Math 180: Analytical Methods in Economics, Law and Medicine
Fall 2012
Monday, Wednesday, Friday, 1 – 2pm, DRL 4C4

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Texts: *The Drunkard's Walk: How Randomness Rules Our Lives*, Leonard Mlodinow, and *Innumeracy: Mathematical Illiteracy and its Consequences*, John Allen Paulos.

Course web pages: `http://www.math.upenn.edu/~jjau/math180`,
`http://piazza.com/upenn/fall2012/math180`, and **Blackboard**

Course description: The primary goal of the course is to improve students' abilities to reason quantitatively and communicate technical ideas effectively. Along the way, we will explore a number of mathematical topics that are relevant to the world today.

- Probability: the science of chance. Applications to legal cases, medical decisions, everyday life.
- Statistics: using a sample to make inferences about a population. Applications to the upcoming presidential election and much more.
- Game theory: formulating optimal strategies. Applications to economics, law and business.
- Decision theory: helping one make the best choice when outcomes are uncertain. Applications to business and legal strategy.
- Voting theory: exploring the many ways of designing ballots and elections, with their pros and cons. Applications to the election.
- Introductory finance: present vs. future value, revenue streams. Applications to business and economics.
- Additional topics, such as fair division and auction theory.

Course web pages: We will use Blackboard only for keeping track of grades. Our primary means of communication outside of class will be our Piazza page (see address above). Here, you can:

- post questions (from lecture, homework, etc.)
- answer the questions of other students (strongly encouraged!)
- see my answers to questions
- get the homework assignments; see homework solutions to previous assignments
- view supplemental reading selections
- participate in class discussions

Before emailing me a question, please consider posting it to Piazza. Being involved with the discussions on Piazza will count toward your participation grade (see below).

Attendance and notes: To be successful in this course, you should be present for all class meetings. The lectures are largely independent of the assigned reading, so good note-taking is very important. If you must miss class, you should notify me by email immediately. For absences lasting longer than a day, you should also contact the College Office. For more information, see `http://www.college.upenn.edu/policies/attendance.php`

Homework and reading: Homework assignments will be posted online. They will be due as noted, typically once every week, always at the beginning of class. You are responsible for being aware of the assignments and due dates. You are encouraged to work with others to exchange ideas and help each other understand how to approach problems, but the work you turn in must be your own! Reading selections from the texts and other sources will be assigned for discussion.

Writing: One of the goals of the course is to exercise your technical writing skills. Therefore, any work you turn in must be legibly written in complete sentences, with proper grammar, spelling, and punctuation. Both the quality and content of your writing will be taken into account in grading.

Exams: There will be two midterm exams according to the following schedule. **Notify me immediately** if you have a conflict with any of these dates.
- Midterm 1: Friday, October 5th, in class
- Midterm 2: Friday, November 30th, in class

All exams are to be taken under the University's Code of Academic Integrity (see below).

Final paper: In lieu of a final exam, you will be required to write a paper on a subject of your choosing. The topic must be relevant to the course, include a quantitative component, and be approved by me. I will be available to suggest topics, but you will probably find the most interesting ideas by following current events.

Additional details on the paper will be given as the semester progresses. Important due dates are:

- Friday, Nov. 2: Please turn in the title and a one paragraph summary of your paper, followed by a list of possible references.
- Friday, Dec. 7th: Please turn in a partial draft of your paper, at least 1-2 pages, with an outline for the remainder of the paper.
- Tuesday, December 18th, 2pm: final paper due date.

Grades: Your grade for the course will be determined based on the following factors:

Homework	20 %
Class participation	5 %
Midterm exams	25 % each
Final paper	25 %

Missed/late work: Late homework will not be accepted. Missed exams will count as zero, except for reasons such as serious illness, family emergency, etc. (in which case written notification from a dean is required). Your lowest homework grade will be dropped.

Students with disabilities: Any student requiring special accommodations is encouraged to contact me and the Office of Student Disabilities Services as soon as possible.

Honor code: In this course, collaboration on homework assignments is allowed and encouraged,

but the work you hand in must be entirely your own. You are not allowed to have any outside help (people, books, or notes) during exams or quizzes, unless explicitly told otherwise.

Academic integrity is taken very seriously, and Penn's Code of Academic Integrity will be strictly enforced. Cheating on homework, quizzes or exams (using notes, copying/sharing work with other students, etc.) will result in a score of 0 on that work and referral to the Office of Student Conduct.

Getting help: It is very important to get help right away as you need it. First and foremost, *you should ask questions in class* and *attend office hours.* Here are some other ways to get help:

- Weingarten Learning Resource Center (`http://www.vpul.upenn.edu/lrc/`)
- The Tutoring Center (`http://www.vpul.upenn.edu/tutoring/`)
- private tutors (`http://www.math.upenn.edu/ugrad/tutors.html`)