

P.T.V.A.'s

M.L. Dahanukar College of Commerce (Autonomous)

Teaching Plan: 2026- 27

Department: I.T.

Class: M.Sc. (I.T.)

Semester: III

Subject: Advanced Artificial Intelligence

Name of the Faculty: Ms. Hetavi Shah

Month	Topics to be Covered	Internal Assessment	Number of Lectures
June	Intro to AI, Intelligent Agents, Problem Solving using search Algo		10
July	Knowledge Representation, Intro to advance AI concept, DL and NN, NLP understanding, Reinforcement learning		18
August	AI Application, ML systems, supervised and unsupervised learning, inductive and deductive learning, clustering, SVM, case based reasoning and learning		14
September	Artificial Neural Network, Intro to Gen AI and its application, GANs		14
October	Variational Autoencoders, text generation and image synthesis, Ethical consideration in Gen AI		6

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Semester: III

Subject: Machine Learning

Name of the Faculty: Ms. Hiral Parakhiya

Month	Topics to be Covered	Internal Assessment	Number of Lectures
June	Unit I Introduction What Is Machine Learning? Basic Concepts in Machine Learning - Classification versus Regression, Supervised versus Unsupervised Learning Simple versus Complex Models, Parametric versus Nonparametric Models Overfitting versus Underfitting, Bias–Variance Trade-Off General Principles in Machine Learning Occam’s Razor, No-Free-Lunch Theorem, Law of the Smooth World, Curse of Dimensionality. Advanced Topics in Machine Learning Reinforcement Learning, Meta-Learning, Causal Inference, and Other Advanced topics Mathematical Foundation Probability and Statistics Random Variables and Distributions, Expectation: Mean, Variance, and Moments, Joint, Marginal, and Conditional Distributions, Common Probability Distributions, Transformation of Random Variables Information Theory Information and Entropy, Mutual Information, KL Divergence Mathematical Optimization General Formulation, Optimality Conditions, Numerical Optimization Methods		8
July	Classification Algorithms Introduction, Decision-based methods: Nonlinear Instance-based methods, Decision Tree algorithm, Use Cases (Reference 2) Feature Extraction Feature Extraction: Concepts, Linear Dimension Reduction, Nonlinear Dimension Reduction (I): Manifold Learning, Nonlinear Dimension Reduction (II): Neural Networks Unit III Discriminative Models Statistical Learning Theory, Linear Models, Learning Discriminative Models in General, Neural Networks, Ensemble Learning Generative Models Overview of Generative Models, Formulation of Generative Models, Bayesian Decision Theory, Statistical Data Modeling, Density Estimation, Maximum Likelihood Estimation,		18
August	Maximum-Likelihood Classifier, Generative Models (in a Nutshell) Generative versus Discriminative Models Unimodal Models Gaussian Models, Multinomial Models, Markov Chain Models, Generalized Linear Models Mixture Models Formulation of Mixture Models, Expectation-Maximization Method, Expectation-Maximization Method, Gaussian Mixture		16

	Models, Hidden Markov Models Entangled Models Formulation of Entangled Models, Linear Gaussian Models,		
September	Non-Gaussian Models, Deep Generative Models Bayesian Learning Formulation of Bayesian Learning, Conjugate Priors, Approximate Inference, Gaussian Processes Graphical Models Concepts of Graphical Models, Bayesian Networks, Markov Random Fields Unit IV Domain-Based Machine Learning Applications, Ethical Aspects of Machine Learning (Reference 2)		10
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Subject: Human System Interaction

Name of the Faculty: Mrs. Supritha Bhandary

Month	Topics to be Covered	Internal Assessment	Number of Lectures
June	The Interaction: Definition and scope of Human–Computer Interaction, Models of interaction, Interaction styles, Elements of the WIMP interface Interactivity, Interaction paradigms. Interaction design basics: The process of design, User focus, Cultural probes, Navigation design, the big button trap, Modes.		06
July	Screen design and layout, Alignment and layout matters, checking screen colours, Iteration and prototyping. Design Principles for Usability: Usability concepts, Design standards and guidelines, Golden rules and heuristics for interface design		08
August	HCI in the Software Development Process: Software life cycle and usability engineering, Elements of windowing systems, Programming interfaces and toolkits, User interface management systems Goals of evaluation, Expert evaluation methods, User participation and usability testing, Choosing appropriate evaluation techniques.		08
September	Universal design principles, Multimodal interaction, Designing for diversity and accessibility. User Support Systems: Requirements of user support, Help systems and adaptive support, online documentation, Tutorials and user manuals, Context-sensitive help, Error messages and recovery support.		08

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Semester: III

Subject: Natural Language Processing

Name of the Faculty: Ms. Pooja Amin

Month	Topics to be Covered	Internal Assessment	Number of Lectures
June	Unit I a) Introduction to NLP: Brief history, NLP applications, Challenges/Open Problems, NLP Abstraction levels, Introduction to NL computing techniques and steps (segmentation, tagging, parsing, etc.) b) NLP Tasks: Segmentation, Chunking, Tagging, Named Entity Recognition (NER), Parsing, Word Sense Disambiguation, NL Generation, Text Processing Challenges		06
July	Unit II a) Morphological Analysis and Regular Expressions: Introduction to Morphology, Types of morphological parsing: Rule-based vs. paradigm-based, Regular Expressions Automata Finite State Automata (FSA) and Finite State Transducers (FST) Introduction to the Porter stemming algorithm. b) Part-of-Speech (POS) Tagging and Evaluation: Word Classes and Introduction to POS Tagging, Survey of POS tagsets in English and Indian languages, Introduction to rule-based approaches like ENGOWL, Stochastic Approaches: Overview of probabilistic models, N-gram models, and Hidden Markov Models (HMM) for POS tagging, Transformation-Based Learning (TBL)		12
August	Morphology Evaluation Metrics and Error Analysis: Precision, Recall, F-measure, error-analysis. Unit III a) NL Parsing Basics and Grammar Formalisms: Introduction to NL Parsing (top-down and bottom-up parsing approaches), Introduction to constituency and dependency schools of grammar		12

	Overview of grammar notations: CFG, LFG, PCFG, LTAG, Overview of English CFG, Introduction to Paninian Karaka Theory for Indian language parsing, Overview of CFG parsing using Earley's and CYK algorithms, Introduction to Paninian Karaka Theory for Indian language parsing		
September	Overview of CFG parsing using Earley's and CYK algorithms. b) Probabilistic Parsing and Dependency Parsing: Introduction to probabilistic parsing techniques, Overview of probabilistic CFG (PCFG) and its applications, dependency parsing and its importance, Overview of Covington algorithm, MALT parser, and MST parser for dependency parsing. Unit IV a) Lexical Semantics and Word Senses: Introduction to semantic analysis theories and methodologies, lexical semantics, word senses, and relationships, Introduction to WordNet for English and IndoWordnet, Overview of WSD techniques like Lesk Algorithm and Walker's algorithm, Importance of WSD in resolving ambiguity in NLP. b) Coreference Resolution and Semantic Representations: coreference resolution, including Anaphora and Cataphora, Importance of resolving coreference in NLP applications, Semantic Representations and Word Similarity and understanding lexical semantics.		15

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