Course Title	:	Foundation of Artificial Intelligence
Course Code	:	CDS521
Recommended Study Year	:	1
No. of Credits/Term	:	3
Mode of Tuition	:	Lecture-tutorial mode
Class Contact Hours	:	42 hours (3 to 6 hours per week*)
Category	:	Required course (MScAIBA, MScDS, MScSCTA) Elective course (MSceBSCM, SEA, MResADS, MADES)
Discipline	:	Business
Prerequisite(s)	:	Nil
Co-requisite(s)	:	Nil
Exclusion(s)	:	Nil
Exemption Requirement(s)	:	Nil

Brief Course Description:

Artificial intelligence (AI) is a new technical science that studies and develops theories, methods, techniques, and application systems for simulating and extending human intelligence. AI techniques and models have been widely employed in various domain-specific applications due to their promising performance compared to conventional methods. This course focuses on fundamental concepts, techniques, and potential business applications of artificial intelligence. The course provides an overview of waves of AI, intelligent agents, problem-solving, planning, reasoning, learning. It includes topics about search, logic, genetic algorithms, computational learning methods, and some potential business applications like expert systems, news analysis, and so on.

Aims:

This course aims to:

1. Introduce concepts, techniques and potential business applications of artificial intelligence.
2. Provide students a comprehensive understanding of the development of artificial intelligence and the main research content.
3. Equip students with problem description method and solution methods of artificial intelligence.
4. Enable students to apply appropriate artificial intelligence algorithms to solve business problems.

Learning Outcomes (LOs):

Upon successful completion of this course, students will be able to:

1. Demonstrate command of principles and applications of artificial intelligent techniques;
2. Describe and apply advanced AI algorithms for problem-solving;
3. Analyse and formulate complicated business problems creatively by using AI models;
4. Design AI-based expert systems or models to solve some sophisticated real-world problems under various business scenarios.

Indicative Contents:

1. Artificial Intelligence and Intelligent Agents
   Test of the existing intelligence, such as Turing test
   Agents, environment and the structure of agents
2. Problem Solving by Searching
   The formalisation of the problem
   Foundation and principles of different Tree search algorithms
   - Blind search strategy (breadth-first search, deep-first search, iterative deepening search)
   - Information-Seeking Strategies (Greedy Search, A* search, Local search algorithm, Adversarial searching)
3. Knowledge and Reasoning
   Foundation of Propositional logic
   Principles of First-order logic
   Logical reasoning (unification, forward chaining, backward chaining)
4. Uncertain Knowledge and Reasoning
   Uncertainty
   Basic probability notation
   Independence
   Bayesian rule
   Bayesian network
   Bayesian network reasoning
5. Constraint Satisfaction Problems
   Definition of Constraint Satisfaction Problems
   Constraint propagation
   Local search for CSPs
6. Planning
   Planning problems
   Partial order planning
   Real-world planning
7. Learning
   Foundation of Machine Learning
   Principles of Different Approaches of Machine Learning: Connectionist, Bayesian, Evolutionary, Symbolic, and Analogy approaches
8. Application Cases
   Expert systems

News analysis

Teaching Methods:

The course will be delivered through lectures, assignments, course dissertations, group projects. The fundamental concepts, techniques, and potential business applications of artificial intelligence, software packages such as JESS, CLIPS, EXSYS, or JLog will be covered in lectures. Students are required to apply the concepts and principles covered in this course to analyse the real-world problem(s) and formulate them as AI problem(s) in their assignments. Students perform a group project and apply intelligent expert system(s) to solve the AI problem(s). Moreover, AI applications, AI algorithms for problem-solving, analysing AI models and design of AI systems will be learnt by students through project-based learning, case studies, and interactive exercises. They are required to complete a course dissertation to present their analysis, formulations, and intelligent expert systems.