Syllabus for the Introduction to Artificial Intelligence & Machine Learning
(Common for all UG & PG Courses 4 credits)

Introduction:
The course "Introduction to Artificial Intelligence and Machine Learning" is designed to provide both undergraduate and postgraduate students with a comprehensive foundation in two crucial domains: Artificial Intelligence (AI) and Machine Learning. This interdisciplinary course aims to equip students with fundamental concepts and practical skills that are increasingly valuable in today's technology-driven world.

Objectives: The main objectives of this course are as follows:
- To familiarize students with the fundamental concepts, theories, and applications of artificial intelligence. Students will gain insight into the various subfields of AI, such as machine learning, natural language processing, computer vision, and robotics.
- To introduce students to the basics of Python programming, enabling them to write code, solve problems, and understand programming constructs. This objective emphasizes building a programming foundation as a prerequisite for implementing AI algorithms.

Outcomes: Upon completing the course, students can expect to achieve the following outcomes:
- Students will have a clear understanding of the fundamental concepts and terminology of Artificial Intelligence, enabling them to discuss and comprehend AI-related topics.
- Students will be proficient in writing Python programs, understanding syntax, and applying programming constructs. This skill set will serve as a solid foundation for further programming endeavours.

UNIT I

Introduction To Artificial Intelligence : Definition – Future of Artificial Intelligence – Characteristic of Intelligent Agents – Typical Intelligent Agents –Problem Solving Approach to Typical AI problems. Problem solving by Searching: Uninformed and informed strategies and implementation; Path planning; Constraint Satisfaction Problems (CSP).

UNIT II

Knowledge Representaion: Logical Agents– Propositional and first order Predicate logic-–inference– Knowledge representation and Automated Planning– Uncertain Knowledge and Reasoning: Quantifying uncertainty– probabilistic reasoning;

UNIT III

Machine learning & AI Applications: Machine learning basics - Learning from examples - forms of learning (supervised, unsupervised, reinforcement learning) -simple models (linear & logistic regression) - Deep Learning AI applications: Natural Language Processing - Language Models – Machine Translation; Speech Recognition; Computer Vision - Image classification.

UNIT IV

Python Programming: Introduction-The Python Programming Language, History, features, Installing Python, Running Python program, Debugging: Syntax Errors, Runtime Errors, Semantic Errors – Experimental Debugging, Formal and Natural Languages, The Difference between Brackets, Braces, and Parentheses.

Variables and Expressions Values and Types– Variables, Variable & Keywords Type conversion – Operator and Operands– Expressions–Interactive –Mode and script Mode, Order of Operations.

Conditional Statements: if, if- else, nested if –else -**Looping**: for, while, nested-loops.
Control statements: Terminating loops, skipping specific conditions.

UNIT V

Functions: Function Calls, Type Conversion Functions, Math Functions, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters. **Strings:** Strings, String Slices, Strings are immutable, and Searching–Looping–and counting String methods – the in operator–String Comparison – String operations **Lists:** Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List–, Built-in List Operators, Concatenation, In Operator, Built-in List functions and methods.

TEXT/REFERENCE BOOKS

1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach, Prentice Hall,.

2. M. Tim Jones, "Artificial Intelligence: A Systems Approach (Computer Science)",Jones and Bartlett Publishers, Inc.; 1st Edition, 2008.

3. Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press,2009.

4. Python GUI programming Cookbook -Burkahard A Meier, PacktPublication, 2nd Edition.

5. Barry, P. (2016). Head first Python: A brain-friendly guide. " O'Reilly Media, Inc.". Lutz, M. (2013). Learning python: Powerful object-oriented programming. "O'Reilly Media, Inc.".

Note:Theory-2credits, Lab-2 credits