

Computer Science 4963/6963: Internet Economics

RPI, Spring 2012

Instructor: Sanmay Das

Class times: Mon, Thu 2:00-3:30 in Low 3039

Office: Lally 302

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Office hours: Mondays from 3:30-5:00 PM and by appointment.

1 Course Description

1.1 Overview

The Internet has transformed how people interact with each other, lowering the cost of communication, and enabling us to rapidly both discover and pass on new information. This transformation has had major impacts in how we conduct market transactions (think of eBay, Orbitz, or Amazon), how we maintain our social personae (Facebook, Twitter), and how we accumulate and produce knowledge for consumption (Wikipedia, Yelp). This course will cover theoretical foundations of e-commerce and social networks, as well as focusing on practical aspects of understanding how the design of online venues affects the interactions of participants and the success of the venue.

1.2 Learning Outcomes

Students who take this class should develop a sufficiently good grasp of the fundamental ideas at the intersection of computer science, economics, and social networking research to understand the academic literature. Further, students should come away from the class with an understanding of the key issues in this research field, and able to quickly comprehend, and, if necessary, replicate, papers in the field. By the end of the class they should either have made a novel (if incremental) research contribution, or replicated the results of a previous contribution.

1.3 Prerequisites

This course requires mathematical maturity, as evidenced by prior completion of at least one 4000-level or higher course in machine learning, artificial intelligence, statistics, or economics. You should also have taken at least CSCI 2300. If you're uncomfortable with calculus or probability (even if you've taken them in the past), please speak with me. I'm happy to talk with all who have concerns about whether their backgrounds are sufficient for this class.

1.4 Format

Class sessions will initially be lectures. During the semester, we may move on to sessions that focus on presentation and discussion of academic papers. Students will be required to participate

actively in discussions during both lectures and paper presentations. At the end of the semester, students will present their own final project work during class time. At times, we will also engage in practical experiments. You are expected to participate in these experiments (which are purely for pedagogical purposes) during class time.

1.5 Textbooks

There are two textbooks for this class. The textbooks will also be supplemented with readings from the academic literature.

1. *Networks, Crowds, and Markets*, D. Easley and J. Kleinberg. Cambridge University Press. ISBN 9780521195331.
2. *Algorithmic Game Theory*, N. Nisan, T. Roughgarden, E. Tardos and V.V. Vazirani, eds. Cambridge University Press. ISBN 9780521872829 (available online for free as a non-printable PDF).

1.6 Preliminary Syllabus

This syllabus may change based on time constraints, the interests of the class, or other factors. Relevant readings from the book and papers from the literature will be posted on the course website as we go along.

1. Basics of game theory, notions of equilibrium.
2. Basics of graphs and networks.
3. Auctions.
4. Matching Markets.
5. Prediction Markets.
6. Market Microstructure.
7. Social choice and voting.
8. Mechanism design. Auctions. Profit maximization in the design of auctions.
9. Sponsored search auctions.
10. Incentives in peer-to-peer systems.
11. Algorithmic and economic problems in social networks.
12. Collective wisdom: models and data from Wikipedia, the blogosphere, and open-source software.

2 Policies

2.1 Announcements and Course Website

The course website is at <http://www.cs.rpi.edu/~sanmay/teaching/cs4963>. All announcements related to the class will be made either in lecture or on the website. **I will assume that any announcement made on the website is known to everyone in class within 24 hours of it being posted.** It is important to check the website regularly! You are responsible for all announcements made in lecture or on the website.

2.2 Assessment and Course Grade

Your overall course score will be determined (on a curve) using the following weights.

1. Homework assignments: 30%
2. In-class quizzes and tests: 25%
3. Course project and presentation: 20%
4. Class attendance and participation: 15%
5. Participation in hands-on experiments: 10%

Late assignments will not be accepted, except for cases of (official) Institute-established illness or emergency. I expect students to attend regularly and participate actively in discussions – notice that a significant fraction of your course grade is based on attendance and participation.

If you would like to appeal your grade on any work, you may do so within 10 days of the work being handed back or the grade being received. In order to appeal the grade, please provide a detailed written statement explaining why you believe the assigned grade is incorrect, in addition to the work itself. We will regrade the entire piece of work, and your grade may go up or down, or it may stay the same.

2.3 Collaboration and Academic Integrity

The statement below is based partially on a model statement from the provost.

Student-teacher relationships are based on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments that students turn in are their own. Act which violate this trust undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities defines various forms of Academic Dishonesty and you should make yourself familiar with these.

In this class, you are allowed to collaborate on assignments to the following extent. You are welcome to discuss problems with each other and to take your own notes during these discussions. However, you must write up solutions on your own. You must write, on the assignment, the names of students you discussed each problem with, and any external sources you used in a significant manner in solving the problem. Lack of citation of a source is a serious violation of this policy.

Submitting an assignment that is in violation of this policy will automatically lead to receiving no credit for the assignment and a reduction of at least one grade modifier (e.g. from B to B-) beyond that in the overall course grade. However, depending on the circumstances, it could also lead to harsher penalties, for example, a failing grade in the class and initiation of the Institute-wide disciplinary process. If you have any questions about the level of collaboration permitted, or any other aspect of this policy, please speak with me about it before handing in the assignment!