CAP 6635
Artificial Intelligence

3 credits

Spring 2024

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Course Description

This course introduces core concepts, techniques, and applications of artificial intelligence (AI). Course subjects include intelligent agents, problem solving by search, search strategies, game playing, knowledge representation and reasoning, learning from examples, and deep learning. The class also discusses ethical and societal implications of the increasing use of AI.

Instructional Method

Live Class
On-campus lecture days: T, TR 2:00PM – 3: 20 PM
FL-401 (Fleming Hall)

Zoom Session
The class also features a live Zoom session, synchronized with the live class. The Zoom session link is posted through Canvas.

Prerequisites/Corequisites

Graduate standing for EECS students, and instructor's approval for students from other major

The class (both homework and project) involves significant programming tasks and assignments. Entry level programming knowledge (Python preferred) is strongly recommended.

Course Objectives/Student Learning Outcomes

1. Learn concepts of artificial intelligence, knowledge representation, problem solving by search, and learning methodologies.
2. Develop abilities to analyze artificial intelligence systems.
3. Develop the basic understanding of knowledge reasoning.
4. Develop the ability to design basic learning systems.

Course Evaluation Method

Homework -	45 %
project -	15 %
Quiz -	20 %
Participation: -	5 %
Final (or Project Report) -	15 %

All homework/project/solutions are posted online through Canvas. No email submission is accepted. No submission is accepted after homework solutions are published online.

Course Grading Scale

[90, 100]: "A";
[85, 90): "A-"
[80, 85): "B+";
[75, 80): "B";
[70, 75) : "B-"
[55, 70): "C" (including C-)
[40, 55): "D"(including D-)
39 and below: "F."

Policy on Using AI Content Generation Tools

Using AI content generation tools (such as ChatGPT) to answer homework/quiz/final exam are strictly prohibited. Any submission involving AI generated content will receive a 0 grade. Students violating this rule twice will receive an F grade.

Policy on Similar Submissions

Any homework/quiz/final exam submissions with similar content will receive a 0 grade (this applies to the case that two or more students have similar answers, and a student's answers are similar to solutions from online or other sources). Students violating this rule twice will receive an F grade.

Policy on Makeup Tests, Late Work, and Incompletes (if applicable)

All homework are posted through Canvas. Solutions must be submitted through Canvas (no email submission is accepted). Students are responsible for the correctness of each homework submission. We can only grade submission as shown in the Canvas.

Makeup tests are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exam should be administered and proctored by department personnel unless there are other pre-approved arrangements

Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation and the student is currently passing the class, incomplete grades will not be given.

Special Course Requirements (if applicable)

All homework assignments and all lab work in this course must be **INDIVIDUAL** effort. Please take the time to read the documentation. You are responsible for the information outlined in it. Please see the instructor, any teaching assistant, or Engineering Student Services tutoring for assistance.

Classroom Etiquette Policy (if applicable)

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

Policy on the Recording of Lectures (optional)

Because of a new Florida Statute in 2021, the following model language is suggested for inclusion in course syllabi, at the discretion of individual faculty:
Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging

to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

If your college has particular policies relating to cheating and plagiarism, state so here or provide a link to the full policy—but be sure the college policy does not conflict with the University Regulation.

Required Texts/Readings

S. Russell and P. Norvig. "Artificial Intelligence: A Modern Approach". 4th edition, Pearson, 2020, ISBN-10: 0134610997

Supplementary/Recommended Readings (if applicable)

Extra reading and supplementary materials will be announced during the class.

Course Topical Outline

1. Introduction
2. AI agent and Problem Solving by Search
    - State Space Search
    - Blind Search
    - Heuristic Search
    - Gaming Playing
3. Knowledge Representation and Reasoning
    - Logic, Models, and entailment
    - Propositional Logic
    - Knowledge Representation and Reasoning
    - First Order Logic (FOL)
    - FOL Inference
4. Uncertain Knowledge and Reasoning
    - Logic and Uncertainty
    - Probability theory
    - Bayes Rule
    - Bayesian Networks
5. Reinforcement Learning
    - Elements of Reinforcement Learning
    - Markov Decision Processes
    - Q-Learning
6. Learning from Examples
    - Neural Networks