George Mason University
The Volgenau School of Engineering
Department of Computer Science

CS 681 Instructable Cognitive Agents

Meeting time: Tuesday 4:30 pm - 7:10 pm
Meeting location: Innovation Hall 222

Instructor: Dr. Gheorghe Tecuci, Professor of Computer Science
Office hours: Tuesday and Wednesday 7:20 pm - 8:10 pm
Office: Nguyen Engineering Building, Room 4613
Phone: 703 993 1722
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Course Description

Prerequisite: CS 580 or permission of instructor

Can everybody be a programmer by teaching the computer instead of programming it?
This course presents the theory, methods and tools for instructing a learning agent how to solve problems from a given area of expertise. After training, the agent can assist expert and non-expert users in problem-solving and decision-making, and teach students.
Topics include modeling expert's knowledge, mixed-initiative reasoning based on knowledge and evidence, ontology design and development, multistrategy rule learning, and knowledge-based maintenance. Team projects include the design and development of cognitive agents for evidence-based reasoning in domains of students' interest (e.g., cybersecurity, science education, medicine, intelligence analysis, forensics, etc.), and the study and presentation of different approaches to instructable agents from major research groups.

Students will have accounts on Blackboard and can download the lecture notes by going to courses.gmu.edu and logging in using their Mason IDs and passwords.

Course Topics

- Introduction to Knowledge Engineering and Instructable Cognitive Agents
- Evidence-Based Reasoning
- Case Studies of Evidence-Based Reasoning Agents
- Methodologies and Tools for Agent Design and Development
- Modeling the Problem Solving Process
- Ontology Design and Development
- Reasoning with Ontologies and Rules
- Learning for Instructable Agents
- Rule Learning
- Rule Refinement
- Design Principles for Instructable Cognitive Agents

Grading Policy

- Agent development assignments: 25%
- Research study project: 25%
- Final exam: 50%

Readings

- Tecuci G., *Lecture Notes on Instructable Cognitive Agents,* Fall 2019 (provided by the instructor).
- Tecuci G., Marcu D., Boicu M., and Schum D.A., *Knowledge Engineering: Building Cognitive Assistants for Evidence-based Reasoning,* Cambridge University Press, 2016. http://lac.gmu.edu/KEBook/
- Gluck K.A. and Laird J.E., *Interactive Task Learning*, MIT Press, September 2019. https://mitpress.mit.edu/books/interactive-task-learning
- Additional papers required or recommended by the instructor.

Email Communication

- Please use your Mason email and include CS681 in the subject of any message you are emailing to Dr. Tecuci.
- Please try to limit the size of the files you are emailing.

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 me and contact the Office of Disability Services (ODS) at 993-2474. All academic accommodations must be arranged through the ODS. http://ods.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; http://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/

Honor Code

You are expected to abide by the Mason honor code. Information on the university honor code can be found at http://academicintegrity.gmu.edu/honorcode/.
Additional departmental CS information:
http://cs.gmu.edu/wiki/pmwiki.php/HonorCode/CSHonorCodePolicies