**Course Number**     **:** CS562
**Course Name**     **:** Artificial Intelligence
**Credits**     **:** 3-0-0-3.
**Pre-requisite**     **:** IC250 - Programming and Data Structure Practicum or Equivalent,
           CS202 – Data Structure and Algorithm or Equivalent,
           CS403 - Algorithm Design and Analysis or Equivalent, COT
**Intended for**     **:** B. Tech, MS, M. Tech. & PhD.
**Distribution**     **:** Elective for Third and Final year B. Tech (All branches), MS, M. Tech.
    & PhD
**Semester**     **:** Even or Odd.

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## 1. Preamble:

    For an autonomous agent to behave in an intelligent manner it must be able to solve problems. This means it should be able to arrive at decisions that transform a given situation into a desired or goal situation. The agent should be able to imagine the consequence of its decisions to be able to identify the ones that work. In this introductory graduate level course on artificial intelligence (AI) we study a wide variety of search methods that agents can employ for problem solving.

## 2. Course Modules with Quantitative Lecture Hours:

1.  **Introduction:** Overview and Historical Perspective, Turing Test, Physical Symbol Systems and the scope of Symbolic AI, Agents.     **(3 hours)**
2.  **State Space Search:** Depth First Search, Breadth First Search, DFID     **(3 hours)**
3.  **Heuristic Search:** Best First Search, Hill Climbing, Beam Search     **(3 hours)**
4.  Traveling Salesman Problem, Tabu Search, Simulated Annealing     **(3 hours)**
5.  **Population Based Search:** Genetic Algorithms, Ant Colony Optimization **(3 hours)**
6.  Branch & Bound, Algorithm A*, Admissibility of A*     **(3 hours)**
7.  Monotone Condition, IDA*, RBFS, Pruning OPEN and CLOSED in A*     **(3 hours)**
8.  Problem Decomposition, Algorithm AO*, Game Playing     **(3 hours)**
9.  **Game Playing:** Algorithms Minimax, AlphaBeta, SSS*     **(3 hours)**
10. Rule Based Expert Systems, Inference Engine, Rete Algorithm     **(3 hours)**
11. **Planning:** Forward/Backward Search, Goal Stack Planning, Sussman's Anomaly
    **(3 hours)**
12. Plan Space Planning, Algorithm Graph plan     **(3 hours)**
13. Constraint Satisfaction Problems, Algorithm AC-1, Knowledge Based Systems **(3 hours)**
14. Propositional Logic, Resolution Refutation Method     **(3 hours)**

**3. Text Books:**

1. Deepak Khemani. A First Course in Artificial Intelligence, McGraw Hill Education (India), 2013.

**4. References:**

1. John Haugeland, Artificial Intelligence: The Very Idea, A Bradford Book, The MIT Press, 1985.
2. Pamela McCorduck, Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence, A K Peters/CRC Press; 2nd edition, 2004.
3. Eugene Charniak and Drew McDermott, Introduction to Artificial Intelligence, Addison-Wesley Publ., 1985.
4. ZbigniewMichalewicz and David B. Fogel. How to Solve It: Modern Heuristics. Springer; 2nd edition, 2004.
5. Judea Pearl. Heuristics: Intelligent Search Strategies for Computer Problem Solving, Addison-Wesley, 1984.
6. Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw Hill, 1991.
7. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, 2009.
8. Patrick Henry Winston. Artificial Intelligence, Addison-Wesley, 1992.
9. Stefan Edelkamp and Stefan Schroedl. Heuristic Search: Theory and Applications, Morgan Kaufmann, 2011.

**5. Similarity Content Declaration with Existing Courses:** None

**6. Justification for new course proposal if cumulative similarity content is > 30%:**N/A