

**Institute of Computer Science
Samrat Vikramaditya Vishwavidyalaya,
Ujjain (MP)**

**SCHEME OF
M.SC. COMPUTER SCIENCE WITH DATA SCIENCE
(Under the Faculty of Engineering Science)
ONE YEARS (2 SEMESTERS) CBCS
(FOR UTD)
(UNDER NEW EDUCATION POLICY-2025-26)**

CHOICE BASED CREDIT SYSTEM (CBCS)

2025-2026 ONWARDS

Institute of Computer Science
Samrat Vikramaditya Vishwavidyalaya Ujjain
M.Sc.(Computer Science with Data Science)

Programme Objectives:

The objective of this programme is to prepare graduate students for productive careers in the software industry and academia by providing an outstanding environment for teaching and research in the core and emerging areas of the discipline.

This Bachelor Degree Program has been designed with a semester approach in mind. The first year courses are aimed at skills development in computers using various technologies, the second year, provides the specialization and the project work.

The main objectives of this programme includes:

- Learn various programming languages to solve real world problems from diversified python and Machine learning domain.
- To develop in depth understanding of the key concepts of computer science and to impart knowledge of problem solving techniques, database management, software engineering and Web Technology.
- Develop problem solving skills in interdisciplinary domains.
- Focus on development of advanced knowledge and specific skills required for IT industry working in the domain of AI.
- To make sustained efforts for holistic development of the students and empower them to analyze, develop, configure IT solutions keeping in view the challenges posed by changing industrial requirements.
- To develop competent computer professionals with strong ethical values.

PROGRAMME OUTCOMES (POs)

At the end of this programme, student will be able to:

- Explore software, hardware, application systems and their interplay in Machine learning systems.
- Employ tools and technologies to implement Machine learning applications.
- Acquire experimental learning of algorithms and tools required for capturing, storing, managing and analyzing new language.
- Gain understanding of the key technologies Machine learning, Computer Organization, Computer Architecture, Data Communication, Web Technology, Cloud Computing, Soft computing, Artificial Intelligence and Advance Data Structures.
- Understanding the key concepts of Information Technology to improvise organizational performance.

After Completion of the programme students are able to work as-

- Language Programmer
- -Software Developer
- -Web Application Developer

SAMRAT VIKRAMADITYA VISHWAVIDYALAYA, UJJAIN MP

(Session -2025-2026 onwards)

M.Sc.(Computer Science with Data Science)

One Years (Two SEMESTERS), CBCS SCHEME (NEP)

Semester –I

S.No.	Paper code	Course Component and Name of Course	Credits			Marks		Total
			T	P	Total	Max Marks CCE Internals	Max Marks Theory Externals	
1.	MSC -31 Core-I	Cyber Security	5	0	5	40	60	100
2.	MSC -32 Core-II	Data Mining and Data Warehousing	5	0	5	40	60	100
3.	MSC -33 Core-III	Artificial intelligence & Machine Learning	5	0	5	40	60	100
4.	MSC- 34 PC-III	Python Programming/R Programming	3	2	5	40	60	100
5	MSC -35	Seminar	2	0	2	50	0	50
Total Credits and marks			20	2	22	210	240	450

SAMRAT VIKRAMADITYA VISHWAVIDYALAYA, UJJAIN MP

(Session -2025-2026 onwards)

M.Sc.(Computer Science with Data Science)

One Years (Two SEMESTERS), CBCS SCHEME (NEP)

Semester -II

S.No.	Paper code	Course Component and Name of Course	Credits			Marks		Total
			T	P	Total	Max Marks CCE Internals	Max Marks Theory Externals	
1.	MSC -41	Dissertation	8	0	8	50	100	150
2.	MSC -42	Seminar	0	6	6	50	100	150
3	MSC -43	Viva Voce	0	8	8	50	100	150
Total Credits and marks			8	14	22	150	300	450

PART A: Introduction				
Program: M.Sc.		Class: ISEM	Year: I Year	Session: 2025-26
Subject: Computer Science with Data Science				
1.	Course Code		MSC-31	
2.	Course Title		Cyber Security	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational		Core Course	
4.	Pre-Requisite (if any)			
5.	Course Learning Outcomes(CLO)		After the successful completion of the course, the student shall be able to-: ➤ To grasp the fundamental principles, concepts, and terminology of cyber security, including various types of cyber threats, attacks, and vulnerabilities. ➤ To be able to design, implement, and manage network security measures, including firewalls, intrusion detection systems, and secure wireless networks.. ➤ To understand the principles of cryptography and be able to apply cryptographic techniques to secure communication channels, such as encrypting data and verifying digital signatures. ➤ To understand the legal and ethical aspects of cyber security, including privacy laws, intellectual property rights, and ethical hacking practices. ➤ To develop a continuous learning mindset, keeping up-to-date with emerging trends, new threats, and evolving technologies in the field of cyber security.	
6.	Expected job role /career opportunities		➤ Security Analyst ➤ Ethical Hacker/Penetration Tester ➤ Security Consultant ➤ Digital Forensics Analyst	
7.	Credit Value		5	
8.	Total Marks		Max. Marks : 100	Min. Passing Marks: 40

PART B: Content of the Course		
Total No. of Lectures(6 hours per week): 01 Hours per day		
Total Lectures: 60 Hours		
Unit	Topics	No. of Lectures
I	Introduction to Cyber Security, Need for security, Concept of Cyber Space, CyberCrimes and Cyber-attack.Fundamental security principles – threats, attacks andvulnerability.Key Security triad – Confidentiality, Integrity and Availability.Introduction to different classes of security attacks - active and	12

	passive. Impact of attacks on an organization and individuals. Principles of Cybersecurity– Apply cybersecurity architecture principles. Cybersecurity models	
II	History, what is Information Security? Critical Characteristics of Information, NIST Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The Security SDLC, The Computer Security Problem - Targets and Attacks. Approaches to Computer Security, Basic Security Terminology - Security Models. Legal, Ethical and Professional Issues.	12
III	Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk. Risk Identification, Techniques for Identifying risks, Risk Analysis: Types of Risk Analysis, Probability and impact assessment, Risk Matrix, Prioritizing Risks. Risk Evaluation: Accepting, Transferring, Mitigating or Avoiding Risks, Risk Treatment, Monitoring and Review.	12
IV	Introduction Cyber Threat, Definition of Cyber Crime, Classification – Current Threats and Trends, Diversity of Cyber Crime, Cyber Hate Crimes, Cyber Terrorism. Cyber Strategy– National Security Strategy – Cyber Security Strategy – Organized Crime Strategy – Cyber Crime Strategy, Policy Cyber Crime, International Response – National Cyber Security Structure, Strategic Policy Requirements.	12
V	Preventing Cyber Crime, Password Protection, Get Safe Online, Cyber Security, Guidance for Business, Cyber Crime Investigation Skills, Criminal Investigation, Code of Ethics, Hi-Tech Investigations, Capturing and Analyzing Digital Evidence, Cyber security testing – Penetration testing. System Level Solutions – Introduction to Intrusion Detection System (IDS) and Intrusion Protection System (IPS). Basic Concept of Ethical, Hacking. Protecting against Cyber Crime	12

PART C: Learning Resources	
Textbooks, Reference Books, Other Resources	
Suggested Readings:	
1. Textbooks: • "Principles of Information Security" by Michael E. Whitman and Herbert J. Mattord, 6th Edition (2021), Publisher: Cengage Learning • "Computer Security: Principles and Practice" by William Stallings and Lawrie Brown, 4th Edition (2018), Publisher: Pearson • "Cryptography and Network Security: Principles and Practice" by William Stallings, 8th Edition (2020), Publisher: Pearson • "Security Engineering: A Guide to Building Dependable Distributed Systems" by Ross J. Anderson, 2nd Edition (2008). Publisher: Wiley	

2. Suggestive digital platforms web links:

<https://owasp.org/>

<https://www.sans.org/>

<https://www.nist.gov/cybersecurity>

<https://thehackernews.com/>

Suggested equivalent online courses: <https://onlinecourses.swayam2.ac.in>

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: **100**
Continuous Comprehensive Evaluation (CCE): **40**Marks
University Exam (UE): **60** Marks

Internal Assessment:	Class Test	20
Continuous	Assignment/Presentation	20
Comprehensive Evaluation (CCE)		Total Marks: 40
External Assessment:	Section (A):Short Answer type questions	04× 05 = 20
University Exam (UE)	Section (B): Long Answer Type Questions	08× 05 = 40
Time: 03.00 Hours		Total Marks: 60

PART A: Introduction			
Program: M.Sc.	Class: ISEM	Year: I Year	Session: 2025-26
Subject: Computer Science with Data Science			
1.	Course Code	MSC-32	
2.	Course Title	Data Mining	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational	Core Course	
4.	Pre-Requisite (if any)	To study this course, a student must have the basic knowledge of Data Base Management System	
5.	Course Learning Outcomes(CLO)	• Demonstrate an Understanding and knowledge of the Data Warehousing, Data Mining and Business Intelligence • Explain the Data Analysis and Knowledge Delivery Stages. • Organize and Prepare the Data Needed for Data Mining Using Pre processing Techniques • Implement the Appropriate Data Mining Methods Like Association, Classification, Clustering • Apply Data Mining Methods to Solve Practical Problems. (Analyze the Problem Domain, Data Collection, Pre processing, Apply Suitable Data Mining Method, Interpret and Visualize the Results and Provide Decision Support.	
6.	Credit Value	5 credits	
7.	Total Marks	Max. Marks : 100	Min. Passing Marks: 40

PART B: Content of the Course		
Total No. of Lectures (in hours per week): 01 Hour per day		
Total Lectures:60 Hours		
Unit	Topics	No. of Lectures
I	Introduction : Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas. Association Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc., Generalized association rules.	12
II	Clustering paradigms; Partitioning algorithms like K-Mediod, CLARA,CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS. Other DM techniques & Web Mining: Application of Neural Network, AI, Fuzzy logic	12

	and Genetic algorithm, Decision tree in DM. Web Mining, Web content mining, Web structure Mining, Web Usage Mining.	
III	Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis. Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends.	12
IV	Data Mining of Image and Video : A case study. Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.	12
V	The vicious cycle of Data mining, data mining methodology, measuring the effectiveness of data mining data mining techniques. Market baskets analysis, memory based reasoning, automatic cluster detection, link analysis, artificial neural networks, generic algorithms, data mining and corporate data warehouse, OLA	12

PART C: Learning Resources	
Textbooks, Reference Books, Other Resources	
Suggested Readings: 1. Data Mining Techniques ; Arun K.Pujari ; University Press. 2. Data Mining; Adriaans & Zantinge; Pearson education. 3. Mastering Data Mining; Berry Linoff; Wiley. 4. Data Mining; Dunham; Pearson education.	

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 40 Marks University Exam (UE): 60 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	20 20 Total Marks: 40
External Assessment: University Exam (UE) Time: 03.00 Hours	Section (A): Short Answer type questions Section (B): Long Answer Type Questions	04 × 05 = 20 08 × 05 = 40 Total Marks: 60

PART A: Introduction			
Program: M.Sc.	Class: ISEM	Year: I Year	Session: 2025-26
Subject: Computer Science with Data Science			
1.	Course Code	MSC-33	
2.	Course Title	Artificial Intelligence and Machine Learning	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational)	Core Course	
4.	Pre-Requisite (if any)	Basic knowledge of Computer.	
5.	Course Learning Outcomes(CLO)	After the successful completion of the course, the student shall be able to:- • Working with Machine Learning • Development of Robotics • Development of Exepert Systems • Development of AI Tool	
6.	Expected job role /career opportunities	• Open AI • AI Tool • Machine Learning	
7.	Credit Value	5	
8.	Total Marks	Max. Marks : 100	Min. Passing Marks: 40

PART B: Content of the Course		
Total No. of Lectures (6 hours per week): 01 Hours per day		
Total Lectures: 60 Hours		
Unit	Topics	No. of Lectures
I	Introduction of Artificial Intelligence: What is AI ? The Importance of AI. AI and related fields. Introduction to Natural Language Processing . Basic Problem solving methods: Production systems-state space search, control strategies, Breadth first search, Depth first search, Heuristic search, Hill Climbing techniques: Best First search, forward and backward reasoning.	12
II	Knowledge : General Concepts, Definition and Importance of Knowledge, Knowledge based system, representation of Knowledge, Knowledge Organization , Knowledge Manipulation , Acquisition of Knowledge. Introduction to Expert System: Definition, Characteristics, Importance and Applications of Expert System, structure of Expert System. Case study of MYCIN & DENDRAL.	12
III	LISP AND AI PROGRAMMING LANGUAGES : Introduction to LISP : Syntax and Numeric Functions, Basic List Manipulation Functions in LISP , Functions, Predicates, and Conditionals, Input, Output, and Local Variables, Iteration and Recursion, Property List and arrays, PROGLOG and Other AI Programming Languages.	12
IV	FORMALIZED SYMBOLIC LOGICS : Introduction , Syntax and Semantics for Propositional Logic , Syntax and Semantics for FOPL , Properties of Wffs , Conversion to Clausal Form, Inference Rules , The Resolution Principle , Representations Using Rules. Neural Network: Basic structure of neuron, perception, feed forward and back propagation, Hopfield network.	12

V	Learning Problems-Perspectives and Issues-Concept Learning - Version Spaces and Candidate Eliminations-Inductive bias-Decision Tree learning-Representation Algorithm- Heuristic Space Search.	12
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PART C: Learning Resources	
Textbooks, Reference Books, Other Resources	
Suggested Readings:	
1. Textbooks: 1. Rajsekaran & Pai – Neural Networks, fuzzylogic & Genetic algorithms, PHI 2. Rich E and Knight K, Artificial Intelligence, TMH, New Delhi. 3. Hagan, Dernuth & Beale, Neural network design, Thomson learning, VP. 4. Philip D. Wasserman, Neural Computing, Van Nostrand Reinhold Pub. 5. Kecman: Learning & soft Computing, Pearson Edu.	
2. Suggestive digital platforms web links: https://www.includehelp.com/soft-computing/ https://www.vssut.ac.in/lecture_notes/lecture1423723637.pdf https://digitalthinkerhelp.com/what-is-soft-computing-and-its-applications-and-techniques/	
Suggested equivalent online courses: https://onlinecourses.nptel.ac.in/noc20_cs17/preview	

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 40 Marks		
University Exam (UE): 60 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Assessment: Continuous Comprehensive Evaluation (CCE)
External Assessment: University Exam (UE) Time: 03.00 Hours	External Assessment: University Exam (UE) Time: 03.00 Hours	External Assessment: University Exam (UE) Time: 03.00 Hours

PART A: Introduction				
Program: M.Sc.		Class: ISEM	Year: I Year	Session: 2025-26
Subject:Computer Science with Data Science				
1.	Course Code		MSC-34	
2.	Course Title		PROGRAMMING IN PYTHON	
3.	Course Type (Core Course/Elective/Generic Elective/ Vocational		PC-III	
4.	Pre-Requisite (if any)		Basic knowledge of programming	
5.	Course Learning Outcomes(CLO)		• Students will be able to design web applications using python • Students will be able to create GUI application • Students will be able to plot graphs • Students will be able to image processing • Student will able to access. • Student will able to learn working with database.	
6.	Credit Value		5 Credits	
7.	Total Marks		Max.Marks : 100	Min. Passing Marks:40

PART B: Content of the Course		
Total No. of Lectures(in hours per week): 1 Hour per Day		
Total Lectures:60 Hours		
Unit	Topics	No. of Lectures
I	Python Introduction: History, Features, Python vs other languages, Python Installation path setup and running programme, Python IDE: Anaconda, Pycharm, Spider, Jupyter notebook, Google Colab. Python Syntax, comment, variable, literals, datatype, type casting, operators, Control Statements- If-else, Match-case, while loop, for loop, break, continue and pass statement.	12
II	Python Function and Module: Defining and calling function, Arguments-arbitrary arguments, keyword argument, Default arguments, return value, Pass by reference vs value, Recursion, Variable scope. Modules- Module creation, using import, from..import and, from..as statement, Math module, DateTime module.	12
III	Python OOPs Concept- Class & Object, Constructor, Inheritance and Polymorphism. String and string manipulation, Python Collection- List, tuple, set, dictionaries and Arrays. Python error and Exception Handling, File Handling, Read and Write CSV and Excel file, Python Multithreading.	12
IV	Python Django / Flask- Overview of HTML, CSS, JavaScript, installation of Django/Flask, create website with python code, Run website using Django/Flask Framework. Python with MySQL / SQLite- Installation, Creating database, connection and table, Data manipulation with Insert, Select, Update and Delete	12

	command.	
V	Python Miscellaneous: Command line arguments, CGI programming, GUI programming using Tkinter, Image Processing using OpenCV, Plotting graph using Matplotlib, Overview of NumPy, Pandas, SciPy, Keras, Tensorflow and Pillow.	12

PART C: Learning Resources		
Textbooks, Reference Books, Other Resources		
Suggested Readings: 1. Let Us Python, Yashavant Kanetkar and Aditya Kanetkar, BPB publication 2. Zero To Mastery In Python Programming, Monu Singh Rakesh K. Yadav, Srinivas Arukonda, Vayu Education Of India publication. 3. Python All-in-One for Dummies, John Shovic, Alan Simpson, Wiley publication		
https://nptel.ac.in/courses/106106145 https://www.javatpoint.com/python-tutorial https://www.tutorialspoint.com/python/index.htm https://www.w3schools.com/python/		

Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods: Maximum Marks: 100 Continuous Comprehensive Evaluation (CCE): 40 Marks University Exam (UE): 60 Marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/Presentation	20 20 Total Marks: 40
External Assessment: University Exam (UE) Time: 03.00 Hours	Section (A): Five Short Questions Section (B): Five Long Questions	04 × 05 = 20 08 × 05 = 40 Total Marks: 60