OPMA 6392: Applied Game Theory to Behavioral Operations
Fall 2017

Instructor(s): Kay-Yut Chen

Office Number: 519

Office Telephone Number: 817-272-3502 (ISOM Department)

Email Address: kychen@uta.edu

Faculty Profile: http://wweb.uta.edu/insyopma/chen.html

Office Hours: Wed 12-1pm, appointment encouraged

Section Information: none

Time and Place of Class Meetings: Tue 11:00-1:50pm, SWCA 114

Description of Course Content: PhD seminar in the area of game theory modeling, numerical analysis and estimation of structural models

Student Learning Outcomes:

In general, this course has the following objectives

1) To learn to model supply chain and other business context with game theory

2) To incorporate behavioral ideas into the modeling

3) To develop skills in analyze models with numerical methods

4) To develop skills to use mathematical models to analyze empirical data

Game theory is a formal approach to analyzing the strategic interactions between multiple decision makers. Although traditionally a subfield of economics, elements of game theoretic modeling are increasingly used in a broad spectrum of fields. In this course we will develop the basics of game theory, with a heavy emphasis on applications to operations. The focus will largely be on the basics of non-cooperative game theory.

Aside from theoretical model, the class will also expose students to numerical analysis, and empirical estimation with the use of game theory, behavioral game theory, and choice models. All the computing and empirical work will be done in R. A simple R tutorial will be provided. However, students are expected to become proficient on the basic operations of R on their own.

SPECIFIC COURSE REQUIREMENTS & GRADING POLICY

Evaluation will be composed of two components:
1) Class project and report (70%)

2) Project presentation (30%)

CLASS PROJECT

Each student will be responsible for his/her own class project. Students are encouraged to discuss ideas and technical issues with one another. However, all the mathematical modeling work, coding, and writing for a particular project needs to be done ONLY by the student responsible.

The project will consist of 3 parts: theoretical development, numerical analysis, and empirical analysis. Depending on the project, real data may or may not be available (for example, it is possible to use existing experimental data the instructor have access to, or request data from outside). If data is not available, simulated data may be used, subject to the approval from the instructor.

PRESENTATIONS

Each student will provide a 30 presentation of each assigned article. The presentation should have:

1. Motivation of the research setting, and some literature review
2. Theoretical development
3. Numerical results
4. Data and estimation results

PROJECT PAPER

Each student will prepare a project paper summarizing their modeling work. The write-up should resemble a "mini-paper" and includes an introduction that motivates the model, literature review, and of course the modeling and results write-up.

The goal of this class is help students develop their modeling and analysis skills. Hence, the paper will be graded mostly on the modeling and results sections.

Attendance: At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I will take attendance. However, attendance does not affect grades.

Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see "Student Support Services," below.

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 University Catalog. Please see http://catalog.uta.edu/academicregulations/grades/#undergraduatetext

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 Accommodations: 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).** 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.
Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671.

Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: *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. For information regarding Title IX, visit* www.uta.edu/titleIX.

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.*

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.

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.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be 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 enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. 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 to the left of the door and up the stairs. 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 programs. 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 www.uta.edu/resources.

Course Schedule

Week	Date	Topics	Assignment
1	29-Aug	Introduction	
2	5-Sep	Static games of complete information	
3	12-Sep	Dynamic games of complete information	
4	19-Sep	Static games of incomplete information	
5	26-Sep	Dynamic games of incomplete information	
6	3-Oct	Revelation principle and mechanism design	
7	10-Oct	Applications: supply contracts	
8	17-Oct	Equilibrium refinements and bounded rationality (QRE, k-level, …)	
9	24-Oct	INFORMS: no class	
10	31-Nov	R tutorial	
11	7-nov	Evaluation of Nash equilibrium & QRE	
12	14-Nov	Estimation (MLE, MSE, model selection, bootstrapping ….)	
13	21-Nov	Mixed Effect Structural Models	
14	28-Dec	Project presentation	
15	5-Dec	Project presentation	
Final Exam	12-Dec	**Final Week, No Class**	

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – Kay-Yut Chen

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911.