Name of the Programme	**: M.Sc. in Data Science**
Course Code	**: CSD-506**
Title of the Course	**: Fundamentals of Artificial Intelligence (Theory)**
Number of Credits	**: 2(2L-0T-0P)**
Total contact hours	**: 30 hours (30L-0T-0P)**
Effective from AY	**: 2023-24**

Pre-requisites for the course	Programming, probability and statistics and linear algebra	
Course Objectives	To develop a basic understanding of 1. Problem-solving 2. Knowledge representation 3. Reasoning and learning methods of AI.	
Content	**Unit 1:** Artificial Intelligence Introduction -Intelligent Agents, Problem-solving Solving Problems by Searching -Search in Complex Environments - Adversarial Search and Games- Constraint Satisfaction Problems Knowledge, reasoning, and planning Knowledge Representation-First-Order Predicate Logic - Unification Forward and Backward Chaining - Resolution - Ontological Engineering Categories and Objects - Events-Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information Uncertain knowledge and reasoning Quantifying Uncertainty - Probabilistic Reasoning - Probabilistic Reasoning over Time Probabilistic Programming -Making Simple Decisions - Making Complex Decisions -Multiagent Decision Making Machine Learning, Learning from Examples - Learning Probabilistic Models - Deep Learning - Reinforcement Learning Communicating, perceiving, and acting	**15 hours**

	Unit 2: Natural Language Processing - Deep Learning for Natural Language Processing - Computer Vision - Robotics. Artificial Intelligence applications Language Models - Information Retrieval - Information Extraction Natural Language Processing - Machine Translation - Speech Recognition Robotics-Hardware and Software for Robots - Planning and Perception Explainable AI - Definitions and concepts such as black-box models, transparency, interpretable machine learning and explanations. - Decision-making and decision support Human-Computer Interaction (HCI) and AI. - Explainable AI. -	**15 hours**
	Methods for Explainable AI. - Applications and examples. - Trust and acceptance.-Evaluation methods and metrics. - Ethical, legal and social issues of explainable AI. Contemporary issues in AI-Philosophy, Ethics, and Safety of AI -The Future of AI	
Pedagogy	Lectures/ Tutorials/Hands-on assignments/Self-study/Flipped classroom	
References/ Readings	1. GF Luger, (2002). Artificial Intelligence, Pearson Education, 2002. 2. M.C. Trivedi, (2019). A Classical Approach to Artificial Intelligence, Khanna Book Publishing. 3. Nilsson, N. J. (1998). Artificial intelligence: a new synthesis. Morgan Kaufmann. 4. Padhy, N. P. (2005). Artificial intelligence and intelligent systems (Vol. 337). Oxford: Oxford University Press. 5. Russell, S. J., & Norvig, P. (2010). Artificial intelligence a modern approach. London. 6. V., Rich, E., Knight, K., & Nair, S. (2009). Artificial Intelligence. Tata McGraw Hill	
Course Outcomes	1. Understand the basic concepts and techniques of Artificial Intelligence. 2. Apply AI algorithms for solving practical problems. 3. Apply basics of Fuzzy logic and neural networks. 4. Explain Expert System and implementation.	

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