Fall 2006
CSCI (PHIL) 4550/6550: Introduction to Artificial Intelligence

Instructor: Prashant Doshi
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Class Times: Tue & Thur: 11:00a – 12:15p

Class Locations: Pharmacy 362

Office Hours: Tue & Thur: 12:15p to 1:00p
By prior email appointment

Course Objectives:
• To gain an understanding of the fundamental ideas, concepts, and methodologies that define the field of artificial intelligence
• To gain an awareness of the philosophical foundations that have shaped AI
• To become proficient in designing and applying AI techniques

Course Topics:
• Foundations and History of AI
  – Philosophical, psychological, and economical foundations
  – Birth of AI to state of the art
• Intelligent Agents
  – Environments, rationality
  – Types of agents: reflex, goal-based, utility-based
• Uninformed Search
  – Search problem formulation
  – Search strategies
    – Breadth-first, depth-first, depth-limited, bidirectional
    – Avoiding repeated states
• Informed Search
  – A* search with heuristics
  – Properties of good heuristics
  – Local search problems
    – Hill-Climbing, Simulated annealing, Beam, and Genetic algorithms
• Adversarial Search
  – Games and optimal decisions
  – Minimax algorithm
  – Alpha-beta pruning and Evaluation functions
  – Games with chance
• Propositional Logic
  – Knowledge-based agents
  – Syntax and Semantics
Inference, Resolution, Forward and Backward chaining

- First-Order Propositional Logic
  - Syntax and Semantics
  - Assertion and queries in first-order logic
  - Inference rules with quantifiers
  - Unification and Lifting
  - Forward and Backward chaining

- Knowledge Representation
  - Ontologies
  - Actions, Situations, and Events
  - Mental Events and Objects
    - Knowledge and Beliefs

- Classical Planning
  - Language
  - Planning as State-space search
  - Partial-order planning and Planning graphs
  - Hierarchical task networks
  - Planning in Non-deterministic domains

- Selected readings in the philosophical foundations

**Course Textbooks:**

There is one required textbook for this course:

AI: A Modern Approach, 2nd Edition
Stuart Russell and Peter Norvig

Other textbooks for reference are:

Artificial Intelligence, 2nd Ed.
Rich and Knight

Essentials of AI
Ginsberg

ANSI Common Lisp
Graham

Selected readings in AI:

The Society of the Mind
Marvin Minsky

The Sciences of the Artificial, 3rd Ed.
Herbert Simon

**Course Structure:**

Teaching
Assignments
- Written and Programming (pseudo-code)
Written Exams
- Midterm and Final
Course Schedule: This is an approximate schedule and is subject to change:

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<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>08/22/06 to 11/30/06</td>
<td>7 Biweekly Assignments</td>
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<tr>
<td>10/24/06</td>
<td>Midterm Exam</td>
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<tr>
<td>12/08/06</td>
<td>Final Exam</td>
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Grade Allocations: Undergraduate and graduate students will be assessed separately. Final letter grade will depend on class standing.

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<thead>
<tr>
<th>Component</th>
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<tbody>
<tr>
<td>Assignments</td>
<td>45%</td>
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<td>Midterm Exam</td>
<td>20%</td>
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<td>Final Exam</td>
<td>30%</td>
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<tr>
<td>In-class participation and</td>
<td>5%</td>
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<tr>
<td>Attendance</td>
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Course Policy: The work you submit and present must be your own. Plagiarism and other forms of academic dishonesty will be handled within the guidelines of the Student Handbook. The usual penalty for academic dishonesty is loss of credit for the assignment in question; however, stronger measures may be taken when conditions warrant.