Class Schedule: TR 2:40-3:55pm, 535 Mudd Bldg.
Instructor: W. Tim Huh. 338 Mudd Bldg.
Tel: (212)854-1802. Email: th2113@columbia.edu
Instructor Office Hours: TR 11:00am-noon, and by appointment
TA: TBA
TA Office Hours: TBA

One of the major discrepancies between traditional operations research models and the actual business decision making process is the presence of multiple agents and their mutual interaction. Competitors, consumers and suppliers are agents seeking their self-interest, and their actions affect one’s profit and optimal decision. This course exposes students to strategic thinking through game theory. In particular, it focuses on auctions, which have become a popular method of pricing goods and services in electronic markets. The study of bidding behavior and mechanism design is important in designing an effective supply chain. Students will learn the theory of games and auctions and gain insights into their application to operations management. No previous knowledge of game theory is required; students who have taken a game theory class should consult the instructor prior to enrollment.

Prerequisits
Familiarity with probability, optimization, differential equations and a programming language; or, instructor’s permission.

Course Content

- Static Games of Complete Information: Nash equilibrium. Cournot and Bertrand models. Mixed strategy.
- Static Games of Incomplete Information: Bayesian Nash equilibrium. The revelation principle.
- Dynamic Games of Incomplete Information: Perfect Bayesian equilibrium. Signaling games.
- Auctions with interdependent values. The winner’s curse. Collusion.
- Bargaining Theory with Applications.
Textbooks

- **Required Textbooks**

- **Other References**

Grading

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<th>Assignments:</th>
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<td>Article Reviews/Project:</td>
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<td>Midterm Exam:</td>
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The instructor reserves the right to change the students’ grade up to 5 % based on participation.

Assignments: There will be 7-10 assignments. Unless otherwise noted, you are permitted to work together, but you must write up your own solution individually. If you discuss the homework with anyone and use his/her ideas in any way in your own homework, then you must mention that fact on the homework. In fairness to other students, late submissions will not be accepted.

You should select one of the following options:

**Article Reviews (Individual):** If you select this option, you will submit two article reviews in total. Find newspaper or magazine articles related to game theory, auctions, procurement, electronic marketplaces, bidding, pricing, or a related subject. The article should be dated between **July and December 2004**. The first review should be about 2 pages in length, and the second review, 3 pages. You are encouraged, but not required, to use the perspectives and/or techniques introduced in the course. Please include a copy of the original article in your submission; the article will not be returned to you.

| Article Review #1 Due: | October 10, 2004 |
| Article Review #2 Due: | December 7, 2004 |
Project (Group): If you select the group project option, you will write a coherent well-documented report (9-12 pages) on a topic, chosen with consultation of the instructor. The topic can be related to any aspect of the theory and practice of auctions, and potential project ideas include the comparison of online auctions, treasury auctions, FCC auction, and allocating scarce resources on campus (such as university housing and course enrollment). You are also required to submit a 1/2-page proposal. The project can be analytic, empirical, computational or qualitative. You should work as a group of two or three students.

Written Project Proposal Due: October 10, 2004
Final Report Due: December 7, 2004

Midterm Exam: Tuesday, October 26, 2004, in class.

Final Exam: TBD.

Participation: For this course to be successful, everyone must participate in classroom discussion. The participation grade is based on the instructor’s evaluation of the quality of each student’s progress and contribution during the semester. You should note that in general quality is more important than quantity.

Make-Up Exams: The instructor requires written documentation of the student’s reason for missing the exam, as well as notification prior to the scheduled exam. If the instructor decides that the reason(s) for the absence is/are valid, the student will be scheduled for the make-up exam. However, the make-up exam will not be easier than the regular exam.

Regarding: If you feel that your performance has been under-evaluated, please resubmit your work, along with a written statement directly to the course instructor within three days after receiving your grades, explaining clearly why you feel that your grade should be adjusted. In order to prevent “cherry-picking”, the course instructor will re-grade your entire assignment/exam, which may possibly lower your grade. If you are not satisfied with the regarding, please feel free to talk to the instructor in person.