

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
KATHMANDU UNIVERSITY

**Subject: Introduction to Intelligent Systems**

**Course Code: AICC 101**

**Credit: 3**

**F.M: 100**

**Type: Core [Theory + Practical +Tutorial]**

**Course Description:**

This course introduces students to the field of intelligent systems, its uses in solving real world problems for which solutions are difficult to express using the traditional computing methods. The course will mainly focus on search techniques and logic applicable for design of intelligent systems.

**Course Objectives:**

This course is an introductory course on intelligent systems. The objective of this course is to help learners get introduced to the concepts of intelligent systems and make foundations for the design of intelligent systems using search techniques and logic implementations.

**1. Introduction [6 Hours]**

- 1.1 Introduction to Intelligent Systems
  - 1.1.1. Communication and Learning
  - 1.1.2. Components of Intelligent systems
- 1.2 Artificial Intelligence System
  - 1.2.1 Approaches to Artificial Intelligent System
- 1.3 Evolution of Intelligent Systems
- 1.4 Natural Intelligence Vs. Artificial Intelligence
- 1.5 Current Trends in Intelligent Systems
- 1.6 Benefits and Advantages of Intelligent Systems

**2 Intelligent Agents and Environment (9 Hours)**

- 2.1 Agents and Environment: Introduction
- 2.2 Characteristics of an Agent
- 2.3 Agent Function and Program
- 2.4 Rationality of Agent
- 2.5 Basic Skeleton Agent Design
- 2.6 Types of Agents
  - 2.6.1 Simple Reflex Agents
  - 2.6.2 Model-based Reflex Agents
  - 2.6.3 Goal-based Agents
  - 2.6.4 Utility-based Agents
  - 2.6.5 Learning Agents
- 2.7 Nature of Environment and its Influence on Agent Design

## 2.8 Behavior and Performance Measures of Agent

### **3 Problem Solving by Searching (12 Hours.)**

- 3.1 Problem Types (tractable and Intractable)
  - 3.1.1 Single State Problem
  - 3.1.2 Sensorless Problem
  - 3.1.3 Contingency Problem
  - 3.1.4 Exploration Problem
- 3.2 Problem Formulation State Space Representation
- 3.3 Search Strategies: Fundamental Concept of Evaluation Matrix
  - 3.3.1 Completeness
  - 3.3.2 Optimality
  - 3.3.3 Time Complexity
  - 3.3.4 Space Complexity
- 3.4 Classification of Search Techniques /Basic Search Algorithms
  - 3.4.1 Brute Force Search Strategies
    - Fundamental Concepts of: Breadth First Search, Depth First Search, Depth Limited Search, Iterative Deepening Search
  - 3.4.2 Heuristic Search Strategies
    - Fundamental Concepts of Greedy search, A\* search
    - Fundamental Concepts Local Search

### **4. Introduction to logic (6 Hours)**

- 4.1 Introduction to Knowledge
  - 4.1.1 Knowledge Representation Techniques, Issues and Acquisition
- 4.2 Propositional Logic: a Very Simple Logic
  - 4.2.1 Syntax. Semantics and Representation
  - 4.2.2 Propositional Theorem Proving
  - 4.2.3 Agents Based on Propositional Logic
- 4.3 First Order Logic
  - 4.3.1 Syntax, Semantic and Representation
- 4.4 Introduction to Inference System

### **5. Application Areas of Intelligent Systems (12 Hours)**

- 5.1 Expert System
  - 5.1.1 Introduction, Characteristics, Architecture
  - 5.1.2 Design of Rule Based Expert System
- 5.2 Machine Learning
  - 5.2.1 Decision Tree
  - 5.2.2 Neural Networks: Introduction, Characteristics, Architecture
  - 5.2.3 Perceptron and its Design
- 5.3 Evolutionary Computation
  - 5.3.1 Introduction, Components of Genetic Algorithm
  - 5.3.2 Genetic Algorithm Simulation
- 5.4 Natural Language Processing
  - 5.4.1 Concept and Basic NLP techniques

**Lab Assignments:**

Lab works/assignments/tutorials on relevant topics

**Text Book**

Russell, S., & Norvig, P. (2020). *Artificial Intelligence: A Modern Approach* (4th ed.). Pearson.

**References**

Padhy, N. P. (2005). *Artificial Intelligence and Intelligent Systems*. Oxford University Press.  
Nils J. Nilsson (2011) *Artificial Intelligence: A new Synthesis*, Elsevier Publication