



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Computer Science and Engineering

Program: MCA III Semester

ANNEXURE-2 (DC and BM) Syllabus

(DC) 680311 Artificial Intelligence and Applications

Objectives:

1. To study the concepts of Artificial Intelligence
2. To learn Methods of solving problems using Artificial Intelligence
3. To present an overview of artificial intelligence (AI) principles and approaches.
4. To introduce the concepts of Expert Systems and machine learning.
5. To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements.
6. To have an appreciation for the engineering issues underlying the design of AI systems.
7. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
8. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

UNIT-I

An Overview of AI: Definitions, Foundations of AI: Philosophy, Mathematics, Psychology, Computer Engineering, linguistics, History of AI, Applications of AI, AI Productions system and problem formulation.

UNIT-II

AI Search and Control Strategies: Exploring alternatives: Finding a path: Depth first search, hill climbing, breadth first search, beam search, best first search; Finding the best Path: The British Museum search, Branch and Bound Search, A* Search, AO* Search; Game Playing: Minmax search, Alpha-beta pruning, Progressive deepening, Heuristic Pruning.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

UNIT-III

Knowledge Representations: Concept of data, information and knowledge, semantic nets, partitioned semantic nets, Propositional calculus, First order predicate calculus, Well Formed Formula (WFF), Clause form representation of WFFs, resolution principle & unification, inference mechanism, frame systems and value inheritance, scripts, conceptual dependency.

UNIT-IV

Problem solving by Planning and uncertainty handling and NLP: Components of planning system, Goal Stack Planning, Nonlinear Planning using constraint posting, probability theory, statistical reasoning, fuzzy sets and fuzzy logic, Overview of linguistics, grammars and languages, Parsing techniques

UNIT-V

Expert systems and Soft Computing: Introduction and applications of expert systems, Rule-based System Architecture, Non-production system architecture, Expert system shells, Introduction to Some of the AI Techniques like neural networks, genetic algorithms, machine learning, pattern recognition, Robotics etc.

Books:

1. Introduction to AI and Expert Systems: D.W. Patterson PHI.
2. Artificial Intelligence: P.H. Winston, Addison Wesley.
3. Principles of AI: N.J. Nilsson, Springer-Verlag
4. Artificial Intelligence: Saroj Kaushik, Cengage Learning
5. Artificial Intelligence: A Modern Approach: Stuart Russell and Peter Norvig, Pearson Education

Course Outcomes:

Student would be able to

CO1: **Demonstrate** knowledge of the building blocks of AI as presented in terms of productions system

CO2: **Analyse** and formalize the problem as a state space, graph, design heuristics and select amongst different search or game-based techniques to solve them.

CO3: **Develop** intelligent algorithms for search, control strategies and game playing.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

CO4: **Attain** the capability to represent various real life problem domains using logic-based techniques and use this to perform inference or planning.

CO5: **Apply** concept planning and Natural Language processing to problems leading to understanding of cognitive computing.

CO6: **Explore** the latest trends in soft computing, expert systems and machine learning.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

(BM) 680312: Management Support Systems

Course Objective:

1. To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
2. To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
3. To understand the various knowledge representation methods and different expert system structures as strategic weapons to counter the threats to business and make business more competitive.
4. To use information to assess the impact of the Internet and Internet technology on electronic commerce and electronic business and understand the specific threats and vulnerabilities of computer systems.
5. To provide the theoretical models used in database management systems to answer business questions.

Unit-I

Organizations, Management and the Networked Enterprise – Information Systems in Global Business Today, Emerging digital firm, Strategy, perspectives and dimensions of Information systems, Network based strategies

Global E-business and Collaboration – Business processes, Systems for different management groups and Enterprise, E-Business, E-commerce, E-Government, Tools and technologies for Collaboration and Social Business, Porter's competitive forces model, The Business value chain Model

Unit-II

Ethical and Social issues in information systems – A model for Thinking about Ethical, Social, Political issues, Five moral dimensions of the Information Age, Ethical analysis, Candidate Ethical Principles

IT Infrastructure & Emerging Technologies – Evolution, Components, management issues, contemporary hardware platform trends, contemporary software platform trends, Web services and service-oriented architecture



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Foundations of Business Intelligence – File organization terms and concepts, Capabilities of Database management Systems, Analytical tools, Databases design, managing data resources

Unit-III

Telecommunications, Internet and Wireless Technology – Networking and communication trends, signals, types of networks, internet services and communications tools, Wireless computer networks and internet access

Securing Information Systems – Malicious Software: Viruses, worms, Trojan horses, spyware, Hackers and computer crime, Internal threats, Business value of security and control: Legal and Regulatory requirements for Electronic records management, Establishing a framework for security and control: Risk assessment, Security policy, technologies and tools for protecting information resources.

Unit-IV

Enterprise Information System - Achieving Operational Excellence and Customer Intimacy: Enterprise system, Applications, Business values of Enterprise systems, Supply chain management system: Supply chain, Global supply chain, customer relationship management: Operational and Analytical CRM, Business value of Customer relationship management systems, Enterprise applications: New opportunities and challenges

Managing Knowledge – Important dimensions of knowledge, types of knowledge management systems, requirements of knowledge work systems, expert systems.

Unit-V

Enhancing Decision Making – Business value of improved decision making, types of decisions, decision-making process, Business intelligence, decision support for operational and middle management, decision support for senior management, group decision support systems, modeling and designing systems: structured and object oriented methodologies, Alternative systems building approaches, Application development for the digital firm.

Project management – Runaway projects and system failure, project management objectives, importance of project management, linking systems projects to the Business plan, Information system costs and benefits, dimensions of project risk, change management and the concept of implementation, controlling risk factors, project management software tools.



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Outcomes:

Student would be able to

- CO1. **Apply** basic concepts of Information Technology, its support and role in Management, for managers
- CO2. **Recognize** security aspects of IT in business, highlighting electronic transactions, advanced security features
- CO3. **Analyze** managerial decision-making and to develop perceptive of major functional area of MIS
- CO4. **Describe** emerging MIS technologies like ERP, SCM and trends in enterprise applications.
- CO5. **Translate** the role of information systems in organizations, the strategic management processes, with the implications for the management.
- CO6. **Apply** various information systems like DBMS together to accomplish the information objectives of an organization in Business Management

Textbooks and References:

1. Management Information Systems, Laudon and Laudon, 7th Edition, Pearson Education Asia.
2. Management Information Systems, Jawadekar, Tata McGraw Hill.
3. Management Information Systems, Davis and Olson, Tata McGraw Hill.
4. Analysis and Design of Information Systems, Rajaraman, Prentice Hall.
5. Decision Support Systems and Intelligent Systems, Turban and Aronson, Pearson Education Asia.
6. Management Information Systems, Schulthesis, Tata McGraw Hill.
7. Management Information Systems - Sadagopan, Prentice Hall.
8. Management Information Systems – Jayant O



(DC) 680313 DATA MINING AND WAREHOUSING

Objectives:

1. To introduce and understand the basic concepts of Data Warehouse and Data Mining principles and techniques.
2. To identify the scope and necessity of Data Mining & Warehousing for the society.
3. To study the methodology of engineering legacy databases for data warehousing and data mining to derive business rules for decision support systems
4. To describe the designing of Data Warehousing so that it can be able to solve the root problems.
5. To Develop skills to write queries using DMQL
6. To examine the types of the data to be mined and apply preprocessing methods on raw data.
7. To discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
8. To understand various tools of Data Mining and their techniques to solve real time problems.
9. To Develop and apply critical thinking, problem-solving, and decision-making skills.
10. To Introduce DM as a cutting edge business intelligence method and acquaint the students with the DM techniques for building competitive advantage through proactive analysis, predictive modelling, and identifying new trends and behaviours.

UNIT-I

Data Warehouse Basic: Data warehousing Definition, usage and trends, DBMS vs. data warehouse, statistical databases vs. data warehouses. Data marts, Metadata, Multidimensional data model, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations.

UNIT-II



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Storage and Architecture of Data Warehouse: Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP types of OLAP, servers, 3 – Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager, data consolidation, warehouse internals, storage and indexing, Operations, materialized , online analytical processing(OLAP) systems

UNIT-III

Data Mining Basic: Data mining definition & task, KDD versus data mining, tools and applications. Data mining query languages, Preprocessing, pattern presentation & visualization specification, data mining techniques, tools and applications.

Data mining techniques: Statistical perspective, Regression, Bayes Theorem, Hypothetical testing.

UNIT-IV

Classification and Clustering: Issues in classification, Statistical –Based Algorithms, Distance–Based Algorithms, Decision Tree–Based Algorithms, ID3,C4.5, Evaluating the performance.

Clustering: Basic concepts, Partition algorithms, Agglomerative Hierarchical algorithms, DBSCAN, BIRCH, CURE algorithm. Clustering with categorical attributes, Comparison.

UNIT-V

Association Rules: Frequent Itemset generation, Apriori Algorithm. Rule generation, Compact representation of frequent Itemset.

Advanced Topics: Dimensionality Reduction, overview of Principle Component Analysis and SVD, Spatial mining, Web mining, Temporal mining.

Books:

1. Jiawei Han & Micheline Kambe :Data Mining – Concepts & Techniques;
2. Margaret H. Dunham, S. Sridhar:Data Mining Introductory and Advanced Topics
3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining
4. Kimball R, Reeves L , Ross M etc – Data Warehouse life cycle tool kit, John Wiley.
5. Anahory: Data Warehousing in Real World, Addison Wesley



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

6. Adriaans: Data Mining, Addison Wesley.
7. JayeBischoff & Ted Alexander : Data Warehouse: Practical advice from the Expert, Prentice Hall, New jersey.

Outcomes:

Student would be able to

CO1: **Describe** the basics of data warehouse, its storage fundamentals and knowledge discovery in databases

CO2: **Discuss** the storage and architectures of the data warehouse and its operations.

CO3: **Apply** the basics of data mining and its techniques to various real life problems.

CO4: **Analyze** classification and clustering algorithms and concepts

CO5: **Select** appropriate DM tools for clustering, association, and classification problems

CO6: **Explore** recent trends in data mining such as web mining, spatial-temporal mining

Madhav Institute of Technology and Science, Gwalior

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

Department of Computer Science & Engineering

MACHINE LEARNING USING PYTHON (682320)

COURSE OBJECTIVES:

- To learn the basic construct of python programming for implementing various Machine Learning algorithms.
 - To understand the basic concepts of Machine Learning.
 - To use Machine Learning concepts and algorithms for real-world problem solving.
-

Unit – I:

Introduction to Python Programming: Setting up programming environment, running python programs from a terminal, variables and simple data types: numeric, string, list, tuple, dictionary, set, boolean. Conditional statements and loops. Lambda functions; various inbuilt functions; Read write operations in files; Using python packages and modules.

Unit – II:

Data processing and visualization: Introduction to Pandas, Installation, reading csv files and performing various operations: slicing, merging, concatenation on various datasets.

Introduction to NumPy, vector representation, basic operations on n-dimensional matrices using NumPy.

Data visualization using matplotlib, plotting various types of graphs: line, bar, scatter, histogram and pie-charts.

Unit – III:

Introduction to Machine Learning: Basic principles, Applications, Challenges; Supervised, unsupervised and reinforcement learning approaches; Basic steps of Machine learning: data collection, data preparation, choosing a learning model, training a model, evaluation of model, parameter tuning and prediction.

Unit – IV:

Supervised Learning: Linear regression, gradient descent, features, overfitting, regularization and complexity, training, validation, testing data, performance matrices: Mean Squared Error(MSE), Root-Mean-Squared-Error(RMSE), Mean-Absolute-Error(MAE), R^2 or Coefficient of Determination; multivariate regression; applications of regression.

Classification: Binary, Multi-class and Multi-label classification; applications; Logistic regression, k-nearest neighbour, Decision trees, Random forests, Support vector machines and Neural networks; Comparison matrix.

Unit – V:

Unsupervised Learning: clustering and association problems; applications; k-means, DBSCAN, Principal Component Analysis, Apriori algorithm for association rule learning problems.

Machine learning model building on various datasets available on Kaggle and UCI repositories using Python Machine Learning Library: Scikit-learn.

RECOMMENDED BOOKS:

- John Hunt, A Beginners Guide to Python 3 Programming, Springer, 1st Edition, 2019
- Learn Python the Hard Way: 3rd Edition
- Python Crash Course: A Hands-On, Project-Based Introduction to Programming, By Eric Matthes
- Andreas C. Müller, Sarah Guido, Introduction to Machine Learning with Python, O'Reilly Media,

Madhav Institute of Technology and Science, Gwalior
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)
Department of Computer Science & Engineering and Information Technology

Inc, 2016.

- Aurélien Géron, Hands-On Machine Learning with Scikit-Learn and TensorFlow, O'Reilly Media, Inc, 2017.

COURSE OUTCOMES:

After completion of this course, the students would be able to:

CO1. define basic concepts of Machine Learning.

CO2. Summarize various concepts of python programming, data processing and visualization.

CO3. apply machine learning algorithms to solve real world problems using python programming.

CO4. compare machine learning algorithms for applicability and performance analysis.

CO5. assess various open source datasets and estimate the most suitable machine learning model for prediction process.

CO6. build machine learning models on open source datasets using python machine learning library.
