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| **NAME OF DEPARTMENT:** | | | | | | | | | | | | | | School of Computing | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | |
| **Subject Name:** | | | | | Introduction to Artificial Intelligence and Machine Learning | | | | | | | | | | | | | | | | | | | | | | | **Subject Code:** | | | | | | | | TBC 403 | | |
|  | | | | |  | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | |  | | |
| **Course Name:** | | | | | Bachelor of Computer Applications (BCA) | | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | |  | | |
|  | | | | |  | | | | | | | | | | | | | | | | | | | | | |  | | | | | | | |  | | | |
| **1** | **Contact Hours:** | | | | | | | 45 | | | |  | | | | | | | | | | | | | | | | | | **L** | | 3 | | **T** | | 0 | **P** | 0 |
|  |  | | | | | | |  | | | |  | | | | | | | | | | | | | | | | | |  | |  | |  | |  |  |  |
| **2** | **Examination Duration (Hrs):** | | | | | | | | | | | | | | | |  | **Theory** | | | | | 0 | 3 |  | **Practical** | | | | | 0 | | 0 |  | | | | |
|  |  | | | | | | | | | | | | | | | |  |  | | | | |  |  |  |  | | | | |  | |  |  | | | | |
| **3** | **Relative Weightage:** | | | | | | | | |  | | | | **CWE:** | | | | | | | 25 | | **MTE:** | | | 25 | | | **ETE:** | | | 50 | | |  | | | |
|  |  | | | | | | | | |  | | | |  | | | | | |  | | |  | | |  | | |  | | |  | | |  | | | |
| **4** | **Credits:** | | 0 | | | 3 | |  | | | | | | | | | | | |  | | |  | | |  | | |  | | |  | | |  | | | |
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| **5** | **Semester:** | | |  | | | |  | | | \* | |  | | |  | | |  | | | | | | | | | | | | | | | | | | | |
|  |  | **Autumn** | | | | | | | **Spring** | | | | | | **Both** | | | | | | |  | | | | | | | | | | | | | | | | |
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| **6** | **Pre-Requisite:** | | | | | | | **Knowledge of Computer Programming and Mathematics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **7** | **Subject Area:** | | | | | | | Computer Application | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **8** | **Objective:** | | | | | | To enable the student to apply the artificial intelligence techniques in applications which involve perception, reasoning and learning**.** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | |  | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **9** | **Course Outcomes:** | | | | | | | | | | The student, on successful completion, will be able to: | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**CO1** Understand the concept of intelligence, types of intelligence.

**CO2** Explain AI, its history and applications.

**CO3** Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.

**CO4** Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).

**CO5** Learn different AI/ML methods, Tools and Techniques

1. **Details of the Course:**

|  |  |  |
| --- | --- | --- |
| **Sl.NO** | **CONTENT** | **CONTACT HOURS** |
| 1. | Introduction: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents The concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation | 9 |
| 2. | Introduction to Search : Searching for solutions, Uniformed search strategies: Breadth first search, depth first Search,  Informed search,strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning. | 9 |
| 3. | Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic,  Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks. | 9 |
| 4. | **Introduction to Machine Learning:** What is Machine Learning, Introduction to ML's three approaches: Supervised, Unsupervised and Reinforcement Learning.  **UnSupervised Learning Algorithms** Clustering: K-means, Silhoutte Scores, Hierarchical Clustering, Fuzzy c- means, DBSCAN  Dimensionality Reduction: Low Variance Filter, High Correlation Filter, Backward Feature Elimination, Forward Feature Selection, Principle Component Analysis, Projection Methods. | 9 |
| 5. | **Validation Techniques:** Hold out, K-Fold Cross Validation, Leave one out, Bootstrapping.  **Supervised Learning Algorithms:** Linear Regression, Logistic Regression, Decision Trees, Support Vector Machine, K-Nearest Neighbours, CN2 Algorithm, Naive Bayes, Artificial Neural Networks. | 9 |
|  | **TOTAL** | **45** |

**11. Suggested Books:**

|  |  |  |
| --- | --- | --- |
| **Sl. NO** | **NAME OF AUTHORS/BOOKS/PUBLISHERS** | **YEAR OF PUBLICATION/REPRINT** |
| 1. | Nils J. Nilsson, “Artificial Intelligence: A new Synthesis”, Harcourt Asia Pvt. Ltd. | 2000 |
| 2. | Elaine Rich and Kevin Knight, “Artificial Intelligence”, 2nd Edition, Tata McGraw-Hill. | 2003 |
| 3. | Stuart Russell, Peter Norvig, “Artificial Intelligence – A Modern Approach”, 2nd Edition, Pearson Education / Prentice Hall of India | 2004 |