

### SUGGESTED READINGS:

**Textbooks:**

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1.	Jon Duckett, HTML and CSS: Design and Build Websites, John Wiley & Sons, 2011, ISBN 978-1118008188.
2.	Jon Duckett, JavaScript and JQuery: Interactive Front-End Web Development, John Wiley & Sons, 2014, ISBN 978-1118531648.

### Reference Books:

1.	Jennifer Niederst Robbins, Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics, O'Reilly Media, 2018, ISBN 978-1491960202.
2.	Anne Boehm and Zak Ruvalcaba, Murach's HTML5 and CSS3, Mike Murach & Associates, 2018, ISBN 978-1943872260.

### Suggested e- resources (Websites/e- books)

[https://onlinecourses.swayam2.ac.in/nou25\\_ma10/preview](https://onlinecourses.swayam2.ac.in/nou25_ma10/preview)

<https://www.codecademy.com/catalog/subject/web-development>

### LIST OF PRACTICAL

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# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

## Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

Diploma CSE/Cyber Security/AI/DS

SEMESTER-IV (2025-20228)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME					L	T	P	CREDITS	
			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam					Teachers Assessment*
DTCS404	DCC	Web Technologies	Max	00	00	00	00	50	0	0	4	2
			Min	00	00		00	23				

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

	Title	CO Mapping
1.	Design a web page using HTML tables and images with proper formatting	CO2
2.	Develop a student registration form using HTML form elements and input controls	CO2, CO5
3.	Apply CSS (inline, internal, external) to style a web page	CO2
4.	Create a responsive web page using CSS media queries	CO3
5.	Design a webpage layout using Flexbox or Grid system	CO3
6.	Develop a website navigation menu using HTML and CSS	CO2, CO3
7.	Write JavaScript programs using variables, operators, and control statements	CO4
8.	Create dynamic web pages using JavaScript DOM manipulation and event handling	CO4
9.	Perform form validation using JavaScript and connect basic form data handling	CO4, CO5
10.	Design a web page using HTML tables and images with proper formatting	CO2, CO3, CO4

### COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course	Correlation with POs	Correlation with
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Diploma CSE/Cyber Security/AI/DS

SEMESTER-IV (2025-20228)

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam					Teachers Assessment*
DTCS404	DCC	Web Technologies	Max	00	00	00	00	50	0	0	4	2
			Min	00	00		00	23				

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Outcomes													PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	–	–	2	–	–	–	–	–	–	1	2	1	1
CO2	3	2	3	1	3	–	–	–	–	1	–	1	3	2	2
CO3	3	3	3	1	3	–	–	–	–	1	–	1	2	3	2
CO4	3	3	3	2	3	–	–	–	1	1	–	2	2	3	3
CO5	3	3	2	2	3	–	–	–	1	1	–	2	2	3	3

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 Choice Based Credit System (CBCS) in the light of NEP-2020  
 Diploma Cyber Security  
 SEMESTER-IV (2026-2029)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS	
			Marks	THEORY			PRACTICAL						
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*					
DTCS408	DCC	Cryptography	Max	60	20	20	30	20	3	0	2	4	
			Min	24	16		14	9					

**Legends:** L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; \*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**COURSE OBJECTIVES:**

The student will have ability to:

1.	To introduce the fundamental concepts of cryptography, including encryption, decryption, and security goals.
2.	To understand classical and modern cryptographic techniques used for secure communication and data protection.
3.	To study symmetric and asymmetric encryption algorithms along with their practical applications in cyber security.
4.	To explore hashing techniques, message authentication mechanisms, digital signatures, and secure communication protocols.
5.	To develop the ability to analyze, implement, and evaluate cryptographic mechanisms for securing digital systems and networks.

**COURSE ALIGNMENT WITH UNSDG:**

The Course aims to fulfill the United Nations Sustainable Development Goals, **SDG 4 (Quality Education)** and **SDG 9 (Industry, Innovation and Infrastructure)**.

**COURSE OUTCOMES:**

After completion of the course, the student will be able to:

<b>CO1</b>	Understand cryptographic concepts, security goals, attack models, and security services.
<b>CO2</b>	Apply classical encryption techniques and analyze their strengths and weaknesses.
<b>CO3</b>	Implement and evaluate symmetric key cryptographic algorithms such as DES and AES with various modes of operation.
<b>CO4</b>	Analyze and apply asymmetric cryptographic algorithms including RSA, Diffie-Hellman, and digital signatures.
<b>CO5</b>	Evaluate hashing algorithms, message authentication techniques, and secure communication protocols such as SSL/TLS.

**TEACHING PEDAGOGY:**

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## Shri Vaishnav Institute of Information Technology

Choice Based Credit System (CBCS) in the light of NEP-2020

Diploma Cyber Security

SEMESTER-IV (2026-2029)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS	
			Marks	THEORY			PRACTICAL						
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<b>T1</b>	Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching
<b>T2</b>	ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

### ASSESSMENT TOOLS:

<b>ATL1</b>	Quiz
<b>ATL2</b>	Activity Based Learning
<b>ATL3</b>	Midterm Exams
<b>ATL4</b>	Flip Class
<b>ATL5</b>	Seminar Presentation
<b>ATL6</b>	Assignments
<b>ATL7</b>	Poster
<b>ATL8</b>	Oral Viva-voce examination
<b>ATL9</b>	Industrial Visit Report

### PREREQUISITES:

- Basic Computer Knowledge
- Fundamentals of Computer Networks
- Basic Programming Knowledge

### SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	<b>Basics of Cryptography:</b> Plaintext, ciphertext, encryption and decryption techniques. Cryptographic algorithms and keys for securing data against unauthorized access. Passive and active attacks, cryptanalysis, brute-force techniques, and attack models. Core security goals include confidentiality, integrity, availability, authentication, and non-repudiation. Cryptography applications in information security and cyber security systems.	9	ATL1, ATL3, ATL6

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			Marks	THEORY			PRACTICAL						
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II	<b>Classical Ciphers:</b> Study of traditional encryption techniques including Caesar Cipher, Monoalphabetic Cipher, Playfair Cipher, Vigenère Cipher, and Hill Cipher. Frequency analysis, substitution and transposition techniques, cryptanalysis methods, and limitations of classical encryption systems. Applications of classical cryptography in secure communication concepts.	9	ATL1, ATL3, ATL6
III	<b>Symmetric Encryption:</b> Introduction to symmetric key cryptography, block ciphers and stream ciphers. DES and AES algorithms include internal structures and working principles. Modes of operation include ECB, CBC, CFB, OFB, and CTR modes. Key distribution challenges, security issues, and applications of symmetric encryption in secure systems.	9	ATL1, ATL3, ATL6
IV	<b>Asymmetric Encryption:</b> Concepts of public key cryptography and its importance in modern security systems. RSA algorithm includes key generation, encryption, and decryption. Diffie-Hellman key exchange mechanism for secure communication. Digital signatures, Public Key Infrastructure (PKI), certificate management, and applications in authentication and secure communication.	9	ATL1, ATL3, ATL6
V	<b>Hashing and Security Protocols:</b> Introduction to hash functions and their properties for ensuring data integrity. MD5 and SHA algorithms, MAC and HMAC techniques. Digital certificates, certificate authorities, SSL/TLS protocols, secure communication mechanisms, and applications of cryptographic protocols in network security and e-commerce systems.	9	ATL1, ATL3, ATL6
<b>Total Hours</b>		<b>45</b>	
<b>ADDITIONAL RESOURCES</b>			
A.	<b>Value addition to course content/ Skill enhancement content:</b>		

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	<ul style="list-style-type: none"> <li>• <a href="#">OpenSSL Documentation</a></li> <li>• <a href="#">NIST Cryptographic Standards and Guidelines</a></li> <li>• Cisco Cybersecurity Learning Network</li> <li>• <a href="#">Cryptography Engineering Resources</a></li> </ul>
<b>B.</b>	<b>Remedial classes for slow learners:</b>
	As per the SVVV SOP for slow and fast learners.

### SUGGESTED READINGS:

#### Textbooks

1.	William Stallings, Cryptography and Network Security: Principles and Practice, 7th Edition, Pearson Education, 2017.
2.	Christof Paar and Jan Pelzl, Understanding Cryptography, Springer, 2010.
3.	Behrouz A. Forouzan, Cryptography and Network Security, McGraw-Hill Education, 2011.

#### Reference Books:

1.	Douglas R. Stinson, Cryptography: Theory and Practice, CRC Press, 2006.
2.	Bruce Schneier, Applied Cryptography, 2nd Edition, Wiley, 2015.
3.	Atul Kahate, Cryptography and Network Security, 4th Edition, McGraw-Hill Education, 2019.

#### Suggested e- resources (Websites/e- books)

1.	<a href="#">NPTEL Cryptography and Network Security Course</a>
2.	<a href="#">OpenSSL Official Documentation</a>
3.	<a href="#">Cryptography Tutorials – GeeksforGeeks</a>
4.	W3Schools SSL/TLS Tutorial

#### LIST OF PRACTICAL

S. No	Practical Title	CO Mapping
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1	Implementation of Caesar Cipher for encryption and decryption.	CO2
2	Implementation of Vigenère Cipher using polyalphabetic substitution.	CO2
3	Implementation of Playfair Cipher using digraph substitution technique.	CO2
4	Demonstration and implementation of Advanced Encryption Standard (AES).	CO3
5	Implementation of SHA hashing algorithm for data integrity verification.	CO5
6	File encryption and decryption using symmetric key techniques.	CO3
7	Demonstration of Digital Signature generation and verification.	CO4
8	Inspection and analysis of SSL/TLS communication and certificates.	CO5
9	Development of encryption and decryption programs using Python.	CO3
10	Implementation of RSA algorithm for secure communication.	CO4
11	Demonstration of Diffie-Hellman Key Exchange Mechanism.	CO4
12	Mini project on secure communication using cryptographic techniques.	CO5

### COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcomes	Correlation with POs												Correlation with PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	2	-	-	-	1	1	-	2	2	1	1
CO2	3	3	2	2	2	1	-	1	2	1	-	2	2	1	2
CO3	3	3	3	3	3	2	1	2	2	2	1	3	3	2	3
CO4	3	3	3	3	3	2	1	2	2	2	1	3	3	2	3
CO5	3	3	3	3	3	2	1	2	2	2	1	3	3	3	3

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