SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC-AUTONOMOUS)
Permanent Affiliation to JNTUK, Kakinada
Narsapur, West Godavari District, Andhra Pradesh

# DEPARTMENT OFMECHANICALENGINEERING

## LESSON PLAN

| Course Code | Course Title | Semester | Branch | Contact Periods /Week | Academic Year | Date of commencement of the semester |
|---|---|---|---|---|---|---|
| 23ME6T02 | ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING | VI | ME | 5 | 2025-26 | 10-12-2025 |

**COURSE OUTCOMES:** Students are ableto

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| 1 | Summarize the basic concepts of artificial intelligence. [K2] |
| 2 | Learn about the principles of supervised learning methods [K2] |
| 3 | Illustrate unsupervised learning method and Bayesian algorithms. [K3] |
| 4 | Formulate neural networks and genetic algorithms. [K2] |
| 5 | Apply the machine learning analytics and apply deep learning techniques. [K3] |
| 6 | Describe Machine Learning Algorithm Analytics[K3] |

| UNIT | Out Comes / Bloom's Level | Topics No. | Topics/Activity | Text Book / Reference | Contact Hour | Delivery Method |
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| I | CO1: Summarize the basic concepts of artificial intelligence. [K2] | **UNITIIntroduction Artificial Intelligence** | | | | Chalk, Talk, Active Learning, NPTEL |
| | | 1.1 | Definition of Artificial Intelligence | T1,R1 | 1 | |
| | | 1.2 | Evolution, Need, and applications in the real world | T1,R1 | 1 | |
| | | 1.3 | Intelligent Agents, Agents and Environments | T1,R1 | 1 | |
| | | 1.4 | Good Behaviour - concept of rationality | T1,R1 | 1 | |
| | | 1.5 | the nature of environments, structure of agents. | T1,R1 | 1 | |
| | | 1.6 | Knowledge–Representation and Reasoning: Logical Agents | T1,R1 | 1 | |
| | | 1.7 | Knowledge-based agents, the Wumpus world, logic | T1,R1 | 2 | |
| | | 1.8 | Patterns in Propositional Logic | T1,R1 | 1 | |
| | | 1.9 | Inference in First-Order Logic-Propositional | T1,R1 | 2 | |
| | | 1.10 | vs first order inference, unification. | T1,R1 | 1 | |
| | | | | **Total** | **12** | |
| II | | **UNIT II Introduction to Machine Learning (ML)** | | | | |
| | | 2.1 | Definition, Evolution, Need | T2,T3 | 1 | |
| | | 2.2 | applications of ML in industry and real world | T2, T3 | 1 | |

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| | CO 2:Learn about the principles of supervised learning methods [K2] | 2.3 | regression and classification problems | T2,T3 | 1 | Chalk, Talk, PPT, Active Learning |
| | | 2.4 | performance metrics | T2, T3 | 1 | |
| | | 2.5 | differences between supervised and unsupervised learning paradigms | T2, R2 | 1 | |
| | | 2.6 | bias, variance, overfitting and underfitting. | T2, T4 | 1 | |
| | | 2.7 | Supervised Learning: Linear regression | T2,T3 | 1 | |
| | | 2.8 | logistic regression | T2, T3 | 1 | |
| | | 2.9 | Distance-based methods, Nearest-Neighbours, | T2, R2 | 1 | |
| | | 2.10 | Decision Trees | T2, T3 | 1 | |
| | | 2.11 | Support Vector Machines, | T2,T3 | 1 | |
| | | 2.12 | Nonlinearity and Kernel Methods. | | 1 | |
| | | | | **Total** | **12** | |
| **III** | CO3: Illustrate unsupervised learning method and Bayesian algorithms. [K3] | **UNIT III Unsupervised Learning** | | | | Chalk, Talk, PPT, Active Learning, |
| | | 3.1 | Unsupervised Learning: Clustering, K-means, | T2,T3 | 1 | |
| | | 3.2 | Dimensionality Reduction | T2, T3 | 1 | |
| | | 3.3 | PCA and Kernel. | T2,T3 | 1 | |
| | | 3.4 | Bayesian and Computational Learning | T2, T4 | 1 | |
| | | 3.5 | Bayes theorem | T2,T3 | 1 | |
| | | 3.6 | concept learning | T2, T3 | 1 | |
| | | 3.7 | maximum likelihood of normal | T2, R2 | 1 | |
| | | 3.8 | binomial, exponential | T2, T3 | 1 | |
| | | 3.9 | and Poisson distributions | T2,T3 | 1 | |
| | | 3.10 | minimum description length principle | T2, T3 | 1 | |
| | | 3.11 | Naïve Bayes Classifier | T2,T4 | 1 | |
| | | 3.12 | Instance-based Learning- K-Nearest Neighbour learning. | T2, T3 | 1 | |
| | | | | **Total** | **12** | |
| **IV** | CO4: Formulate neural networks and genetic algorithms. [K2] | **UNIT IV Neural Networks and Genetic Algorithms** | | | | Chalk, Talk, PPT, Active Learning, Seminar, Quiz |
| | | 4.1 | Neural network representation | T2, T3 | 1 | |
| | | 4.2 | problems, perceptron | T2,R2 | 1 | |
| | | 4.3 | multilayer networks and backpropagation | T2, T4 | 2 | |

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| | | 4.4 | steepest descent method | T2,T3 | 1 | |
| | | 4.5 | Convolutional neural networks and their applications | T2, T3 | 1 | |
| | | 4.6 | Recurrent Neural Networks and their applications | T2,T3 | 1 | |
| | | 4.7 | Local vs Global optima | T2, T3 | 1 | |
| | | 4.8 | Genetic algorithms | T2,T3 | 1 | |
| | | 4.9 | binary coded | T2, T4 | 1 | |
| | | 4.10 | GA, operators | T2,T3 | 1 | |
| | | 4.11 | convergence criteria. | T2, T3 | 1 | |
| | | | | **Total** | **12** | |
| V | . CO5: Apply the machine learning analytics and apply deep learning techniques. [K3]<br><br>CO6:Describe Machine Learning Algorithm Analytics[K3] | | **UNIT V Deep Learning** | | | Chalk, Talk, PPT, Active Learning |
| | | 5.1 | Deep generative models | T2,T3 | 1 | |
| | | 5.2 | Deep Boltzmann Machines | T2, T3 | 1 | |
| | | 5.3 | Deep auto-encoders | T2,T3 | 1 | |
| | | 5.4 | Applications of Deep Networks. | T2, T4 | 1 | |
| | | 5.5 | Machine Learning Algorithm Analytics | T2,T3 | 1 | |
| | | 5.6 | Evaluating Machine Learning algorithms, | T2, R2 | 2 | |
| | | 5.7 | Model, Selection | T2,T3 | 1 | |
| | | 5.8 | Ensemble Methods | T2, T3 | 1 | |
| | | 5.9 | Boosting, Bagging | T2,T4 | 1 | |
| | | 5.10 | and Random Forests. | T2, T3 | 1 | |
| Content beyond Syllabus | | | Convolutional Neural Network | website | 1 | |
| | | | | **Total** | **12** | |
| | | | | **CUMULATIVE PROPOSED PERIODS** | **60** | |

**Text Books:**

| S.No. | AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION |
|---|---|
| 1 | Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach,3rd ed, Pearson Education, 2010. |
| 2 | Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning),4th ed, The MIT Press, 2004. |
| 3 | Tom M. Mitchell, Machine Learning,1st ed,McGraw-Hill, 2013. |

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| 4 | Andriy Burkov, "The Hundred-Page Machine Learning Book", 1st Edition, Notion Press, 2019. |
| **Reference Books:** | |
| **S.No.** | **AUTHORS, BOOK TITLE, EDITION, PUBLISHER, YEAR OF PUBLICATION** |
| 1 | Elaine Rich and Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata McGraw Hill. 2017, |
| 2 | Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems,1st edition PHI Learning, 2015. |
| **Web Details** | |
| 1 | An Introduction to Artificial Intelligence - Course |
| 2 | Artificial Intelligence: Concepts and Techniques - Course |
| 3 | nptel.ac.in/courses/106106139 |
| 4 | nptel.ac.in/courses/106105152 |
| 5 | nptel.ac.in/courses/108103192 |

| | | Name | Signature with Date |
|---|---|---|---|
| i. | Faculty | Mr.N.BulliRaju | |
| ii. | Course Coordinator | Mr.N.Bulli Raju | |
| iii. | Module Coordinator | Dr. Francis Luther King M | |
| iv. | Programme Coordinator | Dr. Francis Luther King M | |

Principal