



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/ 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.

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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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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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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	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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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	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

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTIT201N	DCC	Data Security	Max	60	20	20	30	20	3	0	2	4
			Min	24	16		0	45				

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COURSE OBJECTIVES:

The student will have ability to:

- To impart the knowledge of encryption and decryption techniques and their applications in managing the security of 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** Explain the fundamental concepts, principles, and challenges of data security, including confidentiality, integrity, and availability of information.
- CO2** Analyze cryptographic techniques, authentication mechanisms, and access control models used for securing data and communication systems.
- CO3** Evaluate security threats, vulnerabilities, attacks, and risk management strategies in databases, networks, cloud environments, and information systems.

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
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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.

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Foundation Security Taxonomy: Domain of information security, security goals, security approaches, principles of security, security attacks, threats, vulnerabilities, malicious software's, virus, worms, Trojan, spy wares, Applets/Active X, cookies. Security services, mechanisms and security models. Types of attacks, packet sniffing, packet spoofing, IP sniffing, IP spoofing, DNS spoofing attack.	10	ATL1 ATL4 ATL6
II	Classical Cryptographic Techniques: Cryptography terminologies, classical cryptography: substitution techniques, transposition techniques, play fair cipher, Hill cipher. Mathematics of cryptography: Integer arithmetic, modular arithmetic, Elucid theorem, Concept of symmetric and asymmetric key cryptography, stenography, digital watermarking, key range and size, possible types of attacks. Stream ciphers and Block cipher. Algorithm type and modes. Key distribution, Deffie Hellman key exchange, Man in the middle attack.	9	ATL3 ATL6
III	Symmetric Key Algorithms: Computer based symmetric key cryptographic algorithms: Data Encryption Standard (DES), Double DES, meet in the middle attack,	8	ATL2 ATL3 ATL5

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MTIT201N	DCC	Data Security	Max	60	20	20	30	20	3	0	2	4
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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.

	Triple DES, International Data Encryption Algorithm (IDEA), RC5, Blowfish, Advance Encryption Standard (AES).		
IV	Asymmetric Key Algorithms: Random number generation, Prime numbers. Fermat's and Euler's theorem. Principles of public key crypto systems. Computer based asymmetric key cryptographic algorithms: RSA algorithm. Principles of public key cryptosystems, symmetric and asymmetric key cryptography together. Concept of Digital Envelope, Digital signatures, message digests and its requirements.	7	ATL2 ATL8
V	Public Key Crpto systems: MD5 Message Digest Algorithm, Message authentic codes, Hash functions, Secure Hash Algorithms, Hash based message authentic code. Elliptical Curve Cryptography (ECC). Problems with the public key exchange.	8	ATL7 ATL8
	Total Hours	30	

ADDITIONAL RESOURCES

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

<https://www.netacad.com/career-paths/cybersecurity>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. D. R. Stinson and M. B. Paterson, *Cryptography: Theory and Practice*, 4th ed. Boca Raton, FL, USA: Chapman & Hall/CRC, 2018.
2. W. Stallings, *Cryptography and Network Security: Principles and Practice*, 7th ed. Noida, India: Pearson Education, 2017.

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Reference Books

1. M. Bishop, *Introduction to Computer Security*. Boston, MA, USA: Addison-Wesley, 2005.
2. A. Kahate, *Cryptography and Network Security*, 3rd ed. New Delhi, India: Tata McGraw-Hill Education, 2013.

Suggested resources (Websites/e-books)

1. C. Kaufman, R. Perlman, and M. Speciner, *Network Security: Private Communication in a Public World*, 2nd ed. Upper Saddle River, NJ, USA: Prentice Hall, 2002.

LIST OF PRACTICAL

	Title	CO Mapping
1.	Study of Basic Security Concepts – Confidentiality, Integrity, Availability (CIA Triad), Authentication, Authorization, and Non-Repudiation.	CO1
2.	Implementation of Classical Encryption Techniques – Caesar Cipher, Playfair Cipher, and Vigenère Cipher.	CO1
3.	Implementation of Symmetric Key Cryptography – AES and DES encryption/decryption algorithms.	CO2
4.	Implementation of Asymmetric Key Cryptography – RSA algorithm for secure communication.	CO2
5.	Implementation of Hashing Algorithms – MD5, SHA-1, and SHA-256 for data integrity verification.	CO2
6.	Implementation of Digital Signatures – Generate and verify digital signatures using RSA/ECDSA.	CO3
7.	Study and Implementation of Key Exchange Protocols – Diffie-Hellman Key Exchange.	CO3
8.	User Authentication and Access Control – Design and implement role-based access control (RBAC).	CO3

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COURSE ARTICULATION MATRIX (MAPPING OF COs WITH POs)

Course Outcome s	Correlation with POs												Correlation with PSOs		
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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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MTIT202N	DCC	Secure Wireless Network	Max	60	20	20	30	20	3	0	2	4
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COURSE OBJECTIVES:

The student will have ability to:

1. Provide students with enhance base of knowledge of wireless networking.
2. Learn Security Issues in different wireless networks and mitigation techniques.
3. Develop a comprehensive knowledge of Tools and Techniques used in Management of wireless Networks.
4. Develop ability to carry out research in area of security in wireless 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:

- CO1** Explain wireless communication technologies and network architectures
- CO2** Analyze mobility management and data dissemination techniques
- CO3** Evaluate security mechanisms in Bluetooth, WLAN, and MAN technologies
- CO4** Assess security issues and solutions in GSM, 1G–4G, Ad hoc and Sensor Networks

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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ATL7 Poster

ATL8 Oral Viva-voce examination

ATL9 Industrial Visit Report

PREREQUISITES:

Basic Computer Knowledge

SYLLABUS:

Module	Descriptors/Topics	Hours	Assessment Tools
I	Foundation Review of wireless communication Technologies: Cellular Networks, Wireless LAN, Personal Area Networks, Adhoc and Sensor Networks, Challenges in Adhoc and Sensor networks: Constrained Resources, Security, Mobility.	10	ATL1 ATL3
II	Adaptability in Mobile computing, Mobility Management: Location Management Principles and Techniques, Data Dissemination and Management.	9	ATL6 ATL8
III	Mobile and Wireless Security Issues, Approaches to security, Security in Wireless Personal Area Networks: Bluetooth Security Modes, Bluetooth Security Mechanisms, Authentication and Encryption in Bluetooth networks.	8	ATL2 ATL8
IV	Security in Wireless Local Area Networks: WEP, WPA, IEEE802.11i, Security in Metropolitan Area Networks: IEEE 802.16 and Security.	7	ATL5 ATL7
V	Security in Wide Area Networks: GSM Security, Four Generations of Wireless: 1G-4G, limitations and Security. Security in Ad hoc and Sensor networks.	8	ATL8 ATL9

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

M.Tech (Information Security)

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*				
MTIT202N	DCC	Secure Wireless Network	Max	60	20	20	30	20	3	0	2	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.

		Total Hours	30	
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ADDITIONAL RESOURCES

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

<https://www.netacad.com/courses/introduction-to-cybersecurity>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. F. Adelstein, S. K. S. Gupta, G. Richard III, and L. Schwiebert, *Fundamentals of Mobile and Pervasive Computing*. New York, NY, USA: McGraw-Hill, 2005. .
2. N. Bergman, M. Stanfield, J. Rose, and J. Scambray, *Hacking Exposed: Mobile Security Secrets and Solutions*. New York, NY, USA: McGraw-Hill/Osborne, 2005.

Reference Books

1. J. Khan and A. Khwaja, *Building Secure Wireless Networks with 802.11*. Indianapolis, IN, USA: Wiley Publishing, 2003
2. C. S. R. Murthy and B. S. Manoj, *Ad Hoc Wireless Networks: Architectures and Protocols*. Upper Saddle River, NJ, USA: Prentice Hall, 2004.

LIST OF PRACTICAL

	Title	CO Mapping
1.	Study of Wireless Communication Technologies: Cellular Networks, WLANs, PANs, Ad hoc Networks, and Wireless Sensor Networks	CO1
2.	Configuration and Performance Analysis of IEEE 802.11 Wireless LAN	CO1,03
3.	Implementation of Bluetooth Security Modes, Authentication, and Encryption Mechanisms	CO3
4.	Simulation of Mobility Management and Handoff Mechanisms in Mobile Networks	CO2
5.	Implementation of Location Management Techniques in Mobile Computing Environments	CO2
6.	Data Dissemination and Routing Analysis in Ad hoc Networks	CO2,04

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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*				
MTIT202N	DCC	Secure Wireless Network	Max	60	20	20	30	20	3	0	2	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.

7.	Configuration and Security Analysis of WEP, WPA, and IEEE 802.11i Protocols	CO3
8.	Study and Security Analysis of IEEE 802.16 (WiMAX) Metropolitan Area Networks	CO3
9.	GSM Security Architecture: Authentication and Encryption Mechanisms	CO4
10.	Security Analysis of Wireless Sensor Networks under Different Attack Scenarios	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	3	2	1	1	2	3	2	1	2	2	1	2	3	2	1

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SEMESTER-II (2026-28)

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTIT203N	DCC	Cloud Security	Max	60	20	20	0	0	2	0	0	2
			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. To understand Cloud concepts, introduction to IBM cloud.
2. To understand ISO 27017-Cloud Security, PCI.
3. To Understand DSS Controls.
4. To Understand Flips Levels and Learners will be able.
5. To Understand how to work on containerization concept using Docker as a Tool and will work on Kubernetes.

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** Set Cloud computing security guidelines set forth by ISO, NIST, ENISA and Cloud Security Alliance (CSA).
- CO2** Design Cloud security architectures that assure secure isolation of compute, network and storage infrastructures.
- CO3** Comprehensive data protection, end-to-end identity and access management.
- CO4** Monitoring and auditing processes and compliance with industry and regulatory mandates.
- CO5** Fundamentals of cloud computing architectures based on current standards, protocols, And best practices.

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

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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*				
MTIT203N	DCC	Cloud Security	Max	60	20	20	0	0	2	0	0	2
			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.

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	- Cloud security model - Introduction of IBM cloud - Network parameters and cryptography	10	ATL1 ATL4 ATL6
II	- FIPS - Management plan implementation - What is forensic science - Gap analysis - Risk terminology - The CSA STAR component and supply chain	9	ATL2 ATL5 ATL8
III	- Key data function - Access process and share - Data dipression in the cloud security - Threats to storage types: Gateway encryption key storage in cloud - Containerization data de identification Anonymization DLP, DRM, SDN Data protection risk	8	ATL2 ATL3 ATL6

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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*				
MTIT203N	DCC	Cloud Security	Max	60	20	20	0	0	2	0	0	2
			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.

IV	• Key regulations for CSP Facilities • BIA • Phases and methodologies • Threat modelling • Software supply chain management	7	ATL4 ATL5 ATL8
V	• Federated identity management • WS federation • O Auth 2.0 • Open id connect • Database activity monitor • Cloud secured development lifecycle • Open web aap security project • DRS performance monitoring • IDS	8	ATL5 ATL7 ATL9
Total Hours		30	

ADDITIONAL RESOURCES

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

<https://learn.microsoft.com/training>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. J. R. Vacca, *Cloud Computing Security: Foundations and Challenges*. Boca Raton, FL, USA: CRC Press, 2017.
2. R. D. Vines and R. L. Krutz, *Cloud Security: A Comprehensive Guide to Secure Cloud Computing*. Indianapolis, IN, USA: Wiley Publishing, 2010.

Reference Books

1. R. D. Vines and R. L. Krutz, *Cloud Security: A Comprehensive Guide to Secure Cloud Computing*.

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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*				
MTIT203N	DCC	Cloud Security	Max	60	20	20	0	0	2	0	0	2
			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.

Indianapolis, IN, USA: Wiley Publishing, 2010.

2. D. E. Y. Sarna, *Implementing and Developing Cloud Computing Applications*. Boca Raton, FL, USA: CRC Press, 2011.

Suggested resources (Websites/e-books)

- 1 T. Erl, R. Puttini, and Z. Mahmood, *Cloud Computing: Concepts, Technology and Architecture*. Upper Saddle River, NJ, USA: Prentice Hall, 2013.

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	3	3	3	3	2	1	2	3	2	2	3	2	2	3	1
CO5	2	3	2	-	3	2	2	1	3	3	1	3	1	2	3

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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*				
MTIT204N	DCC	Information Theory and Coding	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:

- Students should be able to calculate the information content of a random variable from its probability distribution relate condition and marginal entropies of variables interims of their coupled probabilities.
- Channel capacities and properties using Shannon's Theorems construct efficient client codes for data on imperfect communication channels generalize the discrete concepts to continuous signals on continuous channels understand.

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 be introduced to the basic notions of information and channel capacity.
- CO2** Derive equations for entropy mutual information and channel capacity for all types of channels.
- CO3** Design a digital communication system by selecting an appropriate error correcting codes for a particular application.

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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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTIT204N	DCC	Information Theory and Coding	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.

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 of Information Theory: Introduction, Measure of information, Average information content of symbols in long independent sequences, Average information content of symbols in long dependent sequences. Mark off statistical model for information source, Entropy and information rate of mark off source.	9	ATL1 ATL3 ATL8
II	Source Coding: Encoding of the source output, Shannon's encoding algorithm. Communication Channels, Discrete communication channels, Continuous channels. Fundamental Limits on Performance: Source coding theorem, Huffman coding, Discrete memory less Channels, Mutual information, Channel Capacity.	9	ATL2 ATL6
III	Channel: Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Channel capacity Theorem Introduction. Introduction to Error Control Coding: Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for Decoding	9	ATL6 ATL8
IV	Cyclic Codes: Binary Cycle Codes, Algebraic structures of cyclic	8	ATL2

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTIT204N	DCC	Information Theory and Coding	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.

	codes, Encoding using an (n-k) bitshift register, Syndrome calculation. BCH codes. RS codes, Golay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes.		ATL3 ATL8
V	Convolution Codes: Convolution Codes, Time domain approach. Transform domain approach.	7	ATL5 ATL8
Total Hours		30	

ADDITIONAL RESOURCES

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

<https://nptel.ac.in/courses/108102117>

B. Remedial classes for slow learners:

As per the SVVV SOP for slow and fast learners.

SUGGESTED READINGS:

Textbooks

1. R. Bose, *Information Theory, Coding and Cryptography*, 3rd ed. New Delhi, India: Tata McGraw-Hill Education, 2017.
2. I. A. Glover and P. M. Grant, *Digital Communications*, 2nd ed. Harlow, U.K.: Pearson Education, 2008.

Reference Books

1. K. N. Hari Bhat and D. Ganesh Rao, *Information Theory and Coding*. New Delhi, India: Cengage Learning, 2017.
2. K. S. Shanmugam, *Digital and Analog Communication Systems*. New York, NY, USA: Wiley, 1996.
3. Digital communication, Simon Haykin, Wiley, 2003. S. Haykin, *Digital Communication*. New York, NY, USA: Wiley, 2003.

Suggested resources (Websites/e-books)

- 1 S. Lin and D. J. Costello, *Error Control Coding: Fundamentals and Applications*, 2nd ed. Upper Saddle River, NJ, USA: Pearson Education, 2004.

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			Marks	THEORY			PRACTICAL					
				END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MTIT204N	DCC	Information Theory and Coding	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.

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	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
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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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