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| Sukkur_IBA_New_Logo | **Sukkur IBA University** |

**Course Title: Artificial Intelligence (CSC-350)**

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| **Programs & Class:** BS-VI (CS) | **Semester:** Spring 2025 (January 20 – May 31, 2025) |
| **Credit Hours: 4(3+1)** | **Course Instructor: Dr. Abdul Baseer Buriro** |
| **Pre-requisite Courses: No** | **Post-requisite Courses: None** |
| **Co-requisite Courses: None** | **e-mail:** [abdul.baseer@iba-suk.edu.pk](mailto:abdul.baseer@iba-suk.edu.pk) |
| **Consultation Hours:** Tuesday 11:00AM – 1:00PM and Wednesday 11:00AM – 1:00PM | |

**ASSESSMENT/ EVALUATION**

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|  | Mid Term exam | **30%** |
|  | Group project & Quizzes | **20%** |
|  | Final Exam | **50%** |

**RECOMMENDED BOOKS:**

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| **SNo** | **Book Name** | **Author/s Name** | **Edition** |
| 1. | Artificial Intelligence: Foundations of Computational Agents | David L. Poole & Alan K. M. | Third |
| 2. | Python Machine Learning | Sebastian R. & Vahid M. | Second |
| 3. | Artificial Intelligence: A Modern Approach | Stuart J. Russel and Peter Norvig | Forth |

**COURSE DESCRIPTION:**

Artificial intelligence (AI) is one of the fastest-growing and most interesting fields. The frontiers of AI are wide open. In this course students will learn about the foundation and some of the representative applications of modern AI.

**COURSE LEARNING OUTCOMES:**

CLO1: **Understand** key concepts and principles of AI

CLO2: **Implement** classical AI techniques

**Week Wise Lectures:**

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| **Week #** | Topics |
| 1 | * Introduction to Artificial Intelligence (AI) **(Artificial Intelligence – A Modern Approach, Chapter 1)**   + Introduction   + Foundation of AI   + History of AI   + Risks and benefits of AI |
| 2 | * Intelligence Agents **(Artificial Intelligence – A Modern Approach, Chapter-2)**   + Agent and environments   + Rational agents and their types   + Nature of environments   + Structure of agents |
| 3, 4 | * Problem Solving & Search Strategies **(Artificial Intelligence – A Modern Approach, Chapter-3)**   + Problem Representation in AI   + Search and problem formulation   + Uninformed Search Strategies     - Breath-first search     - Depth-first search     - Uniform cost search   + Informed Search Strategies     - Heuristic     - Greedy search     - A\* Search   + Examples and Applications |
| 5, 6 | * Search in Complex Environments **(Artificial Intelligence – A Modern Approach, Chapter-4)**   + Introduction   + Local search and optimization problems     - Hill climbing     - Terminologies     - Local beam     - Genetic algorithm |
| 7 | * Adversarial Search **(Artificial Intelligence – A Modern Approach, Chapter-5)**   + Game theory     - Zeros-sum games     - Minimax search     - Alpha-beta pruning   + Examples |
| 8 | * Logical Agents **(Artificial Intelligence – A Modern Approach, Chapter-7)**   + Knowledge-based agents   + Logic   + Prepositional logic   + Agents based on prepositional logic |
| 9, 10 | * Midterm |
| 11 | * Uncertainty **(Artificial Intelligence – A Modern Approach, Chapter 12)**   + Quantification     - Acting under uncertainty     - Probability – revisit     - Bayes’ rule |
| 12 – 15 | * Machine Learning Fundamentals **(From Chapter: 2, 3, 6, 10, and 11 – Python Machine Learning)**   + Supervised and unsupervised learning   + Basic concepts     - Understanding data (structured and unstructured)     - Data Splits (train-test and k-fold)     - Underfit     - Overfit   + Regression     - Line and hyperplane     - Linear     - Nonlinear   + Classification     - Decision boundary     - kNN     - Logistic Regression     - Decision Tree     - Naïve Bayes   + Feature selection/importance   + Regularization     - L1     - L2   + Evaluation metrics     - Mean absolute error     - Mean square error     - Confusion matrix     - Sensitivity, specificity, and accuracy (where these fail)     - Precision     - F-score     - Geometric Mean     - AUC-ROC   + Clustering   + Practical tips   + Examples with applications     - Image classification     - NLP   + An overview of ANN |
| 16 | * Project Submission/ Revisions |
| 17, 18 | * Final Exam |