George Mason University
School of Computing
Department of Computer Science
CS580: Introduction to Artificial Intelligence
Fall 2022
Instructor: Erion Plaku

Contents

1 General Information

Classroom	Nguyen Engineering Building 1103	
Day and Time	Wednesday, 4:30pm-7:10pm	
Schedule Type	Lecture, in person	
Credit Hours	3	
Recommended Prerequisites	CS310 and CS330	
Grading	This course is graded on the **Graduate Regular scale**	
Instructor	Dr. Erion Plaku	Associate Professor
	Office	Nguyen Engineering Building 4423
	Web	**https://cs.gmu.edu/∼plaku/**
	E-mail	plaku@gmu.edu
	Office Hours	Wednesday 2:00pm-4:00pm
Teaching Assistant	Jin Zhou	Graduate Student
	Email	jzhou23@gmu.edu
	Office Hours	TBD

2 Course Description

Artificial Intelligence principles and methods. Topics will include uninformed search, informed search, adversarial search, probabilistic reasoning and models, Bayes networks, machine learning fundamentals, classification and clustering, and neural networks. Additional topics may include knowledge representation, constraint satisfaction search, agent architectures, and Markov decision problems, among others.

3 Course Outcomes

- Upon completion of the course, students should have a fundamental understanding of the main ideas that have emerged in AI. These ideas will help students to broaden their knowledge of computer science and further their research.
- Students will have developed a good understanding of search algorithms and the fundamentals of machine learning.
- The course will help students to develop creative and critical reasoning skills, and apply their knowledge to solve various computer science and engineering problems using AI techniques.

4 Textbook

Title	"Artificial Intelligence - A modern Approach, Fourth Edition"
Authors	Stuart Russell and Peter Norvig
ISBN-13	978-0134610993
ISBN-10	0134610997
Publisher	Prentice Hall

5 Lectures

- Course Logistics & Introduction to AI **(0.5 lectures)**
- Solving Problems via Search **(5 lectures)**
  - Fundamentals (0.5 lectures)
  - Local Search (1 lecture)
    - Hill-Climbing

        - Simulated Annealing
        - Tabu Search
    - Uninformed Search (1 lecture)
        - Breadth-first Search
        - Depth-first Search
        - Iterative Deepening Search
    - Informed (Heuristic-Based) Search (1.5 lectures)
        - Dijkstra's Shortest Path
        - Uniform Search
        - Greedy-best First Search
        - A*
        - Branch-and-bound
    - Adversarial Search (1 lecture)
        - Minimax
        - Alpha-Beta Pruning
- Machine Learning **(6 lectures)**
    - Introduction and Fundamentals (0.5 lectures)
    - Probabilistic Reasoning and Bayesian Networks (0.5 lectures)
    - Inference in Bayesian Networks (1 lecture)
    - Supervised Learning (1.5 lectures)
        - Classification
            - k-Nearest Neighbors
            - Decision Trees
        - Regression
        - Ensemble Methods
    - Unsupervised Learning (0.5 lectures)
        - Clustering
    - Artificial Neural Networks and Deep Learning (2 lectures)
- Special Topics (if time permits, class can choose)
    - Constraint Satisfaction Problems
    - Classical Planning
    - Logical Reasoning
    - Reinforcement Learning

6 Assessment and Grade Brakedown

Homeworks and Quizzes	15%
Midterm Exam	15%
Programming Projects	50%
Final Exam	20%

- All work is individual. You are not allowed to work with others on homeworks, quizzes, exams, or projects.
- Quizzes and exams are open book, open notes. You can print and bring with you the lecture notes, your notes, or other notes you download from the web. You can also bring the textbook

or any other textbook. You are only allowed printed or hand-written materials; no viewing on electronic devices.

- Each homework, quiz, exam, or project will have at least 5 points of extra credit.
- Programming assignments should be done in C++, C, Python, or Java. If you are not familiar with any of these programming languages, please see the instructor as soon as possible.
- All programming assignments should be turned in via Blackboard.
- There will be four programming projects as follows:
  - Project 1 on local search, possibly some variant of Queens problem.
  - Project 2 on informed search, possibly some variant of Sliding Puzzle or Sokoban game.
  - Project 3 on adversarial search, possibly some variant of Generalized Tic-Tac-Toe, Nine Men's Morris, Checkers, or some other two-player board game.
  - Project 4 on machine learning, possibly some classification problem.

7 Lateness and Make-Up Policy

- Every homework and programming project should be returned by the due date.
- You have 5 late days in total that you can use at any point in time without any penalty. You will receive 0 points on every homework or programming project that is returned late (after exhausting your 5 late days).
- There will be no make-up for missed in-class quizzes or exams except under the following: If there is ever an emergency situation which prohibits you from attending class during quizzes or exams, you must alert the instructor and the appropriate student offices to make alternative arrangements. Doctor's notice or other proper documentation may be required to grant the exception.

8 Student Support Resources on Campus

Mason offers numerous student support resources, as detailed **here**.

9 Academic Integrity

- All students must adhere to the **GMU Honor Code**. The University Honor Code is upheld and supported by the Office for Academic Integrity. Please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely.
- In addition to this honor code, the computer science department has further honor code policies regarding programming projects, as detailed **here**.
- See also the **Statement on Academic Integrity** by the CS Department.
- Any deviation from the GMU or the CS Honor Code is considered an Honor Code violation.

10 Recording and/or Sharing Class Materials

- Sharing of instructor-created materials, particularly materials relevant to assignments or exams, to public online "study" sites is considered a violation of Mason's Honor Code: these include but are not limited to accessing exam/quiz/homeworks/project/or any assignment questions or answers for this class; uploading of any of the instructor's materials, quizzes, homeworks, projects, or exams; and uploading any of your own answers or finished work. For more information, see the Office of Academic Integrity's **summary of information about online study sites**. They also have a **short video** on this subject.
- All course materials posted to Blackboard or other course site are private to this class; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.
- Videorecordings – whether made by instructors or students – of class meetings that include audio, visual, or textual information from other students are private and must not be shared outside the class.
- Live video conference meetings (e.g. Collaborate or Zoom) that include audio, textual, or visual information from other students must be viewed privately and not shared with others in your household or recorded and shared outside the class.

11 Privacy

- Student privacy is governed by the Family Educational Rights and Privacy Act (FERPA) and is an essential aspect of any course.
- Students must use their Mason email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.

12 Disability Accommodations

- Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email:ods@gmu.edu — Phone: (703) 993-2474
- **Covid-19 Note:** Students who have a Covid-related disability should contact the Disability Services office; DS will contact faculty using standard protocols about any students who require accommodations. Faculty are not expected to create accommodations for students outside of the Disability Services official guidelines.

13 Diversity and Inclusion

- George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs,

policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

- An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

- For more information, please see
  - **Mason Diversity Statement** and
  - **Mason Non-Discriminatory Policy**

14 Sexual Harassment, Sexual Misconduct, and Interpersonal Violence

- George Mason University is committed to providing a learning, living and working environment that is free from discrimination and a campus that is free of sexual misconduct and other acts of interpersonal violence in order to promote community well-being and student success. We encourage students and employees who believe that they have been sexually harassed, sexually assaulted or subjected to sexual or interpersonal misconduct to seek assistance and support. University Policy 1202: Sexual Harassment and Misconduct speaks to the specifics of Mason's process, the resources, and the options available to students and employees.

- **Notice of mandatory reporting of sexual or interpersonal misconduct:** As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-993-3686 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.