

CAP 5635

Artificial Intelligence Concepts

Fall 2012

Subject Material

CAP 5635: Artificial Intelligence Concepts

Prereq: COP 3530.

Heuristic search, game theory, knowledge representation, logic, machine learning, AI languages and tools. Applications such as planning, natural language understanding, expert systems, and computer vision.

This course presents an overview of Artificial Intelligence concentrating on the core concepts of problem solving, heuristic search, and knowledge representation. It introduces one of the two major A.I. languages, Lisp, (the other being Prolog) and examines the application of the core concepts in some of A.I.'s application areas: natural language processing, expert systems, vision, planning, and learning.

There are a series of follow-on classes that are offered by our department that include: Expert Systems, Computers and Vision, Machine Learning, and Neural Networks. One or two of these classes are offered each semester.

Class Meeting Times

This course meets every MWF during the semester for lecture from 11:45 – 12:35 a.m. (5th hour) in 122 CSE.

Instructor

Dr. Douglas Dankel II

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Other times BY APPOINTMENT ONLY.

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On-Line Materials

Materials (handouts, lecture notes, assignments, etc) will be available on the course's website in Sakai (<http://lss.at.ufl.edu>). It is *your* responsibility to log-on to Sakai **regularly** using your Gator Link account so you do not miss material.

Texts

Ben Coppin's *Artificial Intelligence Illuminated* published by Jones and Bartlett is the required text for the class. All of the reading assignments are from this book. I will roughly follow this text, but will skip some material, greatly supplement some topics, and add others. View it as a highly recommended supplement to the lectures. Do **not** view it as a substitute to attending class since material not discussed in the book will be presented in lecture.

A Lisp text is available on-line: <http://www-2.cs.cmu.edu/Groups/AI/html/cltl/cltl2.html>. If you would prefer to have a hard copy text to reference, consult the course's on-line Lisp textbook list to pick one.

Lecture Notes. A copy of all of the overhead slides that will be used during the class is available on-line in both PowerPoint and PDF formats. Students should *print out or use an electronic copy of these* for taking

notes in class. Note that material *has been left out* of the notes – this is material for you to fill in during lecture. I will *not* provide the completed set of notes.

Examinations

Four examinations will be given during the semester. Each examination will be a 1 hour in-class examination. Each examination will concentrate on new material covered since the last examination, but because of the nature of the course, up to 50% of any examination might be from earlier in the course. The examinations will be closed book and closed notes. **VERY** tentative dates for these examinations are: September 21, October 19, November 16, and 7:30- 9:30 a.m. on December 14.

Assigned Readings

The following is a list of the readings to be completed during the specified weeks of the semester. These readings will not all correspond with the material covered in lecture. They instead act as supplements to the lecture material.

| Week | Assignment For The Week |
|---------------|----------------------------|
| 8/20 | Chapter 1 |
| 8/27 | Chapter 1 |
| 9/ 3 | Chapter 2 |
| 9/10 | Chapter 3 |
| 9/17 | Chapter 3 |
| 9/24 | Chapter 4 |
| 10/ 1 | Chapter 4 & 5 |
| 10/ 8 | Chapter 5 |
| 10/15 | Chapter 6 |
| 10/22 | Chapter 7 |
| 10/29 | Chapter 8 |
| 11/ 5 | Chapter 9 |
| 11/12 – 12/ 3 | chapters based on coverage |

All readings are from *Artificial Intelligence Illuminated*.

Attendance

Attendance during the semester will not be recorded. I will make every attempt to make this class interesting and enjoyable in the hope that you will want to attend. However, all of you are “big boys and girls” and, as a result, are free to make your own decision concerning attendance. One word of caution is in order: Some of the material that I will cover is not documented in texts and on-line materials and some is extremely difficult to locate, so I do recommend that you attend so you do not miss this material.

Cheating

All students admitted to the University of Florida have signed a statement of academic honesty committing them to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Unfortunately, it is necessary to mention the subject of cheating. While the following discusses cheating involving programming, ***the general ideas apply to any assignment given within the course***. Some of the exercises given in this class require the development of short programs or program fragments, and there are always *many* correct solutions to any non-trivial programming problem. It is sometimes difficult for students and instructors to determine what constitutes cheating or academic dishonesty in this setting. Each exercise, if carried out by the student, will give the student understanding, or will reinforce the student's understanding, of an important A.I. concept. Hence, the student is permitted to *inspect* related problems and ask questions of the instructor and others in the class about the problem and related problems, but the

student is **not** permitted to **copy** the work of *any* others, *including but not limited to* the instructor, previous TAs, other students (who are, have or have not taken the class), or any other individual(s). Likewise, students allowing others to copy their own work are guilty of cheating.

The exercises assigned for this course are **not** team projects unless the instructor **explicitly** tells you so. You may consult with others when attempting to develop your solutions to assignments. It is legitimate for two individuals to **discuss** the assigned problem so they both *understand what is being asked*. But once any details of the development and coding of the program starts, collaboration should cease. This does not mean that students may not help each other – there are just limits to "helping". You cannot develop a single solution working together as a team with other students. Two identical or *nearly identical* solutions to the same problem will be regarded as evidence of over-collaboration and will be dealt with as cheating. The borderline where simply consulting with others becomes working as a team or copying is a gray area. If you have any doubts, you are working too closely and should stop – go off and work by yourself.

All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Because computer resources are shared, it is essential that all students use them in a way that respects the rights of others. Any attempt to copy other people's assignments, destroy other people's data or code, or deny the use of the computer to others is unethical and is considered a violation of academic honesty guidelines. The bottom line is, ***do not misuse any computer or the computer lab!***

Do not cheat! Do not copy others work! Immerse yourself in the class. Learn the material. The benefit and enjoyment you will receive will be much more valuable than any consequences of cheating. **Do not even think about cheating!** You do not realize how easy it is for us to identify who has cheated and to prove it to others. Individuals who have misrepresented work as being their own **or** who have *assisted* another will receive as a **minimum**: a grade of *zero* on that assignment **and** a decrease of *one letter grade* on their final course grade. This is *in addition* to any other penalties given by Student Affairs. Every one of you should examine the Academic Honesty Guidelines and Student Conduct Code in the *University of Florida Graduate Catalog* for more details. Ignorance of these Guidelines is no excuse!

Grading

Grading for students in this course shall be weighted approximately:

| | |
|---------------|-----|
| Examination 1 | 15% |
| Examination 2 | 15% |
| Examination 3 | 15% |
| Examination 4 | 15% |
| Project | 30% |
| Homework | 10% |

The grading of the main project will be according to the following scale:

| | |
|-------------------------|-----|
| Initial "Demonstration" | 10% |
| Intelligence Report | 15% |
| Tournament Play | 15% |
| Final "Demonstration" | 25% |
| Final Report | 35% |

Any of these values can be changed by $\pm 5\%$.

Undergraduate students, in order to graduate, must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. Graduate students, in order to graduate, must have an overall GPA of 3.0 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

The following chart identifies grade guarantees (if you make above 92 you are guaranteed a grade no lower than "A"). The percentages required for each grade category might be (and typically are) lowered based on the distribution of grades at the end of the semester.

| Total Point Percentage Range | Letter Grade |
|------------------------------|--------------|
| TP \geq 92 | A |
| 92 > TP \geq 90 | A- |
| 90 > TP \geq 88 | B+ |
| 88 > TP \geq 82 | B |
| 82 > TP \geq 80 | B- |
| 80 > TP \geq 78 | C+ |
| 78 > TP \geq 72 | C |
| 72 > TP \geq 70 | C- |
| 70 > TP \geq 68 | D+ |
| 68 > TP \geq 62 | D |
| 62 > TP \geq 60 | D- |
| 60 > TP | E |

Recommended Lisps

The following recommendations are aimed at students who are interested in obtaining a version of Lisp to use at home on their own PC. There are three versions of Lisp that I recommend for you to use on your class project. Note: you should verify that your project will execute using CLisp on the department's Unix machines since that is the environment that will be used for the final project evaluation.

1. **Allegro Common Lisp.** Most likely the best implementation of Common Lisp for PCs. It has an excellent development environment with an outstanding debug facility. They have made a *free* time-limited version of this system available on their web site – once the time limit is exceeded, you can renew your copy! If you wish to purchase a copy you should recognize that an excellent system can be expensive -- the cost of this system is ~\$1000! Their home page is: <http://www.franz.com>! Highly recommended!
2. **CLisp.** CLISP is a Common Lisp (CLtL1 + parts of CLtL2) implementation by Bruno Haible of Karlsruhe University and Michael Stoll of Munich University, both in Germany. This is available on the department's Unix machines. It runs on microcomputers (DOS, OS/2, Atari ST, Amiga 500-4000) as well as on Unix workstations (Linux, Sun4, Sun386, HP9000/800, SGI, Sun3 and others) and needs only 1.5 MB of RAM. It is free software and may be distributed under the terms of GNU GPL. CLISP includes an interpreter, a compiler, a subset of CLOS (the Common Lisp Object System), and, for some machines, a screen editor. Available for free downloading by anonymous ftp from the CLISP Organization where versions are available for many different platforms and pointers are provided to Lisp documentation.
3. For those of you that are using Linux, consider using GCL (GNU Common Lisp). This is an excellent implementation that has been around for many years.

Accommodation for Students with Disabilities

Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

UF Counseling Services

Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.