Programme	BS Computational Statistics and Data Analytics	Course Code	CSTA-403	Credit Hours	3
Course Title	Artificial Intelligence				

Course Introduction

Artificial Intelligence has emerged as one of the most significant and promising areas of computing. This course focuses on the foundations of AI and its basic techniques like Symbolic manipulations, Pattern Matching, Knowledge Representation, Decision Making and Appreciating the differences between Knowledge, Data and Code. AI programming language Python has been proposed for the practical work of this course.

Learning Outcomes

By the end of this course, students will be able to:

1. Identify problems where artificial intelligence techniques are applicable.
2. Apply selected basic AI techniques; judge applicability of more advanced techniques.
3. Participate in the design of systems that act intelligently and learn from experience.

Course Content		Assignments/Readings
Week 1	**Unit – I** Introduction to Artificial Intelligence (AI) Overview of AI and its basic components	
	Unit – II Identification of AI systems and their applications	
Week 2	**Unit – III** Introduction to branches of AI and types of problems addressed	
	Unit – IV Search Strategies in AI Exhaustive and heuristic search techniques	
Week 3	**Unit – V** Introduction to informed and uninformed searching algorithms	
	Unit – VI Exploration of local search algorithms	
Week 4	**Unit – VII** Advanced Searching Techniques Further exploration of informed and uninformed searching algorithms	
	Unit – VIII Advanced local search strategies	
Week 5	**Unit – IX** Game Playing and Genetic Algorithms Application of AI in game playing	
	Unit – X Introduction to genetic algorithms and their	

	optimization techniques	
Week 6	**Unit – XI** Constraint Satisfaction Problems Understanding constraint satisfaction problems and their solutions	
	Unit – XII Techniques for solving constraint satisfaction problems in AI	
Week 7	**Unit – XIII** Symbolic AI and Logic Programming Overview of symbolic AI and the physical symbol system hypothesis	
	Unit – XIV Knowledge representation and search using logic programming	
Week 8	**Unit – XV** Reasoning in Logic Programming Unification and its role in logic programming	
	Unit – XVI Introduction to horn clause logic and resolution	
Week 9	**Unit – XVII** Prolog as an Example Logic Programming Formalism Introduction to Prolog programming language	
	Unit – XVIII Applications of Prolog in logic-based AI systems	
Week 10	**Unit – XIX** Knowledge Representation Schemas Understanding different knowledge representation schemas in AI	
	Unit – XX Analysis of various knowledge representation techniques	
Week 11	**Unit – XXI** Advanced Topics in Knowledge Representation Exploration of logic, propositional logic, and first-order logic	
	Unit – XXII Introduction to frames, semantic nets, and scripts in knowledge representation	
Week 12	**Unit – XXIII** Expert Systems and Applications Introduction to expert systems and their role in AI	
	Unit – XXIV Applications of expert systems in various domains	

Week 13	**Unit – XXV** Fuzzy Logic and Its Applications Overview of fuzzy logic and its principles	
	Unit – XXVI Applications of fuzzy logic in decision-making systems	
Week 14	**Unit – XXVII** Natural Language Processing (NLP) Introduction to NLP and its challenges	
	Unit – XXVIII Techniques and algorithms used in natural language understanding and generation	
Week 15	**Unit – XXIX** Computer Vision Basics of computer vision and image processing	
	Unit – XXX Applications of computer vision in AI systems	
Week 16	**Unit – XXXI** Emerging Trends in AI Exploration of recent advancements and emerging trends in AI	
	Unit – XXXII Future directions and challenges in the field of AI	

Textbooks and Reading Material

Text Book
1. Ertel, W. (2018). *Introduction to artificial intelligence*. Springer.
2. Russell, S. J., & Norvig, P. (2010). *Artificial intelligence a modern approach*. London.

Teaching Learning Strategies

Class Lecture method, which includes seminars, discussions, assignments and projects. (Audio-visual tools are used where necessary)

Assignments: Types and Number with Calendar

According to the choice of respective teacher.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2.	Formative Assessment	25%	It is continuous assessment. It includes: Classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes

			etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.