



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

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

M.Tech (CSE)

SEMESTER-II (2026-28)

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*				
MTCS201 N	DCC	Advance Computer Architecture & Organization	Max	60	20	20	0	0	3	0	0	3
			Min	24	16		0	0				

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. Describe current and emerging trends in computer architectures, focusing on performance and the hardware/software interface.
2. Analyzing fundamental issues in architecture design and their impact on application performance.
3. Identify the performance and efficiency in advanced multiple-issue processors
4. Identify and Analyzing various memory models.
5. Describe various techniques to enhance a processors ability.

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** Know the classes of computers, and new trends and developments in computer architecture.
- CO2** Understand pipelining, instruction set architectures, memory addressing.
- CO3** Understand symmetric shared-memory architectures and their performance.
- CO4** Understand multiprocessor cache coherence using the directory based and snooping class of protocols.
- CO5** Understand the various models to achieve memory consistency.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching

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MTCS201 N	DCC	Advance Computer Architecture & Organization	Max	60	20	20	0	0	3	0	0	3
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T2 ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- 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

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Overview of Parallel Processing and Pipelining Processing, study and comparison of uni-processors and parallel processors, Evolution of parallel processors, Necessity of high performance, Architectural Classification, Applications of parallel processing, Instruction level Parallelism and Thread Level Parallelism.	10	ATL1 ATL4 ATL6
II	Principles and implementation of Pipelining, Pipeline Architecture, Study and comparison of processors with and without pipelining, Linear pipeline processor, Nonlinear pipeline processor Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling -score boarding and	9	ATL2 ATL3 ATL8

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MTCS201 N	DCC	Advance Computer Architecture & Organization	Max	60	20	20	0	0	3	0	0	3
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	Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscaler pipeline design, Super pipeline processor design.		
III	Study and comparison of Vector and array processors, Vector Processing Principles, Vector instruction types, Vector-access memory schemes. Vector supercomputer architecture, SIMD Computer Organization Masking and Data network mechanism, distributed memory model and shared memory model, Parallel Algorithms For Array Processors: Matrix Multiplication. Sorting, SIMD computer organization, Implementation issues of Matrix multiplication and sorting on array processor and their analysis.	8	ATL2 ATL3 ATL5
IV	Microprocessor Architectures, study and comparison of Loosely and Tightly coupled multiprocessors. Loosely and Tightly coupled multiprocessors, Processor characteristics of multiprocessors, Inter Processor communication network, Time shared bus, Crossbar switch, Multiport Memory Model, Memory contention and arbitration techniques, Cache coherence, Snoopy protocols, Directory based protocols. Message routing schemes in multicomputer network, deadlock and virtual channel.	7	ATL2 ATL5 ATL8
V	Study of Architecture of Multithreaded processors, Latency hiding techniques, Principles of multithreading, Issues and solutions, Parallel Programming Techniques: Message passing program development, Synchronous and asynchronous message passing, Message passing parallel programming, Shared Memory Programming, Data Parallel Programming. Implementation issues of a multithreaded program.	8	ATL5 ATL7 ATL9
Total Hours		30	

ADDITIONAL RESOURCES

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

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			Marks	THEORY			PRACTICAL					
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MTCS201 N	DCC	Advance Computer Architecture & Organization	Max	60	20	20	0	0	3	0	0	3
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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.

<https://nptel.ac.in/courses/106106166>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. K. Hwang and F. A. Briggs, *Computer Architecture and Parallel Processing*. New York, NY, USA: McGraw-Hill International Editions, 1984.
2. J. P. Hayes, *Computer Architecture and Organization*, 3rd ed. New York, NY, USA: McGraw-Hill, 1998.

Reference Books

1. V. Rajaraman and C. S. R. Murthy, *Parallel Computers: Architecture and Programming*. New Delhi, India: PHI Learning, 2000.
2. R. Kain, *Advanced Computer Architecture: A Systems Design Approach*. New Delhi, India: PHI Learning, 2010.
3. M. J. Flynn, *Computer Architecture: Pipelined and Parallel Processor Design*. New Delhi, India: Narosa Publishing House, 1995.
4. K. Hwang and F. A. Briggs, *Computer Architecture and Parallel Processing*. New York, NY, USA: McGraw-Hill, 1984.
5. D. E. Culler and J. P. Singh, *Parallel Computer Architecture: A Hardware/Software Approach*. San Francisco, CA, USA: Morgan Kaufmann Publishers, 1999.

Suggested resources (Websites/e-books)

1. S. G. Shiva, *Advanced Computer Architecture*. Boca Raton, FL, USA: CRC Press (Taylor & Francis Group), 2000.

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

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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*				
MTCS201 N	DCC	Advance Computer Architecture & Organization	Max	60	20	20	0	0	3	0	0	3
			Min	24	16		0	0				

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 Outcome s	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	-	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	1	2	3	2	2	3	3	2	3	3	2	1	2	3	1
CO5	3	2	1	2	3	1	2	3	2	2	3	3	2	3	1

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			Ma rks	THEORY			PRACTICAL					
				END SEM Unive rsity Exam	Tw o Te rm Ex am	Te ac he rs As ses sm ent *	END SEM Unive rsity Exam	Te ac he rs As ses sm ent *				
MTCS202 N	DCC	Advance Database Management System	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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. Describe database management system internals. Understand and describe internal algorithms in detail. Decide on optimization issues given a known database workload, by manipulating indexes, choosing more adequate data types, and modifying queries.
2. Identify opportunities for the use of the object model, and design and code client code to manipulate an object database.
3. Analyze and optimize transactional code, identifying causes of possible anomalies and correct them.
4. Identify and be able to use recent and advanced database techniques (e.g. in concurrency control, buffer management, and recovery).
5. Analyze, describe and use other models than the Relational. Analyze, compare and evaluate alternative database architectures and models in different application contexts. Identify limitations of the standard Relational databases in certain application domains, e.g. for multidimensional data, or unstructured data.

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** Be familiar with a commercial relational database system (Oracle) by writing SQL using the system.
- CO2** Be familiar with the relational database theory, and be able to write relational algebra expressions for queries.
- CO3** Be familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B-tree, and hashing.
- CO4** Master the basics of query evaluation techniques and query optimization.
- CO5** Be familiar with the basic issues of transaction processing and concurrency control.

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			Ma rks	THEORY			PRACTICAL					
				END SEM Unive rsity Exam	Tw o Te rm Ex am	Te ac he rs As ses sm ent *	END SEM Unive rsity Exam	Te ac he rs As ses sm ent *				
MTCS202 N	DCC	Advance Database Management System	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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.

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
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

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Database Systems: Database System Concepts and Architecture, Data Models, Data Independence, SQL: DDL, DML, DCL, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF. Query Processing and Optimization: Query Processing, Syntax Analyzer, Query Decomposition, Query Optimization, Heuristic Query Optimization, Cost Estimation, Cost Functions for Select, Join, Query	10	ATL1 ATL2 ATL6

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	Evaluation Plans.		
II	Object Oriented and Object Relational Databases: Object Oriented Concepts, Object Oriented Data Model, Object Definition Language, Object Query Language, Object Relational Systems, SQL3, ORDBMS Design.	9	ATL4 ATL5 ATL8
III	Transaction Processing and Concurrency Control: Transaction Processing Concepts, Concurrency Control Techniques: Two-phase Locking, Timestamp Ordering, Multiversion, Validation, Multiple Granularity Locking.	8	ATL2 ATL3 ATL8
IV	Backup and Recovery: Types of Database Failures, Types of Database Recovery, Recovery Techniques: Deferred Update, Immediate Update, Shadow Paging, Checkpoints, Buffer Management.	7	ATL2 ATL3 ATL6
V	Introduction to Data Warehousing and Data Mining: Introduction to OLAP, OLTP, Data Warehouse, Data Marts, Data Mining, Data Mining Process. Distributed Databases: Distributed Database Concepts, Advantages and Disadvantages, Types of Distributed Database Systems, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design, Five Level Schema Architecture, Query Processing, Concurrency Control and Recovery in Distributed Databases. Commercial Databases: Commercial Database Products, Familiarity with IBM DB2 Universal Database, Oracle, Microsoft SQL Server, MySQL, their features.	8	ATL5 ATL7 ATL9
	Total Hours	30	

ADDITIONAL RESOURCES

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

<https://education.oracle.com/oracle-database-foundations>

B. Remedial classes for slow learners:

As per the AUMP SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. C. J. Date, *An Introduction to Database Systems*, 8th ed. Boston, MA, USA: Addison-Wesley, 2003.
2. A. Silberschatz, H. F. Korth, and S. Sudarshan, *Database System Concepts*, 6th ed. New York, NY, USA: McGraw-Hill Education, 2011.

Reference Books

1. P. O'Neil and E. O'Neil, *Database: Principles, Programming, and Performance*, 2nd ed. San Francisco, CA, USA: Morgan Kaufmann Publishers, 2001.
2. M. L. Gillenson, *Fundamentals of Database Management Systems*. Hoboken, NJ, USA: Wiley India, 2005.
3. S. Ceri and G. Pelagatti, *Distributed Databases: Principles and Systems*. New York, NY, USA: McGraw-Hill, 1984.
4. P. Ponniah, *Data Warehousing Fundamentals: A Comprehensive Guide for IT Professionals*, 2nd ed. Hoboken, NJ, USA: Wiley India, 2010.

Suggested resources (Websites/e-books)

- 1 J. Han, M. Kamber, and J. Pei, *Data Mining: Concepts and Techniques*, 3rd ed. Waltham, MA, USA: Elsevier/Morgan Kaufmann, 2011.

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LIST OF PRACTICAL

	Title	CO Mapping
1.	Distributed Database for Bookstore.	CO1
2.	Deadlock Detection Algorithm for distributed database using wait- for graph.	CO1
3.	Object Oriented Database – Extended Entity Relationship (EER).	CO1
4.	Parallel Database – University Counselling for Engineering colleges.	CO2
5.	Parallel Database – Implementation of Parallel Join & Parallel Sort.	CO2
6.	Active Database – Implementation of Triggers & Assertions for Bank Database.	CO3
7.	Deductive Database – Constructing Knowledge Database for Kinship Domain (Family Relations).	CO3
8.	Study and working of WEKA Tool.	CO4
9.	Query Processing – Implementation of an Efficient Query Optimizer.	CO4
10.	Designing XML Schema for Company Database.	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 10	PO 11	PO 12	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	2	1	2	1	2	3	2	2	3	3	2	3	1	2	3
CO5	2	1	3	1	2	2	1	2	3	2	2	3	3	2	3

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M.Tech CSE/ CSE(/DS/BDA/AI) / DS / BDA / AI / IS

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTRM301	AECC	Research Methodology in Engineering	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	45				

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COURSE OBJECTIVES:

The student will have ability to:

1. The ensuing knowledge as property.
2. To plan and design business research using scientific and statistical methods.

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** Demonstrate understanding of research methodology.
- CO2** Apply the statistical concepts in business research.
- CO3** Validate statistical statements relating to business research.

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

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

M.Tech CSE/ CSE/(DS/BDA/AI) / DS / BDA /AI / IS

SEMESTER-II (2026-28)

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*				
MTRM301	AECC	Research Methodology in Engineering	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	45				

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.

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Business Research 1. An overview: Research process 2. Types of Research - Exploratory Research, Descriptive Research, Causal Research, Analytical Research 3. Problem formulation, Management problem v/s. Research problem 4. Approaches to Research 5. Importance of literature review 6. Business Research Design: Steps involved in a research design	10	ATL1 ATL2 ATL6
II	Sampling and Data Collection 1. Sampling and sampling distribution: Meaning, Steps in Sampling process 2. Types of Sampling - Probability and Non probability Sampling Techniques 3. Data collection: Primary and Secondary data – Sources – Advantages/Disadvantages 4. Data collection Methods: Observations, Survey, Interview and Questionnaire design, Qualitative Techniques of data collection.	9	ATL2 ATL8
III	Measurement and Scaling Techniques 1. Nominal Scale, Ordinal Scale, Interval Scale, Ratio Scale, Criteria for good measurement 2. Attitude measurement – Likert's Scale, Semantic Differential Scale, Thurstone-equal appearing interval scale	8	ATL1 ATL6
IV	Statistical Tools for Data Analysis 1. Measures of central tendency - Mean, Median, Mode ,Quartiles, Deciles and Percentiles	7	ATL5 ATL7

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M.Tech CSE/ CSE(/DS/BDA/AI) / DS / BDA / AI / IS

SEMESTER-II (2026-28)

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*				
MTRM301	AECC	Research Methodology in Engineering	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	45				

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.

	2. Measures of Dispersion: Standard Deviation – Variance – Coefficient of Variance, Skewness 3. Correlation - Karl Pearson's coefficient of Correlation, Rank Correlation 4. Regression: Method of Least Squares 5. Formulation of hypothesis 6. Testing of hypothesis 7. Type I and Type II Errors. 8. Parametric tests: Z-Test, t-test, F-test, Analysis of Variance – One-Way and Two-way classification. 9. Non parametric tests - Chi-Square test		
V	Report writing 1. Reporting Research 2. Types of reports 3. Characteristics of a research report	8	ATL4 ATL9
	Total Hours	30	

ADDITIONAL RESOURCES

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

<https://nptel.ac.in/courses/109105196>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. N. K. Malhotra, *Marketing Research: An Applied Orientation*, 6th ed. Noida, India: Pearson Education, 2008.
2. W. G. Zikmund, B. J. Babin, J. C. Carr, and M. Griffin, *Business Research Methods*, 7th ed. New Delhi, India: Cengage Learning, 2003

Reference Books

1. D. R. Cooper and P. S. Schindler, *Business Research Methods*, 9th ed. New York, NY, USA: McGraw-

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SEMESTER-II (2026-28)

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*				
MTRM301	AECC	Research Methodology in Engineering	Max	60	20	20	0	0	3	1	0	4
			Min	24	16		0	45				

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.

Hill Education, 2006.

2. D. R. Anderson, D. J. Sweeney, T. A. Williams, and J. D. Camm, *Statistics for Business and Economics*, 12th ed. Boston, MA, USA: Cengage Learning, 2014.
3. O. R. Krishnaswami and M. Ranganatham, *Methodology of Research in Social Sciences*. Mumbai, India: Himalaya Publishing House, 2011.
4. R. I. Levin and D. S. Rubin, *Statistics for Management*, 7th ed. New Delhi, India: Dorling Kindersley (India) Pvt. Ltd., 2008.
5. U. Sekaran and R. Bougie, *Research Methods for Business: A Skill Building Approach*, 4th ed. New Delhi, India: Wiley India, 2003.

Suggested resources (Websites/e-books)

- 1 S. P. Gupta, *Statistical Methods*, 43rd ed. New Delhi, India: Sultan Chand & Sons, 2014.
- 2 A. D. Aczel and J. Sounderpandian, *Complete Business Statistics*, 7th ed. New Delhi, India: Tata McGraw-Hill, 2008.

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	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

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

M.Tech (CSE)

SEMESTER-II (2026-28)

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*				
MTCS203N	DCC	Advance Computer Network	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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 be able to demonstrate an understanding of the physical properties and performance characteristics of communication media; specifically copper cable, fibre optics and wireless networks.
2. To be able to demonstrate an understanding of the importance of communication standards, including an appreciation of protocol layer models and enhancements to those standards.
3. To be able to demonstrate an appreciation of the theory and practice of common local area networks including virtual and wireless LANs.
4. To be able to demonstrate an appreciation of the theory and practice of wide area networks and their interconnection.
5. To be able to demonstrate an appreciation of the significance of network and inter-network protocols; specifically IPv4, IPv6, TCP and UDP.
6. To be able to describe the importance of reliability and quality of service, including examples of error recovery strategies, traffic differentiation and prioritization.

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** Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
- CO2** Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
- CO3** Analyze, specify and design the topological and routing strategies for an IP based networking infrastructure.
- CO4** Have a working knowledge of datagram and internet socket programming.

TEACHING PEDAGOGY:

- T1** Classroom teaching (white board), Power Point Presentations, Interactive lectures, Inquiry-based teaching

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

M.Tech (CSE)

SEMESTER-II (2026-28)

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*				
MTCS203N	DCC	Advance Computer Network	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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.

T2 ABL activities, Assignments, Flip Class/ Seminars, Quizzes, Oral Viva-voce examination

ASSESSMENT TOOLS:

- 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

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction Concepts: Goals and Applications of Networks, Requirements, Network architecture, Networking principles, Network services and Layered architecture. The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.	10	ATL1 ATL4 ATL6
II	Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling Protocol architecture -	9	ATL2 ATL3 ATL8

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M.Tech (CSE)

SEMESTER-II (2026-28)

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*				
MTCS203N	DCC	Advance Computer Network	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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.

	Protocols - OSI - TCP/IP - LAN architecture - Topologies - MAC - Ethernet, Fast Ethernet, Token ring, Wireless LANS ,Switches.		
III	Circuit switching vs. packet switching / Packet switched networks – IP – ARP – RARP – DHCP – ICMP – Queueing discipline – Routing algorithms – RIP – OSPF – Subnetting – CIDR – Interdomain routing – BGP – Ipv6 – Multicasting – Congestion avoidance in network layer.	8	ATL2 ATL3 ATL6
IV	Transport Layer - Design issues, connection management, session Layer Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management UDP – TCP – Adaptive Flow Control – Adaptive Retransmission - Congestion control – Congestion avoidance – QoS.). Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.	7	ATL2 ATL5 ATL8
V	Email (SMTP, MIME, IMAP, POP3) – HTTP – DNS- SNMP – Telnet – FTP – Security – PGP – SSH. Control of networks: objectives and methods of control, Circuit switched networks, datagram and ATM networks. Mathematical background for control of networks like Circuit switched networks, Datagram and ATM networks Wireless LAN, 802.11, DHCP, outing in the Internet, MOSTF DVMRP, IP Over ATM, Storage Area Networks, Traffic Engineering Planning, WAP, Tiny OS, NEST Cellular Network, Multimedia Over Internet, RTP, RSVP, Tuning RED for Web Traffic, XCP, Skype, Internet Telephony, Enterprise Network Security, SNAT, DNAT.	8	ATL5 ATL7 ATL9
Total Hours		30	

ADDITIONAL RESOURCES

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

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

M.Tech (CSE)

SEMESTER-II (2026-28)

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*				
MTCS203N	DCC	Advance Computer Network	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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.

<https://www.netacad.com/courses/networking>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. A. S. Tanenbaum and D. J. Wetherall, *Computer Networks*, 4th ed. Upper Saddle River, NJ, USA: Prentice Hall, 2003.
2. J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 5th ed. Boston, MA, USA: Pearson Education, 2010.

Reference Books

1. B. A. Forouzan, *Data Communications and Networking*, 5th ed. New York, NY, USA: McGraw-Hill Education, 2013.
2. F. Halsall, *Computer Networking and the Internet*, 5th ed. Boston, MA, USA: Addison-Wesley, 2005.
3. B. A. Forouzan, *Data Communications and Networking*, 5th ed. New York, NY, USA: McGraw-Hill Education, 2013.
4. B. A. Forouzan, *TCP/IP Protocol Suite*, 4th ed. New York, NY, USA: McGraw-Hill Education, 2010.

Suggested resources (Websites/e-books)

1. D. E. Comer, *Internetworking with TCP/IP, Volume 1: Principles, Protocols, and Architecture*, 6th ed. Boston, MA, USA: Pearson Education, 2013.

LIST OF PRACTICAL

	Title	CO Mapping
1.	Simulate cyclic redundancy check (crc) error detection algorithm (crc) for noisy channel.	CO1
2.	Simulate and implement stop and wait protocol for noisy channel.	CO1
3.	Simulate and implement go back n sliding window protocol.	CO1
4.	Simulate and implement selective repeat sliding window protocol.	CO2
5.	Simulate and implement distance vector routing algorithm.	CO2

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M.Tech (CSE)

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTCS203N	DCC	Advance Computer Network	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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.

6.	Simulate and implement dijkstra algorithm for shortest path routing.	CO2
7.	Programs for ip address conversion function.	CO2
8.	Client server applications using inter process communication and synchronous. 1. Mechanisms fifo, Message queues, Shared memory.	CO2
9.	Connection oriented client server applications with tcp.	CO3
10.	Connectionless client server applications with UDP.	CO3
11.	Programs using rpc remote procedure call.	CO3
12.	Client server applications using concurrent server.	CO4
13.	Client server applications using multi protocol server.	CO4

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	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	2	3	3	2	1	2	3	2	2	3	2	1	3	2	1

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

M.Tech (CSE)

SEMESTER-II (2026-28)

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*				
MTCS204 N	DCC	Data science and Machine learning	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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 impart necessary knowledge of the mathematical foundations needed for data science and develop programming skills required to build data science 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** Demonstrate understanding of the mathematical foundations needed for data science.
- CO2** Collect, explore, clean, munge and manipulate data.
- CO3** Implement models such as k-nearest Neighbors, Naive Bayes, linear and logistic regression, decision trees, neural networks and clustering.
- CO4** Build data science applications using Python based toolkits.

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
- ATL3** Midterm Exams
- ATL4** Flip Class
- ATL5** Seminar Presentation
- ATL6** Assignments
- ATL7** Poster
- ATL8** Oral Viva-voce examination

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

M.Tech (CSE)

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTCS204 N	DCC	Data science and Machine learning	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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.

ATL9 Industrial Visit Report

PREREQUISITES:

None

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Introduction to Data Science: Concept of Data Science, Traits of Big data, Web Scraping, Analysis vs Reporting.	10	ATL1 ATL4 ATL6
II	Introduction to Programming Tools for Data Science: Toolkits using Python: Matplotlib, NumPy, Scikit-learn, NLTK, Visualizing Data: Bar Charts, Line Charts, Scatterplots, Working with data: Reading Files, Scraping the Web, Using APIs (Example: Using the Twitter APIs), Cleaning and Munging, Manipulating Data, Rescaling, Dimensionality Reduction.	9	ATL6 ATL8
III	Mathematical Foundations: Linear Algebra: Vectors, Matrices, Statistics: Describing a Single Set of Data, Correlation, Simpson's Paradox, Correlation and Causation, Probability: Dependence and Independence, Conditional Probability, Bayes's Theorem, Random Variables, Continuous Distributions, The Normal Distribution, The Central Limit Theorem, Hypothesis and Inference: Statistical Hypothesis Testing, Confidence Intervals, Phacking, Bayesian Inference.	8	ATL3 ATL8
IV	Machine Learning: Overview of Machine learning concepts – Over fitting and train/test splits, Types of Machine learning – Supervised,	7	ATL2

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M.Tech (CSE)

SEMESTER-II (2026-28)

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*				
MTCS204 N	DCC	Data science and Machine learning	Max	60	20	20	30	20	2	0	2	3
			Min	24	16		0	45				

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.

	Unsupervised, Reinforced learning, Introduction to Bayes Theorem, Linear Regression- model assumptions, regularization (lasso, ridge, elastic net), Classification and Regression algorithms- Naïve Bayes, K-Nearest Neighbors, logistic regression, support vector machines (SVM), decision trees, and random forest, Classification Errors, Analysis of Time Series- Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Neural Networks-Learning And Generalization, Overview of Deep Learning.		ATL3 ATL8
V	Case Studies of Data Science Application: Weather forecasting, Stock market prediction, Object recognition, Real Time Sentiment Analysis.	8	ATL5 ATL7 ATL9
	Total Hours	30	

ADDITIONAL RESOURCES

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

<https://skillsbuild.org/learn/data-science>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. J. Grus, *Data Science from Scratch: First Principles with Python*, 2nd ed. Sebastopol, CA, USA: O'Reilly Media, 2019.
2. A. Géron, *Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems*, 1st ed. Sebastopol, CA, USA: O'Reilly Media, 2017.

Reference Books

1. V. K. Jain, *Data Sciences*. New Delhi, India: Khanna Publishing House.
2. V. K. Jain, *Big Data and Hadoop*. New Delhi, India: Khanna Publishing House.
3. J. Jose, *Machine Learning*. New Delhi, India: Khanna Publishing House.

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- R. Chopra, *Machine Learning*. New Delhi, India: Khanna Publishing House.
- I. Goodfellow, Y. Bengio, and A. Courville, *Deep Learning*. Cambridge, MA, USA: MIT Press, 2016
- J. Han and J. Pei, *Data Mining: Concepts and Techniques*, 3rd ed. Waltham, MA, USA: Morgan Kaufmann Publishers, 2011.

Suggested resources (Websites/e-books)

- <http://www.deeplearningbook.org>

LIST OF PRACTICAL

	Title	CO Mapping
1.	Write a programme in Python to predict the class of the flower based on available attributes.	CO1
2.	Write a programme in Python to predict if a loan will get approved or not.	CO2
3.	Write a programme in Python to predict the traffic on a new mode of transport.	CO3
4.	Write a programme in Python to predict the class of user.	CO4
5.	Write a programme in Python to indentify the tweets which are hate tweets and which are not.	CO3
6.	Write a programme in Python to predict the age of the actors.	CO4
7.	Mini project to predict the time taken to solve a problem given the current status of the user.	CO2

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	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	2	2	3	2	-	3	2	2	1	1	3	3	1	2

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTCS207 N	SEC	Software Construction Lab	Max	0	0	0	0	50	0	0	2	1
			Min	0	0	0	45					

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. Apply the fundamentals of software construction as outlines in this course to an actual software development project.
2. Demonstrate by example the key construction life cycle models.
3. Interpret key practical construction considerations such as design, languages, coding, testing, quality and reuse.
4. Evaluate and provide examples of the key construction technologies in a typical software construction project.
5. Explain the application of software construction tools such as GUI builders, unit testing tools, profiling, performance analysis and slicing tools.

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** Students will able to understand tools used in software construction.
- CO2** Students will able implement software process models & can use CASE tools.
- CO3** Students will able prepare projects plan and implement projects.

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
- ATL3** Midterm Exams
- ATL4** Flip Class
- ATL5** Seminar Presentation

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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.

ATL6 Assignments

ATL7 Poster

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Course Modules: Software Construction Fundamentals, Minimizing Complexity, Anticipating Change, Constructing for Verification, Reuse Standards in Construction.	10	ATL1 ATL6
II	Construction in Life Cycle Models, Construction Planning, Construction Measurement, Construction Design, Construction Languages, Coding.	9	ATL2 ATL3
III	Construction Testing, Construction for Reuse, Construction with Reuse, Construction Quality, Integration.	8	ATL6 ATL8
IV	API Design and Use, Object-Oriented Runtime Issues, Parameterization and Generics, Assertions, Design by Contract, and Defensive Programming, Error Handling, Exception Handling, and Fault Tolerance, Executable Models, State-Based and Table-Driven Construction Techniques, Runtime Configuration and Internationalization, Grammar-Based Input Processing, Concurrency Primitives Middleware.	7	ATL2 ATL5
V	Constructing Heterogeneous Systems, Performance Analysis and Tuning, Platform Standards, Test-First Programming. Development Environments, GUI Builders, Unit Testing Tools, Profiling, Performance Analysis, and Slicing Tools.	8	ATL2 ATL9
Total Hours		30	

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ADDITIONAL RESOURCES

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

<https://skills.github.com>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. K. J. Lieberherr and I. M. Holland, "Assuring good style for object-oriented programs," *IEEE Software*, vol. 6, no. 5, pp. 38–48, Sep. 1989.
2. D. L. Parnas, "On the criteria to be used in decomposing systems into modules," *Communications of the ACM*, vol. 15, no. 12, pp. 1053–1058, Dec. 1972.

Reference Books

1. W. A. Wulf and M. Shaw, "Global variable considered harmful," *ACM SIGPLAN Notices*, vol. 8, no. 2, pp. 28–34, Feb. 1973.
2. J. Hughes, "Why Functional Programming Matters," *The Computer Journal*, vol. 32, no. 2, pp. 98–107, Apr. 1989.
3. R. C. Martin, *Design Principles and Design Patterns*. Chicago, IL, USA: Object Mentor, 2000.

Suggested resources (Websites/e-books)

1. D. L. Parnas, "On the criteria to be used in decomposing systems into modules," *Communications of the ACM*, vol. 15, no. 12, pp. 1053–1058, Dec. 1972.

LIST OF PRACTICAL

	Title	CO Mapping
1.	Introduction to UML and Course Outlines. Tools Description.	CO1
2.	Introduction to Rational Rose and Practical Implementation.	CO1,02
3.	Introduction to class Diagram.	CO1
4.	Class Diagram in Detail and Tasks Done by using Rational Rose.	CO2

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MTCS207 N	SEC	Software Construction Lab	Max	0	0	0	0	50	0	0	2	1
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5.	Introduction to Use-case Diagram, its Detail and implementation by using Rational Rose.	CO2
6.	Introduction to Sequence Diagram.	CO1,02
7.	Sequence Diagram in Detail and Tasks by using Rational Rose.	CO1
8.	Introduction of Component Diagram and its implementation by using Rational Rose.	CO2
9.	Introduction to Collaboration Diagram and Task by using Rational Rose.	CO1
10.	Test cases and Few Scenarios of test-cases in real life.	CO2
11.	Introduction to TestLog and an implementation on it.	CO3

COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
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