# COMSATS University Islamabad
# Department of Computer Science
# Course Description Form (CDF)

**Course Information**

Course Code: **CSC462** Course Title: **Artificial Intelligence**
Credit Hours: **4(3,1)** Lecture Hours/Week: **3**
Lab Hours/Week: **3** Pre-Requisites: **CSC102-Discrete Structures**

**Catalogue Description:**

This course gives a broad overview of the fundamental theories and techniques of Artificial Intelligence. Topics include: Overview of Artificial Intelligence; Agents & Environments; Problem-Solving; Adversarial Search; Constraint Satisfaction Problems; Knowledge Representation & Reasoning; Uncertainty; and Automated Planning.

**Unit wise Major Topics:**

| Unit | Topic | No. of teaching hours |
|---|---|---|
| 1. | Artificial Intelligence: Definitions, Overview, History, Rationality, Agents, and Environments. | 4.5 |
| 2. | Problem-Solving: Problem-Solving Agents; Searching: Search Algorithms, Uninformed & Informed Search Strategies, Local Search & Optimization Problems, and Heuristic Functions. | 6 |
| 3. | Adversarial Search: Game Theory, Heuristic, Min-Max Procedure & Alpha-Beta Pruning; and Monte Carlo Simulation. | 6 |
| 4. | Constraint Satisfaction Problems (CSPs): Defining, Constraint Propagation, Inference, and Backtracking. | 7.5 |
| 5. | Knowledge Representation & Reasoning: Knowledge-Based Agents, Propositional Logic, Propositional Theorem Proving, CNF & DNF, Horn Clauses, Forward & Backward Chaining, Knowledge Engineering in First-Order Logic; and Expert System. | 9 |
| 6. | Uncertainty: Quantifying Uncertainty; Acting under Uncertainty; Representing Knowledge in an Uncertain Domain, Time & Uncertainty, and Inference in Temporal Models. | 6 |
| 7. | Automated Planning: Definition, Algorithms, Heuristics & Hierarchical Planning, Acting in Nondeterministic Domains, Time, Schedules, and Resources. | 6 |
| **Total Contact Hours** | | **45** |

**Mapping of CLOs and SOs**

| Sr.# | Unit # | Course Learning Outcomes | Blooms Taxonomy Learning Level | SO |
|---|---|---|---|---|
| **CLO's for Theory** | | | | |
| CLO-1 | 1 | Articulate how artificial intelligence enables the capabilities of a computer, machine, or system to mimic | *Understanding* | 1 |

| | | | | |
|---|---|---|---|---|
| | | the human brain. | | |
| CLO-2 | 2-3 | Apply various AI problem solving and searching techniques to a real-world problem. | *Applying* | 1,2 |
| CLO-3 | 4 | Formulate a problem specified in natural language as a constraint satisfaction problem. | *Applying* | 2 |
| CLO-4 | 5 | Apply resolution to a set of logic statements to answer a query. | *Applying* | 2 |
| CLO-5 | 6-7 | Compare various planning strategies for different applications under uncertainty. | *Analyzing* | 2 |
| **CLO for Lab** | | | | |
| CLO-6 | 2-4 | Implement various searching technique, CSP and knowledge-based system to solve a problem. | *Applying* | 2,4 |

**CLO Assessment Mechanism**

| **Assessment Tools** | **CLO-1** | **CLO-2** | **CLO-3** | **CLO-4** | **CLO-5** | **CLO-6** |
|---|---|---|---|---|---|---|
| Quizzes | Quiz 1 | Quiz 2 | Quiz 3 | Quiz 4 | - | - |
| Assignments | - | Assignment 1 | Assignment 2 | Assignment 3 | Assignment 4 | Lab Assignments |
| Mid Term Exam | Mid Term Exam | Mid Term Exam | Mid Term Exam | - | - | - |
| Final Term Exam | Final Term Exam | | | | | - |

**Text and Reference Books**

**Textbook:**

1. Artificial Intelligence: A Modern Approach, Russell, S., and Norvig, P., Pearson, 2020.

**Reference Books:**

1. Artificial Intelligence Basics: A Non-Technical Introduction, Taulli, T., Apress, 2019.