CSC-350: Artificial Intelligence Syllabus

General Information

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| **Course Number** | CSC-350 |
| **Credit Hours** | 2+1 (Theory Credit Hour = 2, Lab Credit Hours = 1) |
| **Prerequisite** | None |
| **Course Coordinator** | Not Specified |

**Course Objectives**

This is an introductory course on Artificial Intelligence. The topics may include: AI methodology and fundamentals; intelligent agents; search algorithms; neural networks; knowledge-based systems; knowledge representation schemes; reasoning in AI; Inference techniques; natural language processing. Several assignments will be given to enable the student to gain practical experience in using these techniques.

**Catalog Description**

CSC-350

**Course Content**

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| **Week** | **Topic** | Classwork/Presentat ions  Assignments | Readings |
| 1-2 | Introduction to Python  Variables  If, elif, else  Loops  Python Collections: list, tuple, set, dict  Fundamentals of OOP in Python |  | R&N: Chapter 1  Luger:.Chapter 1 |

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|  | Numpy   * Creating Arrays * Array Properties * Array Operations * Array Indexing and Slicing   Pandas   * Loading Data * Selecting Data * Modifying Data |  |  |
| 3-4 | **Introduction to Intelligence**  History of AI Introduction to AI What is Intelligence?  Characteristics of Intelligence  What do people in AI think about Intelligence? Characterizing AI Systems  Distinctions Think vs. Act  Cognitive Science Distinctions Rational vs. Human Common Misconceptions Assumptions behind AI research Goals of Al Research  Engineering Goal Scientific Goal  Is AI Possible?  Turing Test |  | Online Resources |
| 5-6 | **Introduction to Machine Learning**  What is Machine Learning  Types of Machine Learning   * Supervised Learning * Unsupervised Learning * Reinforcement Learning   Applications of Machine Learning  Classification Problems  What is Classification Problem  Types of Classification:   * Binary * Multi-Class * Multi-Label   Evaluation Metrics: Accuracy, F1 Score  Problem of Learning | Assignment  Class work |

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| 7-8 | Regression Problems  What is Regression?  Types of Regression:   * Simple Linear Regression * Multiple Linear Regression * Polynomial Linear Regression * Logistic Regression (for classification)   Evaluation Metrics:   * MSE, MAE, R2\_Score |  | R&N: Chapter 2  Luger: Chapter 2 |
| 9-10 | Problem of Learning  Learning Process:   * Training Data * Test Data   Underfitting vs Overfitting  Gradient Descent Algorithm  Introduction to Regularization |  | R&N: Chapter 3  Luger:Chapter. 3 |
| 11 | **Introduction to Neural Networks** Artificial Neural networks   * Perceptron * Weights & Biases * Input Layers, Hidden Layers, Output Layer | Assignment Class work | R&N: Chapter 4  Luger: Chapter 4 |
| 12 | **Introduction to Convolutional Neural Networks**  CNN basics and classification ANN vs CNN  CNN applications  Using Pre-trained model in Google Colab |  | R&N: Chapter 7  Luger: Chapter 7 |
| 13 | **Agent**  What is Agents? Types of Agents Simple reflex agents  Reflex agents with state/model  Goal-based agents |  |

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| 14 | Utility-based agents Agents Environment Properties of Environment Architecture  Rationality Autonomy  Single and multi-agent |  |  | |
|  | **Uninformed Search**  Introduction  State Space search (Classical Search Problem)  Example of shortest path  Breadth First Search (Blind)  Depth First Search (Blind)   |  | | --- | | **Informed Search** | | Heuristic Search (A\*) | | Best First Search |   **OIfklasjdfk;ladsj;lfkjads;klfdjas;lfj;lwj** |  | R&N:  9&10 | Chapter |
|  |  |  | Luger: 7&13 | Chapter |
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|  |  | Assignment |  |  |
| 15 |
|  | Class work |  |  |
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|  |  | Assignment | R&N: Chapter 10 | |
|  |  | Class work | Luger: Chapter 7 | |
|  | Project Submission |  |  | |
| 16 |  |  |  | |
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**Text Book**

1. S. Russell and P. Norvig, “Artificial Intelligence: A Modern Approach”, 3rd Ed. Prentice Hall, 2011

**Reference Material**

1. G. Luger, Addison, “Artificial Intelligence: Structures and Strategies for Complex Problem Solving”, 6th Edition Addison Wesley, 2009

**Course Learning Outcomes**

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|  | **Course Learning Outcomes (CLO)** |
| 1 | Understand different types of AI agents as well as the fundamentals of knowledge representation, inference and resolution. |
| 2 | Design a real world problem for implementation and recognize the dynamic behavior of a system |
| 3 | Implement these techniques in applications that involve perception, reasoning, and learning |

**CLO-SO Map**

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|  | **SO IDs** | | | | | | | | | | | |
| **CLO ID** | **GA1** | **GA2** | **GA3** | **GA4** | **GA5** | **GA6** | **GA7** | **GA8** | **GA9** | **GA10** | **GA11** | **GA12** |
| CLO 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CLO 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| CLO 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Approvals**

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| Prepared By |  |
| Approved By | Not Specified |
| Last Update |  |