

CSS 128: Fundamentals of Artificial Intelligence

Course aim

This course aims at providing students with fundamental knowledge on intelligent and learning systems. It will also cover approaches and methods for developing intelligent and learning system.

Expected Learning Outcomes

At the end of the course, students should be able to:

- i) Understand key applications of Artificial Intelligence
- ii) Have knowledge of the fundamentals of Artificial Intelligence

Course status: Core

Credit rating: 12

Total hours spent: 8 hours per week

Course Content

COURSE CONTENTS

1. Introduction to Artificial intelligence

1.1 Definitions of AI and other key terms

1.2 The history of AI

1.3 Need for, applications of, and problem solving with AI.

1.4 AI models

2. Intelligent agents and rationality

2.1 Agents and environment

2.2 The concept rationality

3. Problem solving

3.1 Problem solving process.

3.2 Problem types and characteristics

3.3 Problem analysis and representation

3.4 Formulating problems

3.5 Searching for solution

3.6 Uninformed search

3.7 Informed (heuristic) search.

3.8 Performance measuring

4. Knowledge, reasoning, and planning

4.1 Knowledge representation

4.2 Representing knowledge using rules

4.3 Knowledge based agents.

4.4 Logical agents

4.5 Actions, Situations and Events

4.6 Classical planning

4.7 Planning and acting in real world

4.8 Quantifying uncertainty

4.9.1 Acting under uncertainty.

4.9.2 Basic probability notation

4.9.3 Bayes rules

5. Probabilistic reasoning

5.1 Representing knowledge in an uncertain domain

5.2 The semantics of Bayesian probability and Belief Networks

5.3 Relational and First order probability model

5.4 Probabilistic reasoning over time

5.4.1 Time and uncertainty

5.4.2 Inference in temporal models

5.4.3 Hidden Markov models

6. Learning

6.1 Forms of learning

6.2 Learning concepts, methods, and paradigms

6.3 Supervised learning

6.4 Unsupervised learning

6.5 Statistical learning

6.6 Artificial Neural network

6.7 Ensemble learning

6.8 Adaptive learning

6.9 Reinforcement learning

7. Natural language processing

7.1 Language models

7.2 Text classification

7.3 Information retrieval

7.4 Information extraction

7.5 Machine translation

Teaching and learning activities

Lectures, practical classes, assignments

Assessment methods

Type	Weight
Tests (Test 1: 15%; Test 2: 15%)	30%
Assignments (Individual: 10%; Group: 10%)	20%
End of Semester Examination	50%
Total	100%

Required Reading

1. George F. Luger (2002). Artificial Intelligence – Structures and strategies for complex problem solving (4th Ed.). Pearson Education Limited.
2. Stuart Russell & Peter Norvig (2015) (Indian Edition). Artificial Intelligence: A modern Approach. Pearson India Education Services.

3. Parag Kulkaran & Prachi Joshi (2015). Artificial Intelligence: Building Intelligent Systems. PHI Learning Private Limited.