George Mason University
The Volgenau School of Engineering
Department of Computer Science
CS 480 Introduction to Artificial Intelligence

Meeting time: Tuesday and Thursday 3:00 pm – 4:15 pm
Meeting location: Online on Blackboard

Instructor: Dr. Gheorghe Tecuci, Professor of Computer Science
Office hours: Online by appointment, for questions unrelated to the course. Course-related questions will be addressed during the course online meetings.
E-mail: tecuci at gmu dot edu

Graduate Teaching Assistant: Arnab Debnath
E-mail: adebnath at masonlive dot gmu dot edu
Office hours: Online, by appointment

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 presents the basic principles and the major methods of Artificial Intelligence, preparing the students to build complex systems incorporating capabilities for intelligent processing of information. Covered topics include: heuristic search, constraint satisfaction, adversarial search, knowledge representation, logic and probabilistic reasoning, statistical learning, knowledge engineering and cognitive assistants. The students will also learn about the Disciple agent development environment created in the Learning Agents Center of George Mason University, as well as other artificial intelligence tools, such as the Weka machine learning workbench, and the SPARQL endpoints for the semantic web. 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.

Online Teaching

A few days before each class meeting we will post the recorded lecture on Blackboard. Your assignment is to watch them before the meeting. During the class meeting I will answer questions about the lecture and solve problems. At the end of some of the class meetings you will take an online quiz which will be graded.

Course Topics

- Overview of Artificial Intelligence and Intelligent Agents
- Problem Solving as Search
- Constraint Satisfaction Problems
- Adversarial Search
- First Order Logic and Production Systems
- Resolution and Prolog
- Ontologies and the Semantic Web

- Probabilistic Reasoning and Learning
- Machine Learning Basics
- Decision Trees Learning
- Neural Networks and Deep Learning
- Instructable Cognitive Agents

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.

Grading Policy

- Quizzes: 10%
- Mid-term exam: 45%
- Final exam: 45%

Exam Dates

- Mid-term exam (part 1): 3/16/2021, starting at 3:00pm
- Mid-term exam (part 2): 3/18/2021, starting at 3:00pm
- Final exam: 5/6/2021, starting at 1:30pm

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/). Any collaboration between students on assignments or exams is unacceptable.

Reading

- Tecuci G., *Lecture Notes in Artificial Intelligence*, 2021 (available on Blackboard)

Main Recommended Reading

- Russell S., and P. Norvig P., *Artificial Intelligence: A Modern Approach*, Prentice Hall
  Fourth edition (ISBN-13: 978-0134610993, ISBN-10: 0134610997)
  Third edition (ISBN-13: 978-0-13-604259-4, 2010)
  Second edition (ISBN: 0-13-790395-2, 2003).

Other Recommended Readings

- Poole D.L. and Mackworth A.K., *Artificial Intelligence: Foundations of Computational Agents*, Cambridge University Press, Second edition 2017.
- Artificial Intelligence and Life in 2030: One Hundred Year Study on Artificial Intelligence, Report of the 2015 Study Panel, September 2016, https://ai100.stanford.edu/2016-report

- Tecuci, G., Marcu, D., Boicu, M., Schum, D.A., *Knowledge Engineering: Building Cognitive Assistants for Evidence-based Reasoning*, Cambridge University Press, 2016.
- 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.
- Tecuci G., *Building Intelligent Agents: An Apprenticeship Multistrategy Learning Theory, Methodology, Tool and Case Studies*, Academic Press, 1998.
- Giarratano J. and Riley G., *Expert Systems: Principles and Programming*, Third Edition, PWS Publishing Company, Boston, 1994.
- Jones T.M., *Artificial Intelligence: A Systems Approach*, Jones and Bartlett Publishers, 2009.
- Bratko I., *PROLOG Programming for Artificial Intelligence*, Addison Wesley, 1990.

Email Communication

- For all the issues related to the course, always email to tecuci@gmu.edu; adebnath@masonlive.gmu.edu
- Always use your Mason email and include CS480 in the subject.
- Do not sent me 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 accommodations, 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/