

**George Mason University  
School of Engineering  
Department of Computer Science**

**CS 681 Knowledge Engineering**

**Meeting time:** Thursday 4:30 pm - 7:10 pm

**Meeting location:** Innovation Hall 134

**Instructor:** [Dr. Gheorghe Tecuci](#), Professor of Computer Science

**Office hours:** Thursday 7:20 pm - 8:10 pm

**Office:** Nguyen Engineering Building, Room 4613

**Phone:** 703 993 1722

**E-mail:** tecuci at gmU dot edu

### **Course Description**

**Prerequisite:** CS 580 or permission of instructor

This course presents the theory and practice of knowledge engineering, the discipline concerned with the design, development, and maintenance of intelligent agents that use knowledge and reasoning to perform problem solving and decision making tasks. It covers the basic concepts, principles, methods, and tools for the main stages in the development of a knowledge-based agent: understanding the application domain, modeling problem solving in that domain, developing the ontology, learning the reasoning rules, and testing the agent. The course includes a major team project to design and develop a cognitive assistants for evidence-based reasoning in a domain of team's choice (e.g., cybersecurity, science education, medicine, intelligence analysis, forensics, etc.). Such a cognitive assistant can learn complex problem-solving expertise directly from human experts, can support experts and non-experts in problem solving and decision making, and can teach their problem-solving expertise to students.

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 IDs and passwords.

The Disciple agent development environment used in this course is available only for Windows. If you have a Macintosh computer and want to install the software on it, you will have to use either a virtual machine or BootCamp to install Windows on your Macintosh computer. VMWare Fusion and Windows are available at no charge through your enrollment in Volgenau School courses. Instructions for obtaining the software are in the Microsoft DreamSpark & VMWare FAQs on <http://labs.vse.gmu.edu>

### **Course Topics**

- Overview of Knowledge Engineering
- Arch of Knowledge
- Evidence-Based Reasoning
- Case Studies of Evidence-Based Reasoning Agents

- Methodologies and Tools for Agent Design and Development
- Modeling the Problem Solving Process
- Ontologies
- Ontology Design and Development
- Reasoning with Ontologies and Rules
- Learning for Knowledge-Based Agents
- Rule Learning
- Rule Refinement
- Abstraction of Reasoning
- Design Principles for Cognitive Assistants

### **Grading Policy**

- Project Assignments: 50%
- Exam: 50%

### **Readings**

- Tecuci G., Marcu D., Boicu M., and Schum D.A. (2016), *Knowledge Engineering: Building Cognitive Assistants for Evidence-based Reasoning*, Cambridge University Press.
- Tecuci G., *Lecture Notes on Knowledge Engineering*, Fall 2018 (provided by the instructor).
- 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>