Fall 2004

CS 409/609: Principles of Artificial Intelligence

Michael T. Cox
Wright State University - Main Campus

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# CS 409-609 PRINCIPLES OF ARTIFICIAL INTELLIGENCE

**Instructor:**

Dr. Michael T. Cox  
[Email](mailto:cs609fac@cs.wright.edu)  
[Website](http://www.cs.wright.edu/~mcox/)

<table>
<thead>
<tr>
<th>Office:</th>
<th>Office Hours:</th>
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<tbody>
<tr>
<td>RC343 (phone 775-5126)</td>
<td>TBA</td>
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<table>
<thead>
<tr>
<th>Prerequisites:</th>
<th>Prerequisites:</th>
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<tr>
<td>CS 400 Data Structures</td>
<td>CS 340 or Lisp Experience</td>
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<tr>
<th>Meeting Times:</th>
<th>Credit Hours:</th>
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<tr>
<td>M W 8:00-9:15, Room 153 RC</td>
<td>4 (3hr lecture, 2hr lab)</td>
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Course Description:

"Principles of Artificial Intelligence" is a graduate/undergraduate level introductory course in Artificial Intelligence (AI), designed for students interested in or specializing in AI. We will cover several basic topics ranging from knowledge representation, inference, problem solving, search, the predicate calculus and other fundamentals of AI, to selected topics concerning intelligent agents, natural language processing, planning, learning, and case-based reasoning. The intent of the course is to provide a background in artificial intelligence, an exposure to the major issues and methods in the field, and experience in writing AI programs. The course will also examine real AI systems and allow the student to modify and experiment with them. I expect classes to consist of active discussions in addition to lectures; thus, class participation will be important and encouraged. Because of this reason, and because lectures will contain information not covered in the text and for which the student will be responsible on tests, attendance is crucial. Class lectures and discussions will be complemented by programming assignments, reading assignments, and a term project. All programming will be done in Common Lisp.

Objectives:

The main objectives of the course are

1. to provide a basic survey of AI
2. to develop a conceptual understanding of the basic issues and major topics in AI
3. to develop design skills for building simple AI systems.

**Required Text:**


**Supplementary Readings**

**LISP and AI Resources**

- LISP FAQ (Frequently Asked Questions)

**Academic Dishonesty:**

Academic dishonesty will not be tolerated in class, on homework, or during examinations. For a list of examples of cheating see the Code of Student Conduct section of the Wright State University Student Handbook. Search for "Academic Dishonesty Defined" to find the exact location where the examples are listed.

**Student Evaluation:**

There will be a midterm exam constituting 25% of the grade. The exam will be
thought provoking, as opposed to being an exercise in memorization and recall. You will be tested on your understanding of the principles, and your ability to apply them to new and different problems. The final exam will be written likewise, constituting 35% of the course grade. Homework assignments and projects will provide 35% and occasional pop quizzes will be worth 5%. Class participation and attendance will also be significant biasing factors in the evaluation.

A positive bias factor comes into effect when the student is on the dividing line between grades. The bias can put the student over the line to a higher grade. Also important to the calculation of positive grading bias is class "brownie points." These points are earned in class when a student discovers the instructor making a mistake. The first student that announces the error during lecture receives the point. Students are responsible for keeping tally of their brownie points and reporting them to the instructor at the end of the course (they may also brag about their current tally to the class as each new mistake is discovered). *NOTE, all professors make mistakes. Never believe a professor without a critical eye (this is key to the scientific method); rather, challenge them publicly :-)*

All of the assignments will be submitted in class with hardcopy on the dates specified. A copy will also be submitted electronically before class (this is optional for assignment #1). If your assignment is incomplete, turn it in and we will grade it for partial credit. If your assignment is late, I will impose a penalty of 10% per day. Some assignments may not allow late submissions.

All assignments must be done independently (or in groups if instructed). You are encouraged to talk to the instructor, if you encounter any difficulties. When working independently, you may discuss the problem and the issues that arise with other students. You may not share or discuss your code. In other words, talk about the problem, not about the program itself. Likewise if working in groups, adhere to the same conduct between groups. These are supposed to be common sense guidelines; please talk to the instructor, if you are unsure about what is permissible. If you use algorithms or methods described in books or papers, make sure you include a comment in your program with the appropriate references.

Some assignments will contain one or more extra credit problems. These are designed for students who need extra credit to remedy a poor score, and also for students who wish to explore particular topics in greater depth. The final grades will be assigned on a curve based on regular credit problems, after which students with extra credit will be scaled up appropriately. This ensures that extra credit can
only help those students who have it, but not hurt those who don't.

College Computing Resources:

Allegro Common Lisp is available on gandalf.cs.wright.edu only.

Help and Communication:

College computer labs, software availability, and the CaTS help desk are listed on-line. The CaTS phone number is 775-4827. Many problems such as how to use your university web server can be answered by them.

Most communication regarding the course will be done electronically. Please read your electronic mail regularly (i.e., once or twice per day); the pine command, Netscape mail, or others can be used to do this. Announcements will be posted on the newsgroup wright.cs.cs409-cs609 which you should also read regularly; the rn command can be used to do this, as well as the gnus command within emacs and with the Netscape newsreader. The newsgroup is also useful for discussing among yourselves various issues pertaining to class (but not solutions to assignments).

Communicate with the instructor by sending e-mail tc6s09fac@cs.wright.edu. It is important that you use your class account to do this, not your university account or other accounts such as yahoo. All homework assignments MUST be sent from your class account; credit may not be given otherwise. You are encouraged to send any questions about the assignments to the wright.cs.cs409-cs609 newsgroup so that everyone can benefit from the questions and answers.

Correspondence: cs609fac@cs.wright.edu
CS 409-609 PRINCIPLES OF ARTIFICIAL INTELLIGENCE

Course Syllabus

For all articles outside of the textbook, see Supplementary Required Readings.

<table>
<thead>
<tr>
<th>DAY</th>
<th>TOPIC</th>
<th>HOMEWORK DUE</th>
<th>READINGS</th>
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<tbody>
<tr>
<td>Sep. 8</td>
<td>Introduction to Course and Discussion</td>
<td>none</td>
<td>Chapter 1, Sections 1.1-1.5, Preface(L) pp. vii-x</td>
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<tr>
<td>Sep. 13</td>
<td>Introduction to AI and Symbolic Computation</td>
<td>*</td>
<td>Chapter 2, Sections 2.1-2.5; Chapt.1(L) Sections 1.1-1.10</td>
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<tr>
<td>Sep. 15</td>
<td>Intelligent Agents</td>
<td></td>
<td>Chapter 2, Sections 2.1-2.5; Chapt.1(L) Sections 1.1-1.10</td>
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<tr>
<td>Sep. 20</td>
<td>Problem-Solving Agents and Representation</td>
<td>*</td>
<td>Chapter 3, Sections 3.1-3.3, Chapt.2(L) Sections 2.1-2.6</td>
</tr>
<tr>
<td>Sep. 22</td>
<td>Problem Spaces and Search</td>
<td></td>
<td>Chapter 3, Sections 3.4-3.5, 3.7, Chapt.4, Section 4.1(pp.94-98), Chapt.3(L) Sections 3.1-3.3</td>
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<tr>
<td>Sep. 27</td>
<td>Knowledge, Reasoning and Knowledge-Based Agents</td>
<td>*</td>
<td>Chapter 7, Sections 7.1-7.4, Chapt.3(L) Sections 3.4-3.14</td>
</tr>
<tr>
<td>Sep. 29</td>
<td>Logic Representations</td>
<td></td>
<td>Chapter 8, Sections 8.1-8.3, 8.5</td>
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<tr>
<td>Oct. 4</td>
<td>Logical Inference</td>
<td></td>
<td>Chapter 9, Sections 9.1; 9.2</td>
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<td>Oct. 6</td>
<td>Knowledge Bases, Memory Organization, &amp; Frame Repr.</td>
<td></td>
<td>Chapter 10, Sections 10.1; 10.2</td>
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<td>Oct. 11</td>
<td>Case-Based Reasoning</td>
<td></td>
<td>Kolodner Article</td>
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<tr>
<td>Oct. 13</td>
<td>Midterm (drop day Oct. 25)</td>
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Oct. 18  Planning and Planning Agents  *  Chapter 11, Sections 11.1; 11.2
Oct. 20  State-Space Planning and PRODIGY Planning Demonstration  Veloso Article (1st half)
Oct. 25  Case-Based Planning  *  Veloso Article (2nd half)
Oct. 27  TBA
Nov.  1  Communication Agents and Natural Language Processing  *  Chapter 22, Sections 22.1-22.2; Chapt.19(L) Sections 19.1-19.2
Nov.  3  Natural Language Processing  Chapt.19(L) Sections 19.3-19.5
Nov.  8  Learning from Observation  Chapter 18, Sections 18.1; 18.2; 18.3 (pp. 653-659)
Nov. 10  Knowledge in Learning  Chapter 19, Sections 19.1-19.3
Nov. 15  Final Exam 5:45-7:45 PM

Correspondence: cs69fac@cs.wright.edu