

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

**CS 480 Introduction to Artificial Intelligence**

**Meeting times:** Monday, Wednesday 12:00 pm – 1:15 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:** Juan Huang

**E-mail:** jhuang21 at gmu dot edu

**Office hours:** Thursdays, 3-4 pm at ENGR 4456, 4-5 pm online ([link](#)).

### **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 waves 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 Contextual Adaptation (evidence-based reasoning; instructable agents).

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

### **Online Teaching and Class Attendance**

**This is a [synchronous](#) online class and your class attendance is [required](#).**

A few days before each class meeting the lecture (pdf and recording) will be posted on Blackboard.

**Your assignment is to watch them before the meeting and to do the associated exercises.**

During the class meetings I will answer questions about the posted lectures and discuss the exercises to improve your understanding of course material.

### **Course Topics & Schedule**

	Monday	Wednesday
<b>Week 1</b>		<b>Jan 17</b> Artificial Intelligence and Intelligent Agents
<b>Week 2</b>	<b>Jan 22</b>	<b>Jan 24</b>

	Problem-Solving as Search	Problem-Solving as Search
<b>Week 3</b>	<b>Jan 29</b> Constraint Satisfaction Problems	<b>Jan 31</b> Adversarial Search
<b>Week 4</b>	<b>Feb 5</b> Logic and Production Systems	<b>Feb 7</b> Resolution and Prolog
<b>Week 5</b>	<b>Feb 12</b> Resolution and Prolog	<b>Feb 14</b> Ontologies
<b>Week 6</b>	<b>Feb 19</b> Semantic Web	<b>Feb 21</b> <b>Midterm</b>
<b>Week 7</b>	<b>Feb 26</b> Probabilistic Reasoning Basics	<b>Feb 28</b> Bayesian Networks Inference and Learning
<b>Week 8</b>	<b>Mar 4</b> Spring Recess (no class)	<b>Mar 6</b> Spring Recess (no class)
<b>Week 9</b>	<b>Mar 11</b> Bayesian Networks Inference and Learning	<b>Mar 13</b> Bayesian Networks Inference and Learning
<b>Week 10</b>	<b>Mar 18</b> Machine Learning Basics	<b>Mar 20</b> Inductive Learning of Decision Trees
<b>Week 11</b>	<b>Mar 25</b> Inductive Learning of Decision Trees	<b>Mar 27</b> Inductive Learning of Decision Trees
<b>Week 12</b>	<b>Apr 1</b> Very Fast Decision Trees	<b>Apr 3</b> Neural Networks
<b>Week 13</b>	<b>Apr 8</b> Neural Networks	<b>Apr 10</b> Deep Learning
<b>Week 14</b>	<b>Apr 15</b> ChatGPT	<b>Apr 17</b> Evidence-based Reasoning
<b>Week 15</b>	<b>Apr 22</b> Evidence-based Reasoning	<b>Apr 24</b> Instructable Cognitive Agents
<b>Week 16</b>	<b>Apr 29 Last day of class</b> Instructable Cognitive Agents	<b>May 1</b> Reading Day (no class)
<b>Week 17</b>	<b>May 6</b> <b>Final Exam</b>	

### 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

- Mid-term exam: 40%
- Final exam: 60%

Absence from the midterm exam and the final exams will not be excused except for doctor-certified 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.

## Exams

### Part 1 closed-book exam with LockDown Browser

(<https://web.respondus.com/he/lockdownbrowser/>).

### Part 2 open-book exam

Dates (mark your calendar)

- Mid-term exam: 02/21/2024
- Final exam: 05/06/2024

## 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/) (<http://oai.gmu.edu/mason-honor-code/>), as well as the [CS department Honor Code](http://cs.gmu.edu/resources/honor-code/) (<http://cs.gmu.edu/resources/honor-code/>). Any collaboration between students on assignments or exams is unacceptable.

## Required Reading

- Tecuci G., *Lecture Notes in Artificial Intelligence*, 2023 (available on Blackboard)

## 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 to 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 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/>