George Mason University
College of Engineering, School of Computing, Department of Computer Science

Introduction to Artificial Intelligence

Staff Information

Instructor: Dr. Gheorghe Tecuci, Professor of Computer Science
E-mail: tecuci at gmu dot edu

Graduate Teaching Assistant: Juan Huang

Course Description

Artificial Intelligence is the Science and Engineering domain which is concerned with the theory and practice of developing systems that exhibit the characteristics we associate with intelligence in human behavior, such as reasoning, problem solving and planning, learning and adaptation, natural language processing, and perception. This course is a broad introduction to the basic principles and the major methods of Artificial Intelligence, preparing the students to build complex systems incorporating capabilities for intelligent processing of information. We will cover the main results from three waives in the evolution of AI: *Handcrafted Knowledge* (problem solving as search; constraint satisfaction problems; adversarial search; logic and production systems; resolution and prolog; ontologies and the semantic web), *Statistical Learning* (probabilistic reasoning basics; Bayesian networks inference and learning; machine learning basics; inductive learning of decision trees; very fast decision trees; neural networks and back propagation; deep learning; recurrent neural networks; convolutional neural networks, large language models), and *Critical Thinking* (evidence-based reasoning; instructable agents).

Online Learning

Students will have accounts on Blackboard and can download the lecture notes by going to courses.gmu.edu and logging in using their Mason ID and passwords. They should also be familiar with Zoom and Microsoft Teams.

This is an asynchronous online class, so it's important to follow the suggested study plan and make weekly progress.

Lectures (in PDF and recording formats) will be posted on Blackboard each week as per the scheduled plan. Your assignment is to watch these lectures and complete the associated exercises.

Outcomes

- Knowledge of and ability to apply uninformed and heuristic search methods;
- Knowledge of and ability to apply knowledge representation and reasoning methods based on first-order logic;
- Knowledge of and ability to apply basic probabilistic reasoning methods;
- Knowledge of and ability to apply basic machine learning methods;
- Knowledge of and ability to apply basic critical thinking methods;

Computer Requirements

HARDWARE

You will need access to a Windows or Macintosh computer with at least 2 GB of RAM and to a fast, reliable broadband Internet connection (e.g., cable, DSL). The recommended computer monitor and laptop screen size is at least 13 inches. Computer speakers or headphones are recommended for recorded content. A web cam is required for the exams. Computer hard disk space must allow for:

- Installing the required and recommended software.
- Saving your course assignments. For hardware and software purchases, visit Patriot Computers.

You are strongly encouraged to back up all contents of your computer on a regular basis. Loss of data will not excuse late or unsubmitted assignments. Feel free to use Gradescope as a backup method - make a submission whenever you make progress, as only the latest submission will be graded.

SOFTWARE

Please ensure you install the following software applications to review course materials, complete homework assignments, and take exams:

- Web browser (See Blackboard Support for supported web browsers)
- Adobe Acrobat Reader
- Flash Player
- Microsoft Office
- Blackboard Collaborate (select from the course menu)
- Respondus Lockdown Browser
- Latex editor (Optional)

Course Evaluation and Grading Breakdown

CATEGORY	% OF OVERALL COURSE GRADE
Quizzes	**5%**
Homework	**20%**
Wave 1 Exam	**30%**
Wave 2 Exam	**30%**
Wave 3 Exam	**15%**
Total:	**100%**

Submission of Assignments

Late submissions for homework or quizzes are **NOT** allowed. You have at least 12 days to complete each homework assignment. A late or missed assignment or quiz is simply missed, unless you have a doctor-certified illness on the day of the deadline that prevents you from submitting. In this scenario, contact the professor no later than 48 hours after the due date and attach the supporting documentation described; otherwise, your case will be dismissed.

A submission is considered on time if it is submitted electronically on Blackboard or Gradescope as instructed on or before the required submission date/time. Once the submission link is closed, it will not be reopened, and email submissions are not accepted.

Each assignment has a specific link for submission, so you must ensure that the correct files are submitted to the corresponding link. For example, if Homework 1 is submitted via the Homework 2 link, it will be marked as an "incorrect submission", and a grade of 0 will be assigned. You can avoid this by taking a few extra minutes to review your submission after uploading it.

It is the responsibility of the student to verify that the submitted files are correct. Please note that resubmissions are not accepted due to wrong file submissions or files that can't be open. It is not a wise decision to wait until the last minute to submit your assignment, this action may cause you not to submit your work or submit a wrong file. Please note that network connection failures or instability will not be accepted as an excuse for late or missed submissions, as there is ample time provided for submission.

Grading

If you feel points have been incorrectly deducted, contact the GTA and cc the professor. Regrading assignments must be requested within 5 days of the grade being published. No grade changes will be considered after this deadline.

Homework Assignments and Quizzes

Unless expressly indicated, all homework must be completed with a text editor and delivered in pdf format. Please note that scanned Apple Pencil (or similar) notes are considered handwritten; Work performed in this manner will be penalized as specified in the task description/rubric. You can earn 1 bonus point if your final submission is made 48 hours before the deadline.

Quizzes are available for 10 hours, so a quiz must be started during its availability. Once a link expires, it will not be reopened.

Exams

Absence from the midterm exam and the final exams will not be excused except for doctorcertified sickness on the day of the exam or quiz that prevented you from attending. If absence from a quiz or exam is unexcused, the grade will be entered as 0.

Part 1 closed-book exam with LockDown Browser
(https://web.respondus.com/he/lockdownbrowser/).

Part 2 open-book exam

Dates (mark your calendar)

- Wave 1 Exam: 10/5/2024
- Wave 2 Exam:11/16/2024
- Wave 3 Exam: 12/14/2024

Honor Code Policy

Mason is an Honor Code university. You are expected to abide by the University's honor code (http://oai.gmu.edu/mason-honor-code/), as well as the CS department Honor Code (http://cs.gmu.edu/resources/honor-code/). All work performed in this course is considered individual effort and will be subject to Mason's Honor Code. Any collaboration between students on assignments or exams is unacceptable.

Required Reading

- Tecuci G., *Lecture Notes in Artificial Intelligence*, 2024 (available on Blackboard)
- Tecuci G., Tecuci, *Critical Thinking: A Gentle Introduction*, 2024, ISBN 978-1-964262-01-7 (hardcover), ISBN 978-1-964262-00-0 (softcover)

Recommended Reading

- Poole D.L. and Mackworth A.K., *Artificial Intelligence: Foundations of Computational Agents*, Cambridge University Press, Second edition 2017, Third edition, 2023.
- Russell S., and P. Norvig P., *Artificial Intelligence: A Modern Approach*, Prentice Hall Fourth edition (ISBN-13: 978-0134610993, ISBN-10: 0134610997, 2020) or Third edition (ISBN-13: 978-0-13-604259-4, 2010) or Second edition (ISBN: 0-13-790395-2, 2003).

Other Readings

- Tecuci, G., Marcu, D., Boicu, M., Schum, D.A., *Knowledge Engineering: Building Cognitive Assistants for Evidence-based Reasoning*, Cambridge University Press, 2016.
- Gathering Strength, Gathering Storms: One Hundred Year Study on Artificial Intelligence, The One Hundred Year Study on Artificial Intelligence (AI100) 2021 Study Panel Report.
- Witten, I., Frank E., Hall M., *Data Mining: Practical Machine Learning Tools and Techniques*, Morgan Kaufmann, 2011. Free access on-campus from http://proquest.safaribooksonline.com/book/-/9780123748560
- Mitchell, T.M., *Machine Learning*, New York: McGraw Hill, 1997.See also 2015-2016 chapters at http://www.cs.cmu.edu/~tom/NewChapters.html • Nilsson J.N., *Artificial Intelligence: A New Synthesis*, Morgan Kaufmann, 1998.
- Luger G., *Artificial Intelligence: Structures and Strategies for Complex Problem Solving*, Addison Wesley, 2009.

Email Communication

- For all the issues related to the course, always email both tecuci at gmu dot edu and jhuang21 at gmu dot edu.
- You are required to always use your Mason email and include CS480 in the subject.
- Do not sent us email through Blackboard.

Mason Email Accounts

Students must activate their Mason email accounts to receive important University information, including messages related to this class.

Office of Disability Services

If you are a student with a disability and you need academic accommodation, please see Dr. Tecuci and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS (http://ds.gmu.edu/).

Other Useful Campus Resources

- Writing Center: A114 Robinson Hall; (703) 993-1200; http://writingcenter.gmu.edu
- University Libraries "Ask a Librarian" http://library.gmu.edu/ask
- Counseling and Psychological Services (CAPS): (703) 993-2380; https://caps.gmu.edu/

University Policies

The University Catalog, http://catalog.gmu.edu, is the central resource for university policies affecting student, faculty, and staff conduct in university affairs. You may also review the University Policy web site, http://universitypolicy.gmu.edu/