Syllabus

Course Information

Course Number:	CSCE 420
Course Title:	Artificial Intelligence
Section:	500
Time:	TR 8:00-9:15
Location:	124 HRBB
Credit Hours:	3 cr.
Course web page:	https://people.engr.tamu.edu/ioerger/cs420-fall24/index.html

Instructor Details

Instructor:	Dr. Thomas R. Ioerger
Office:	438 Peterson Building
E-Mail:	ioerger@cs.tamu.edu

Course Description

Fundamental concepts and techniques of intelligent systems; representation and interpretation of knowledge on a computer; search strategies and control; active research areas and applications such as notational systems, natural language understanding, vision systems, planning algorithms, intelligent agents and expert systems.

Course Prerequisites

CSCE 411 or approval of instructor

Special Course Designation

none

Course Learning Outcomes

List one or more learning outcomes for the course.

A learning outcome is a statement regarding what the student will know or be able to do upon successfully completing the course. It must be both observable and measureable. The outcomes may include competencies developed in the course. Additional assistance with learning outcomes is available through the Center for Teaching Excellence and the Office of Institutional Assessment.

After completing this class, students should be able to do the following*:*

1. Design and implement intelligent search methods for building complex problem-solving programs.

    1. formulate computational problems as search tasks
    2. describe how various search algorithms work and explain differences in their space- and time-complexity
    3. design heuristics to improve efficiency of search
2. Use knowledge representation methods for adding knowledge-based reasoning in programs.
    1. be able to encode rules and information in propositional and first-order logic
    2. implement inference algorithms to extract deductions from a knowledge base
    3. represent and reason about uncertainty using Bayesian probability
3. Implement intelligent decision-making methods in a program
    1. generate symbolic plans to achieve goals autonomously using planning algorithms
    2. use utility theory to make decisions for intelligent agents

Textbook and/or Resource Materials

Russell, S. and Norvig, P. (2021). Artificial Intelligence: A Modern Approach. 4th edition. Pearson.

Grading Policy

The overall score for the course will be a weighted combination of the following components:

- 5 written homeworks: 10%
- 3 programming projects: 35%
- 2 exams: 55% (exam 1: 25%, exam 2: 30%)

(note, Exam 2, held during finals week, will be non-comprehensive)

The final grade will be determined from the weighted-average total as follows:

- A: 90-100%
- B: ≥ 80% and <90%
- C: ≥ 70% and <80%
- D: ≥ 60% and <70%
- F: < 60%

Grades will be posted on Canvas.

Late Work Policy

The penalty for late homeworks and programming assignments is **-5% per day** (pro-rated over 24 hours).

Late work is defined as submitting a deliverable after the established deadline. Work submitted by a student as makeup work for an excused absence is not considered late work and is exempted from the late work policy (see **Student Rule 7**).

Programming Assignments

In addition to written homeworks, there will be several programming assignments throughout the semester. The programming assignments will be done *individually* **in Python or C++** (student's choice). Students are expected to be proficient in Python or C++. The code for course projects will be submitted via their TAMU-associated accounts on **Github.com**. Students will have to create a *private* repository for this class, and then share that with the instructor and TA by making them *collaborators*. The date and time students turn in each project will be determined by the timestamp of their commits on their files. It is the student's responsibility to learn how to use **Git** well enough to commit their code (along with reports and other materials to required turn in) and push it to the Github server by each deadline.

Written homeworks must be typed (not hand-written), and will be also be turned in via github.

Course Schedule

week 1	Overview of AI; core concepts
week 2	Search Algorithms (Ch. 3)
week 3	Heuristic Search (Ch. 3)
week 4	Iterative Improvement (Ch. 4)
week 5	Adversarial (Game) Search (Ch. 5)
week 6	Constraint Satisfaction (Ch. 6)
week 7	Propositional Logic (Ch. 7)
week 8	Inference algorithms (Ch. 7)
week 9	(Spring Break, Mar 13-17)
week 10	First-Order Logic (Ch. 8)
week 11	Inference in FOL (Ch. 9)
week 12	PROLOG
week 13	Default Reasoning and Uncertainty (Ch. 12,13.1)
week 14	Planning (Ch. 11)
week 15	Intelligent Agents (Ch. 2)

Important dates:

Tues, Aug 20, 2024: first day of class
Thurs, Oct 3, 2024: Exam I (in-class)
Tues, Nov 26, 2024: last day of class
Fri, Dec 6, 2024: Exam II (final, non-comprehensive), 1:00-3:00 pm

Optional Course Information Items

none

University Policies

This section outlines the university level policies that must be included in each course syllabus. The TAMU Faculty Senate established the wording of these policies.

***NOTE**: Faculty members should not change the written statements. A faculty member may add separate paragraphs if additional information is needed.*

Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity Statement and Policy

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that

student. Students must keep appropriate records at all times. The inability to authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities at aggiehonor.tamu.edu.

Use of AI Technologies like ChatGPT

This course assumes that all work submitted by students will be generated by the students themselves. Students should not have another person/entity do the writing of any substantive portion of an assignment for them, which includes hiring a person or a company to write assignments and using artificial intelligence tools like ChatGPT or GitHub Copilot.

Americans with Disabilities Act (ADA) Policy

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

***NOTE**: Faculty associated with the main campus in College Station should use this Americans with Disabilities Act Policy statement. Faculty not on the main campus should use the appropriate language and location at their site.*

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention – including but not limited to face-to-face conversations, a written class assignment or paper, class

discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage.

***NOTE**: Faculty associated with the main campus in College Station should use this Title IX and Statement on Limits of Liability. Faculty not on the main campus should use the appropriate language and location at their site.*

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a student's academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at suicidepreventionlifeline.org.

College and Department Policies

College and departmental units may establish their own policies and minimum syllabus requirements. As long as these policies and requirements do not contradict the university level requirements, colleges and departments can add them in this section.