



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.

COURSE OBJECTIVES:	
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.
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 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
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:	
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	Introduction to Database Systems: 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	Relational Data Model: 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	SQL Programming: 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	Normalization: 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	Transaction Management: 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
Total Hours		45	

ADDITIONAL RESOURCES

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

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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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				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*					
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	Introduction to Software Engineering: 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	Requirement Engineering: 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	Software Design: 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	Software Testing: 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	Software Maintenance and Quality Management: 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
	Total Hours	45	

ADDITIONAL RESOURCES

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

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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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DTCS403	DCC	Design and Analysis of Algorithm	Max	60	20	20	30	20	3	1	2	5
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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:

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COURSE OUTCOMES:

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

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

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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 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*					
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.

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	Introduction to Algorithms: Introduction to algorithms, characteristics of algorithms, asymptotic notations including Big-O, Ω , and Θ 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	Divide and Conquer Techniques: 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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COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME						L	T	P	CREDITS
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DTCS403	DCC	Design and Analysis of Algorithm	Max	60	20	20	30	20	3	1	2	5
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	Applications of divide and conquer techniques in sorting and searching problems.		
III	Greedy Algorithms: 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	Dynamic Programming: 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	Backtracking and NP Problems: 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
Total Hours		45	

ADDITIONAL RESOURCES

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

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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.	Remedial classes for slow learners:	
	As per the SVVV SOP for slow and fast learners.	
SUGGESTED READINGS:		
Textbooks		
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.	
Reference Books:		
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.	
Suggested e- resources (Websites/e- books)		
<ul style="list-style-type: none"> • NPTEL – Design and Analysis of Algorithms • MIT OpenCourseWare – Algorithms • Visualgo Algorithm Simulator • GeeksforGeeks – Algorithm Tutorials 		
LIST OF PRACTICAL		
S.	Practical Title	CO Mapping

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			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.

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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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*				
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.

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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*
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.

COURSE OBJECTIVES:	
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
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:	

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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*
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.

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
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:	
ATL 1	Quiz
ATL 2	Activity Based Learning
ATL	Midterm Exams

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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.

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
PREREQUISITES:	
Basic knowledge of computer system.	

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SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Web Technologies: 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	HTML and CSS: 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	Advanced CSS and Responsive Design: 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	JavaScript Fundamentals: 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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			Marks	THEORY			PRACTICAL					
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	techniques.		ATL3, ATL8
V	Server-side Basics and Web Hosting: 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
	Total Hours	60	

ADDITIONAL RESOURCES

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

SUGGESTED READINGS:

Textbooks:

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DTCS404	DCC	Web Technologies	Max	00	00	00	00	50	0	0	4	2
			Min	00	00		00	23				

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

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	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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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.

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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Diploma AI

SEMESTER-IV (2026-20229)

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*				
DTCS406	DCC	Introduction to AI	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:

- To introduce the fundamental concepts, scope, and applications of Artificial Intelligence and intelligent agents.
- To develop an understanding of state-space representation and AI search algorithms for problem solving.
- To explain probabilistic reasoning methods, including Bayesian networks and hidden Markov models.
- To provide knowledge of Markov Decision Processes, utility theory, and policy optimization techniques.
- To familiarize students with reinforcement learning approaches such as temporal difference learning and Q-learning.

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:

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			Marks	THEORY			PRACTICAL					
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After completion of the course, the student will be able to:	
CO1	Understand the basic concepts, agents, environments, and problem formulation techniques in Artificial Intelligence.
CO2	Apply uninformed and informed search algorithms such as BFS, DFS, Best-First Search, and A* algorithm.
CO3	Analyze probabilistic reasoning techniques, including Bayes theorem, Bayesian networks, and hidden Markov models.
CO4	Evaluate decision-making methods using MDPs, utility functions, value iteration, and policy iteration.
CO5	Demonstrate the application of reinforcement learning techniques, including temporal difference learning and Q-learning.
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:	
ATL	Quiz

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			Marks	THEORY			PRACTICAL					
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1	
ATL 2	Activity Based Learning
ATL 3	Midterm Exams
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
PREREQUISITES:	
Basic knowledge of computers, operating systems, and fundamental problem-solving concepts.	

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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.

SYLLABUS:			
Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.	9	ATL1, ATL3, ATL6
II	Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.	9	ATL1, ATL3, ATL6
III	Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks – representation, construction and inference, temporal model, hidden Markov model.	9	ATL1, ATL3, ATL6
IV	Markov Decision Process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.	9	ATL1, ATL3, ATL6
V	Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning – Q learning.	9	ATL1, ATL3, ATL6

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
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	Total Hours	45
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ADDITIONAL RESOURCES

A. Value addition to course content/ Skill enhancement content:

Development of logical thinking, coding standards, and industry-oriented programming skills.

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks:

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Education, 4th Edition, 2021.
2. Elaine Rich, Kevin Knight, and Shivashankar B. Nair, Artificial Intelligence, McGraw-Hill Education, 3rd Edition, 2017.
3. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Pearson Education, 1st Edition, 2015.

Reference Books:

1. Nils J. Nilsson, Principles of Artificial Intelligence, Springer, 1st Edition, 2014.

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2.	George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th Edition, 2009.
3.	Deepak Khemani, A First Course in Artificial Intelligence, McGraw-Hill Education, 1st Edition, 2013.

Suggested e- resources (Websites/e- books)

https://www.ibm.com/solutions/artificial-intelligence?utm_source=chatgpt.com

https://www.kaggle.com/learn?utm_source=chatgpt.com

LIST OF PRACTICAL

S. No	Practical Title	CO Mapping
1.	Study and implementation of Breadth First Search (BFS) algorithm.	CO2
2.	Study and implementation of the Depth First Search (DFS) algorithm.	CO2
3.	Implementation of the Best First Search algorithm for path-finding problems.	CO2
4.	Implementation of A* search algorithm for shortest path optimization.	CO2
5.	Design and implementation of the Tic-Tac-Toe game using Game Search techniques.	CO1, CO2
6.	Implementation of the Bayesian probability theorem for decision making.	CO3

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7.	Construction of a simple Bayesian Network for probabilistic inference.	CO3
8.	Implementation of the Hidden Markov Model for sequence prediction.	CO3
9.	Simulation of Markov Decision Process using the value iteration method.	CO4
10.	Implementation of the Q-learning algorithm for reinforcement learning applications.	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	PO 0	PO 1	PO 2	PSO 1	PSO 2	PSO 3
CO1	3	2	1	–	2	–	–	–	–	–	–	1	3	2	1
CO2	3	3	3	2	3	–	–	–	–	–	–	1	3	3	2
CO3	3	3	2	3	2	–	–	–	–	–	–	1	2	3	3
CO4	3	3	3	3	3	–	–	–	1	1	–	2	2	3	3
	3	3	3	3	3	–	–	–	1	1	–	3	2	3	3

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