Artificial Intelligence

1.1 Course Number: CS360

1.2 Contact Hours: 40 Credits: [3-0-0] 09

1.3 Semester-offered: Fourth

1.4 Prerequisite: Computer Programming, Data Structures, Algorithms, Discrete Maths

1.5 Syllabus Committee Member:

2. **Objective:** To make conversant with fundamentals of AI with the help of a running practical application connecting all the covered topics.

3. **Course Content:**

Unit-wise distribution of content and number of lectures

Unit	Topics	Sub-topic	Lectures
1	Introduction	What is AI, areas, current uses captcha, recommendation systems) Review of mathematical logic, propositional logic, logic implication, finite models and truth values, predicate calculus, infinite models and truth values, representing knowledge about the world: general, blocks world	6
2	Logical reasoning	Logical consequence, relation with deduction, soundness and completeness, resolution refutation procedure	4
3	Machine learning	symbolic learning, transformation based learning, POS tagging, probabilistic learning, markov models, hidden MM, Viterbi, word prediction in speech, POS tagging, chunking, rule based systems, natural language parsing, CFG	16
4	Natural language semantics	Connecting with logic, NL and KR, phrase structure, dependency structure, logic	4
5	Search	Hill climbing, best first, A*, game tree search, min-max, constraint satisfaction/planning, applications, expert systems, vision, philosophical issues, history of AI	10

	Total	**40**

4. Readings

4.1 Textbook:

- Artificial Intelligence – A Modern Approach (3rd Edition) – By Stuart Russell & Peter Norvig
- Artificial Intelligence: The Basics – By Kevin Warwick

4.2 Reference books:

- Machine Learning: The New AI– By Ethem Alpaydin
- Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies– By John D. Kelleher, Brian Mac Namee, Aoife D'Arcy

5 Outcome of the Course: Students will be able to

- Find appropriate idealizations for converting real world problems into AI search problems formulated using the appropriate search algorithm.
- Given a search problem, analyze and formalize the problem (as a state space, graph, etc.), select the appropriate search method, and write the algorithm for it.
- Explain important search concepts, such as the difference between informed and uninformed search, the definitions of admissible and consistent heuristics and completeness and optimality. Give the time and space complexities for standard search algorithms.