Instructor:
Dr. Vicki Allan, Vicki.Allan@usu.edu
Office/Phone:
429 Old Main, 797-2022
Office Hours:
TH: 10:30-1 Other hours by appointment. (Send Email to set up.)
Objectives:
1. Prepare you to do research. This will be accomplished by having you read current articles and discuss them as a group. You will also research a topic, find potential ways to extend the research, and prepare and present a mock research paper.
2. be able intelligently converse about topics in multi-agent systems,
3. be able to state common themes and identify problem structures from the multi-agent systems literature,
4. be able to apply solution approaches to multi-agent systems,
5. be able read and understand current literature in the field

We will attempt to use the new Canvas grading program (which is replacing Blackboard). I am new to the system, so it might be a bit rough.

Research Paper:
A major effort in this class is to produce a mock research paper (see Research Project). This will be presented orally during our final examination period (Tues, December 9th 11:30-1:20). Articles which we read as a class should support the research of someone in the class.

Topics:
The topics covered will be determined by interests of class members. Possibilities include:

Coalition Formation
Kernels
Trust
Stability
Profit Sharing

Agent Personalities
realism
efficiency
cooperation/competition

On-Line Auctions
optimal strategies for buyers
optimal strategies for seller
auction formats
sniping
proxy bidding

Framework for Multi-Agent Choice
Utilities
Payoff Matrices: Extensive and Normal Form
Canonical Games
Mixed Strategies
The Minimax Theorem
Algorithms for Finding Solutions
Finding Mixed-Strategies Nash Equilibrium Via Math
Minimax: Alpha-Beta Pruning
Nash Equilibrium: Fictitious Play

Repeated Interactions
Cooperative Games and Repeated Play

Social Welfare with Preferences
Social Welfare and Mechanism Design
Intro to Impossibility
Arrow's Impossibility Theorem
Annotated Impossibility Proof

Social Welfare with Utilities
Utility Theory Review & Clarke Tax
Auctions
Voting
Bargaining

Multi-Agent Learning: Finding Solutions Via Repeated Interactions
Q-learning & Stochastic Games
Multi-agent learning issues
Minimax Q
Learning to Cooperate
Learning to Bargain
Stimpson/Karandikar's algorithm

Distributed Search Problems
Dynamic Programming, ADP, A*, LRTA*
Constraint Satisfaction
Moving Target Search

Prerequisites:
Prerequisite: A good knowledge of multi-agent systems.

Tardiness
There is no reason to come to this class late. When you come to class late, everyone in the room is
distracted by your entrance (including your professor). You miss important material. You are saying to
your professor, "My time and my schedule are more important than what you have to teach me."! On
the job, if you don't come to work or come late, you will be reprimanded. Come to class and come on
time! It is good practice for the real world.

Cell Phones:
Please turn off cell phones before coming to class. When a cell phone goes off, it disturbs your teacher
and everyone else in the class. The penalty for allowing your cell phone to go off in class is that you will
be expected to bring treats for the whole class the next period!

Text: We will mainly use articles, but An Introduction to Multiagent Systems, Wiley Press, Wooldridge,
2009 (optional) or Multiagent Systems: Algorithmic, Game Theoretic and Logical Foundations. Y. Shoham
Class Time:
1. You can use Canvas discussion groups to talk about the articles. This is a threaded discussion so you will be able to see and comment on what others have said.
2. Before class, answer summary questions about the article – posted to Canvas.
3. Discuss the articles in class. Each of us will take one of the following roles (which will rotate) in class:
   a) To facilitate reading, the leader will give an overview of article the day before we discuss it in class. Look at the introduction and conclusion. What are they trying to do? How well does the article present the material? The supporter should be prepared to help others with understanding.
   b) Be able to explain what the article means.
   c) Evaluation. How important is the article? How well did they achieve their goals? If you were doing follow-on research, what would it be?

Preparation:
Preparation is necessary for learning. For this class, preparation includes attending class regularly (90% of the time), coming on time, remaining focused until class is dismissed, asking timely questions, trying problems at your seats when directed to do so, answering questions when called upon, completing homework questions, paying attention during lecture, and reading appropriate text material before coming to class. In an effort to get you to come to class prepared, discussion points will be awarded for participation on randomly selected days.

Article Critique:
In order to help you acquire skills in reading current literature, we will read articles and discuss them in class. Grading will be three parts: online discussion, summary evaluation, and class discussion.

Exams:
There will be no exams.

Article Selection:
Each of you will be expected to suggest research papers for the class to read in your area of research interest. These are papers (1) you have read (2) which are appropriate for the class to read in terms of level and in terms of content for an agent class (3) which support the research you intend to do for this class. If the paper is not understandable without reading another paper first, have us read the supporting paper (not the original paper you selected). You may read MANY papers before you find three which are good ones for us to read. You are expected to do that preparation.

Rough Grading:
<table>
<thead>
<tr>
<th>Assignments</th>
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<tbody>
<tr>
<td>Project</td>
<td>150</td>
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<td>Total</td>
<td>250</td>
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I generally figure 90-100% is an A, 80-90% is a B, 65-80% is a C, 50-65% is a D, and below 50% is an F. However, grades vary (up or down) somewhat depending on the difficulty of assignments and tests. As a graduate student in this department, you must maintain a 3.0 GPA in all your courses (not just those on your program of study). However, this does not mean that only A and B grades will be given for this course. I would expect that most of you will earn A and B grades, but you will be given the grade you earn. Falling below a 3.0 cumulative GPA creates serious problems for you regarding your standing in this department. Take every precaution to guarantee that you will succeed in your coursework.

I will be recording your points each week, but will not post them on Blackboard (as it is pretty awkward to do so). I will send you an evaluation every three or four weeks.
If you have an excused absence for class, I will compute the in-class discussion grade as the average of the “online discussion” and “summary” grades.

**Class Project:**
You will write a research paper using current articles. The project may or may not include coding. The major reason for doing the project is to study current articles. See the web for a more complete description of this project.

**Incompletes:**
According to university policy, incompletes are not to be given for poor performance. There will be no incompletes given except for conditions beyond the student's control. Such conditions have to have written documentation. The term "conditions beyond the student's control" includes (1) incapacitating illnesses that prevent a student from attending classes for a period of at least two weeks; (2) a death in the immediate family; (3) financial responsibilities requiring a student to alter course schedule to secure employment; (4) change in work schedule as required by employer; or (5) other emergencies of this nature. When an incomplete is given, it is anticipated that the remaining work will be finished within two or three weeks. If the course must be retaken to make up the work, an incomplete is not appropriate. In case of emergency, there are provisions to permit a student to withdraw (grade of W) from a course after the regular drop period.

**Disabilities:**
If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center, preferably during the first week of the course. Any requests for special considerations relating to attendance, pedagogy, taking of examinations, etc. must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative formats- large print, audio, diskette or Braille.

**Class Fee:**
Associated with this class is a class fee. The monies from this fee are used to maintain lab facilities for the class, purchase software and licenses, and supervise the lab. In some cases, students may have their own computing equipment, and thus feel that they do not need to use the lab. However, the lab musts be maintained regardless of an individuals use of it, and thus the fee is charged to all registered for the class. If you have questions or concerns about this fee, please see the department head.

**Add Date:** The last day to add this class is the 15th day of the semester. Attending this class beyond that date without being officially registered will not be approved by the Dean's Office. No assignments or tests of any kind will be graded for students whose names do not appear on the class list.

There are several reasons for this rule. Students who attend classes without registering have an unfair advantage over those who are registered. The unregistered student can chose not to register if their academic performance is poor. There will be no record that the student "withdrew." The registered student must drop the course along with the ramifications of small or no refund in tuition and a possible "W" on his/her transcript.

The university does not receive the headcount credit from the State for students who add any class after the 15th day (Sept 19). We lose a significant amount in support funding for those students not registered prior to day 15. Students who attend classes without registering/paying are utilizing campus resources even though they have not paid tuition and fees. Students who are attending classes but not enrolled in them are not subject to the Student Code of Conduct. Thus, we are asked not to allow students to "sit in" on classes for which they are not enrolled.

**Drop Date:** The last day to drop classes on the QUAD (with the `"W" notation on transcript) is Oct 28th. If you are considering dropping, you should talk to me about the desirability of such a decision. Sometimes students drop when they would actually do well with a different strategy. Other times students who should drop, do not. It is wise to consult your instructor in your decision as she may have a different reading on your situation.