CSE 6369.002 - Multiagent Systems

Spring 2018 - MW 5:30 - 6:50

Instructor: Manfred Huber (huber@cse.uta.edu)

Course Description

Contents and Objectives:

Multiagent systems has emerged as an important research area with applications in many fields of computer science, including artificial intelligence, e-commerce, sensor networks, distributed computing and information retrieval, information security, and robotics. In multiagent systems, multiple autonomous entities with their own objectives have to interact and make decisions. This course explores techniques for the modeling, design, decision making, and communication in these systems. While the course will focus on frameworks, methodologies, and algorithms, it will investigate (and illustrate) them in the context of a wide range of application areas, including multi-robot systems, distributed scheduling and resource allocation, sensor networks, distributed information extraction, and network security.

Prerequisites:

Many of the techniques covered in this course are based on probabilities and random processes and a basic background in statistics is required for the course. Prerequisites for the course are an advanced statistics and random processes course (*CSE 5301* or similar), or consent of instructor. In addition, experience with Algorithms, Artificial Intelligence, and programming will be useful for assignments and projects.

Course Materials:

The course will mainly use the following textbook:
Y. Shoham and K. Leyton-Brown, *Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations*, Cambridge University Press, 2009. (This book is also available on-line in PDF format at *http://www.masfoundations.org/downloading.html*).

In addition the course will use readings from other books as well as papers from technical conferences and journals. These materials will be made available through the library, the course site, or Blackboard.

E-mail and WWW page:

There is a course web page at *http://www-cse.uta.edu/∼huber/cse6369_multi-agent* . All changes and supplementary course materials will be available from this site. In addition, necessary changes or important announcements will also be distributed by e-mail. In order to receive class-related messages you have to send an e-mail to the instructor (huber@cse.uta.edu).

Tentative Office Hours:

Office hours for the course will be held by the instructor either in ERB 128 or in ERB 522, M 2:00 - 2:45, W 7:00 - 8:00, and Th 2:00-3:00. Times are subject to change and will be posted. If for some reason you can not make it to any of these office hours, please inform the instructor.
e-mail: huber@cse.uta.edu

1 Course Work and Grading

In-class presentation of a technical paper:

Each student will be given a technical topic/paper to present in class and to lead the following discussion of the material.

Homework Assignments:

Two hands-on homework assignments will be given where learned techniques are applied to practical problems.

Projects:

Two small projects will be assigned where students implement and test some of the techniques.

In addition, every student will perform a final project that will be presented at the end of the course.

Grading Policy:

The final grade will be calculated using the following policy:

Presentation & Class Participation	15 %
Assignments	30 %
Projects	30 %
Final Project	25 %

2 Course Topics

Topics covered in this course include:

- **Representations and modeling for multiagent systems**
- **Game theory:** matrix and repeat games, stochastic games
- **Auction mechanisms:** sealed bid and Vickory auctions, english and dutch auctions, combinatorial auctions
- **Multiagent Communication**
- **Multiagent Learning**

3 Tentative Class Schedule

CSE 6369
Multiagent Systems
Tentative Lecture and Assignment Schedule
Spring Semester 2018 - MW 5:30 - 6:50

Class	Date	Readings	Lecture Topics	Assignments
1	1/17	Introduction	Course Overview and Introduction	
2	1/22	3.1	Background - Utility and Decision Theory	
3	1/24	Appendix A, C	Background - Probabilities and MDPs	
4	1/29	3.2-3.3	Game Theory & Matrix Games	
5	1/31	3.3-3.4	Games in Normal Form	
6	2/05		Zero-Sum and General-Sum Games	
7	2/07		Computing Solutions	
8	2/12		Extensive Form Games	
9	2/14		Extensive Form Games	Homework 1 due
10	2/19		Repeated Games	
11	2/21		Repeated Games	
12	2/26		Stochastic and Bayesian Games	
13	2/28		Stochastic and Bayesian Games	
14	3/05		Learning in Repeated Games	
15	3/07		Learning in Stochastic Games	Project 1 due
	3/12		*Spring Break - No Class*	
	3/14		*Spring Break - No Class*	
16	3/19		Learning in Bayesian Games	
17	3/21		Multiagent Communication	
18	3/26		Social Choice	
19	3/28		Mechanism Design	
20	4/02		Mechanism Design	
21	4/04		Auctions	Homework 2 due
22	4/09		Single-Good Auctions	
23	4/11		Combinatorial Auctions	
24	4/16		Coalition Game Theory	
25	4/18		Coalition Game Theory	
26	4/23		Student Presentations	Project 2 due
27	4/25		Student Presentations	
28	4/30		Student Presentations	
29	5/02		Student Presentations & Current Challenges	
30	TBD		**Final Project Presentations**	

[1] All information is tentative and subject to change.

4 University Policies and Services

Grade Grievances:

Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog.

Drop Policy:

Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Disability Accomodations:

UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA), and Section 504 of the Rehabilitation Act. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:
The Office for Students with Disabilities, (OSD) www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.
Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy:

The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information,

and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX Policy:

The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@uta.edu.

Academic Integrity:

Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:
I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.
I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.
UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, 2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at https://www.uta.edu/conduct/.

Electronic Communication:

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Campus Carry:

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in loca-

tions the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Student Feedback Survey:

At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture", "seminar", or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit http://www.uta.edu/sfs.

Final Review Week:

A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures:

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is can be reached at the end of the outside hallway either moving left or right. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Student Support Services:

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded pro-

grams. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/universitycollege/resources/index.php.