

PROFESSOR Kyle Woodward
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COURSE **Meetings**
Tuesday/Thursday, 1:15pm–2:30pm
Genome Sciences G200 and/or virtual

Office hours
TBD (and by appointment)
Gardner Hall 305A and/or virtual

COVID-19 PREFACE Syllabus creep, as a phenomenon, accompanies a growing expectation that a syllabus will function as a binding set of laws governing course operation in all circumstances, predicted and otherwise. Given the substantial uncertainty surrounding public health policy at the time of writing (30 July 2020), this syllabus makes essentially no attempt to address the diverse set of circumstances we may find ourselves in later in the semester. The key word is *flexibility*. This syllabus sets forth policies and objectives that will inform the structure of the course, but will not dictate behavior in all situations. Things that truly matter (e.g., grading rubrics) will be adhered to until the bitter end, except as noted; everything else is subject to change.

GOALS Economics studies the allocation of scarce resources. Traditional “markets” determine allocations in a familiar way: consumers decide whether to purchase products, contractors compete to offer a service, &c. When markets are taken as given, traditional economics provides tools for analysis of economic outcomes.

This, however, is a course in *market design*. Market design is possible whenever resources are scarce: how should we determine who gets what, what guiding principles might we use in this determination, and what outcomes are even possible? Practical examples of market design include trade between small numbers of individuals, the assignment of medical residents to hospitals, kidney transplants, the allocation of public school seats, voting, and carbon credits. Moreover, any existing market can be redesigned. Examples include imposing a tax on consumption, delaying the speed at which stock orders are executed, and repricing online advertisements.

In addition to discussing the rationale behind the methods used to address these and similar problems, we will discuss the problems inherent in applying “classical” markets to these problems. As we will see, many of these problems represent general economic principles, and frequently the best we can do is to minimize the problematic aspects of the allocational mechanism at hand, not eliminate the problems entirely.

PREREQUISITES

Satisfactory completion of Economics 400 and 410 is formally required to participate in this course. I will assume that you have the following abilities:

- ⊞ Take simple derivatives; e.g., $\partial/\partial x[x^2] = 2x$.
- ⊞ Take simple integrals; e.g., $\int_0^1 x dx = 1/2$.
- ⊞ Compute expected values of random variables; e.g., if X is a random variable distributed uniformly on $[0, 1]$, $\mathbb{E}[X] = 1/2$.
- ⊞ Define best responses, and determine the Nash equilibrium of a strategic interaction; e.g., everyone “defects” in the prisoner’s dilemma.
- ⊞ Facility with *some* statistical software; exercises that require a computer should be feasible in Microsoft Excel (or any other spreadsheet software), but you are welcome to use whatever tools you find useful.

If during the course of the semester you are not comfortable with these background concepts, I am happy to help you work through and/or remember them during office hours.

POLICIES

Grading

- ⊞ Recaps (15% total). There will be short weekly recaps of course material, which will be graded on a $\checkmark + / \checkmark / \checkmark -$ scale; some will be more like traditional problem sets, others will be open-ended.
- ⊞ Midterm (15% total). There will be one midterm, approximately halfway through the course. The midterm’s date will be announced at least 10 days prior to the exam.
- ⊞ Final (25% total). There will be a *cumulative* final exam, with emphasis on the second half of the course, at a date and time to be determined.

As of this writing (30 July 2020), the University has not yet set final exam dates and times. The final exam will occur when it is supposed to. You will notice below that the course is in three parts — auctions, matching, and student content. “Second half” refers to the second of the two non-student portions of the course.

- ⊞ Presentation (15% total). You will present your term paper to your peers.
- ⊞ Term paper (25% for paper, 5% for checkpoints). There will be a 10–12 page term paper, as well as checkpoint assignments to be sure you are on track to successfully complete your term paper.
- ⊞ Bonus/in-class experiments (+5% total). We will occasionally use class behavior to verify or critique theoretical concepts. You will be awarded points based on how well you perform in these economic settings.

I have a handle on how to assign these points when we have regular in-class meetings, but I have less certainty regarding their implementation in a world with virtual attendance and breakout rooms. I will do my best to ensure that these points are fairly awarded. Keep in mind that, as bonus points, they are all gravy.

Term paper

In fulfillment of the university's experiential education requirement, your term paper is expected to represent a meaningful application of market design principles to an economic research proposal. You will be guided through the research process by a series of checkpoint assignments and meetings with faculty members (including myself). These assignments are as follows:

- ⊞ *Topic selection.* You will select a topic for your term paper. We will discuss how your topic can be investigated using the tools of market design, including what questions are interesting, and the rhetorical strategies useful to your research question.
- ⊞ *Reference selection.* You will provide a list of references you will use to address your chosen topic. We will work together to ensure that these references are useful to the arguments you are making, and that they are of sufficient rigor.
- ⊞ *Outlines.* You will provide a short outline (and, subsequently, a longer outline with more detail) of your term paper. We will discuss how to translate your assignment into an effective and persuasive term paper; we will address what the market design principles covered in class imply about the market you are researching, and how to make well-reasoned statements about the market's effectiveness and operation.
- ⊞ *Meetings with faculty.* During the course of your research, you are required to meet **at least twice** with economics faculty members, including myself; at my discretion, meetings with faculty from other disciplines may be used to fulfill this requirement. Your meetings with faculty are intended to offer (academic) economic perspective on your chosen topic, and will help you develop your thesis and craft a persuasive argument in your term paper.

At the end of this process you will be well-situated to produce an original and independent work of economic analysis, applying the tools of market design to a real-world example of market nonexistence, friction, or failure.

Your paper must be 10–12 pages (double-spaced, excluding references) and **submitted as a PDF** to the course dropbox on Sakai.

Attendance

You are expected to attend all class sessions. With exception to the first week (see below) I will not be taking attendance, so your attending lecture is on a good-faith basis.

Communication

I will respond to workday emails within 24 hours, and to weekend/holiday emails within 48 hours. As a matter of policy, all emails must contain a salutation, e.g., “Hi [X].” I reserve the right to ignore emails that are not politely begun.

Environment

Individuals perform and learn best when they are supported and shown basic dignity. Outside of exam settings, honest mistakes and differing viewpoints provide unique opportunities for discussion of the underlying economic concepts we will cover. I intend to follow these principles in my interactions with you, and (as alluded to above) expect the same in return, especially toward your fellow classmates. You are strongly encouraged to call me out for failing to hold to this commitment.

I will maintain a strict open-door policy during (physical) office hours. I am happy to engage in conversation on most topics, during office hours or otherwise.

Future commitments

I am happy to write past students letters of recommendation, conditional on those students having attended office hours (or met with me) at least once. This requirement serves two purposes: first, it is far simpler to write a decent and genuine letter of recommendation when I know something about your personality and interests; second, the purpose of college is intellectual discovery, fostered by academic researchers, and as this is a class on generating incentives to drive behavior I would be remiss for not encouraging you to “college” properly.

TEXTS

There is one suggested text for the course:

- ⊠ G. Haeringer. *Market Design: Auctions and Matching*. MIT Press, 2018.

Additional readings will be made available through Sakai.

The following texts are mostly available through the UNC library and are useful secondary sources:

- ⊠ P. Milgrom. *Putting Auction Theory to Work*. Cambridge University Press, 2004.
- ⊠ K. Binmore. *Playing for Real: A Text on Game Theory*. Oxford University Press, 2007.
- ⊠ D. Fudenberg and J. Tirole. *Game Theory*. MIT Press, 1991.
- ⊠ M. Osborne. *An Introduction to Game Theory*. Oxford University Press. 2004.
- ⊠ M. Osborne and A. Rubinstein. *A Course in Game Theory*. MIT Press, 1994.

STRUCTURE

We will follow the textbook's presentation of course material. This neatly divides the course into three parts: auctions, matching, and presenting your term paper research.

Part 1 (Auctions)

Adam Smith's invisible hand envisions a number of producers and a number of consumers existing simultaneously in a (more or less) common marketplace, where the invisible hand ensures a proper allocation of resources. Although this is a reasonable simplification of the markets for many goods, the foundational assumptions break down when there is a small number of participants on either side.

Roughly, auction theory studies the strategic behavior of small numbers of agents competing to obtain an object. When there are not many interested parties, each interested party has some ability to affect market prices, and the economic problem is more complicated than, "Should I buy a burger for \$7.00?" because you might be able to buy it for less. We will discuss different auction formats and implementations, and their various virtues and vices.

Part 2 (Matching)

The study of auctions crucially assumes that monetary compensation is available. This assumption is maintained throughout most of economics, and implies some nice economic properties, but is not always valid. Roughly, matching theory studies how to determine market-like allocations that respect individual preferences when money is not available. In these settings the economic problem is more complicated than, "Should I buy a burger for \$7.00?" because there is no such thing as \$7.00. We will discuss why payments may not be feasible in particular markets, and design strategies for eliciting and respecting individual preferences when money is not a factor.

Part 3 (Student content)

As outlined in the grading rubric, you will give a short presentation of your term paper research. Our mandatory meetings (also outlined in the grading rubric) will be used to provide feedback on effective presentation strategies.

RESEARCH AND DISCOVERY

This course meets the *Research and Discovery* objective of the IDEAs in Action Curriculum.

Students immerse themselves in a research project and experience the reflection and revision involved in producing and disseminating original scholarship or creative works.

Questions for Students

1. How do I establish my point of view, take intellectual risks, and begin producing original scholarship or creative works?
2. How do I narrow my topic, critique current scholarship, and gather evidence in systematic and responsible ways?
3. How do I evaluate my findings and communicate my conclusions?

Learning Outcomes

1. Frame a topic, develop an original research question or creative goal, and establish a point of view, creative approach, or hypothesis.
2. Obtain a procedural understanding of how conclusions can be reached in a field and gather appropriate evidence.
3. Evaluate the quality of the arguments and/or evidence in support of the emerging product.
4. Communicate findings in a clear and compelling way.
5. Critique and identify the limits of the conclusions of the project and generate ideas for future work.

ADDENDA

Community Standards in Our Course and Mask Use

This fall semester, while we are in the midst of a global pandemic, all enrolled students are required to wear a mask covering your mouth and nose at all times in our classroom. This requirement is to protect our educational community — your classmates and me — as we learn together. If you choose not to wear a mask, or wear it improperly, I will ask you to leave immediately, and I will submit a report to the Office of Student Conduct. At that point you will be disenrolled from this course for the protection of our educational community. An exemption to the mask wearing community standard will not typically be considered to be a reasonable accommodation. Individuals with a disability or health condition that prevents them from safely wearing a face mask must seek alternative accommodations through the Accessibility Resources and Service.

Title IX Resources

Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Please contact the Director of Title IX Compliance, Report and Response Coordinators in the Equal Opportunity and Compliance Office, Counseling and Psychological Services (confidential), or the Gender Violence Services Coordinators (confidential) to discuss your specific needs. Additional resources are available at Safe at UNC.