36-149: Freshmen Statistics Seminar Fall 2012

Instructor: Rebecca Nugent

Baker Hall 232C (412) 268-7830 rnugent@stat.cmu.edu http://www.stat.cmu.edu/~rnugent Office Hours: Tuesday 11am-12pm, Baker 232C

TAs:Elizabeth Lorenzi
elorenzi@andrew.cmu.edu
Office Hours: Monday 12:30-1:30pm, Baker 132M

Class Meetings: Monday, Wednesday, Friday, 1:30-2:20pm, PH A22

Website: http://www.cmu.edu/blackboard

Prerequisites: none

Textbook: none required; some readings will be provided from the below (among others):

Linked: How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life by Barabasi (2003) Networks: An Introduction by Newman (2010)

<u>General Course Plan</u>: Networks: Where do they come from? What do they tell us? Thirty years ago, the word "network" was mostly used in reference to computers or television broadcasting channels. Now we have networks of friends, enemies, phones, stars, tweets, international governments, terrorists, etc. Where do these networks come from? How are they built? What do they represent? As we learn more about how everything is connected, we also face challenges in trying to understand the data that a network can generate. In this course, you'll learn about networks from a New England monastery facing a political crisis to social groups of friends (is obesity contagious? what about divorce?) to 15th century marriages among prominent Italian families to international political disputes and skirmishes (is the enemy of my enemy my friend?) to the spread of HIV among intravenous drug users. Along the way, we'll explore how to describe, visualize, analyze, and even break down the networks that surround us.

Course Objectives:

- 1. Learn the basic structure of networks and how they occur
- 2. Identify networks and their influence in everyday life
- 3. Develop network-building skills including data collection and network construction
- 4. Effectively summarize/analyze networks with some simple statistics
- 5. Develop presentation and scientific writing skills

<u>Course Work:</u> Your course grade will be determined by homework assignments, a midterm project, and a final project.

• Weekly homework assignments are due at the beginning of class (1:30pm), usually Wednesdays. Assignments should be submitted on paper; electronic versions will not be accepted (exceptions may be made depending on circumstances; instructor permission required).

<u>Homework Format</u>: stapled; name on front page, initials on remaining pages; questions should be answered in order; ALL answers should be clearly marked and labeled. Any graphs should be as close to the corresponding problem as possible. Deviating from this format may result in loss of points on homework.

Please see the TA or instructor during office hours for help with homework. Questions posed by email must be sent at least 24 hours before the time an assignment is due in order to guarantee a response.

• The midterm and final projects will require you to brainstorm, construct, and analyze networks. For the final project, you will present your results in class. More details later.

Grading policy: You are encouraged to discuss homework with your fellow students, however the work you submit must be your own. Acknowledge any help received on your assignments. Copied assignments will receive no credit. **Late assignments will not be accepted. Please come talk to me if there are difficulties; problems/conflicts must be discussed IN AD-VANCE.** Your lowest homework grade will be dropped.

You have one week from the day an assignment, project, etc is handed back in class to bring any grading issues, comments, complaints, etc to the attention of the instructor. Please note that if you are absent the day something is handed back, this deadline will not be extended unless arrangements have been made in advance with the instructor.

Final grades will be computed with the following weights:

Homework	.50
Midterm Project	.20
Final Project	.30

Final letter grades will be determined as usual: [90,100] = A, [80,89] = B, [70,79] = C, [60,69] = D, [< 60] = R. Grades may be curved at the instructor's discretion (effort, improvement, etc).

Laptop Policy: Students are expected to be participating in class; any laptop use during class should pertain directly to the class. Instructor reserves the right to not allow laptop use during class. When the class has a guest speaker, laptops must be turned off and put away.

Cellphones/Pagers, etc: All cellphones, pagers, beepers, and anything else that makes noise should either be turned off or silenced during class.

<u>Communication</u>: Assignments and class information will be posted on Blackboard. Help with using blackboard is available at www.cmu.edu/blackboard/help/.

Email: Sending email to your professor or teaching assistant should be treated as professional communication. Emails should have an appropriate greeting and ending; students should refrain from using any kind of "shortcuts", abbreviations, acronyms, slang, etc. in the email text. Emails not meeting these standards may not be answered.

Academic Integrity: All students are expected to comply with the CMU policy on academic integrity. This policy is online at www.studentaffairs.cmu.edu/acad_integ/acad_int.html

Cheating, copying, etc will not be tolerated; please ask if you unsure of whether or not your actions are complying with assignment/exam instructions. Always ask if you are unsure; always default to acknowledging any help received.

Video/Audiotaping: No student may record or tape any classroom activity without the express written consent of the professor. If a student believes that he/she is disabled and needs to record or tape classroom activities, he/she should contact the Office of Equal Opportunity Services, Disability Resources to request an appropriate accommodation.

Disability Services: If you have a disability and need special accomodations in this class, please contact the professor. You may also want to contact the Disability Resources office at 8-2013.

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Date	Торіс	Due
Mon 8/27	Intro; Syllabus; Euler's Konigsberg Bridges	
Wed 8/29	Six Degrees of Separation	Intro Survey
Fri 8/31	The World Wide Web	
Mon 9/3	Labor Day; no class	
Wed 9/5	Social Networks: The Karate Club	HW 1
Fri 9/7	Social Networks: Predicting the Karate Club Split	
Mon 9/10	no class	
Wed 9/12	Social Networks: Directed, Interviews, Questionnaires	HW 2
Fri 9/14	Social Networks: Name Generators, Ego-Centered	
Mon 9/17	Social Networks: Ego-Centered, Email/Telephone Networks	
Wed 9/19	Social Networks: Longitudinal Networks, Hidden Populations	HW 3
Fri 9/21	Social Networks: Node Positions, Covariates, Sampson's Monks	
Mon 9/24	Social Networks: Covariates as Graph Features	
Wed 9/26	Social Networks: Archival Data, The Rise of Medici	HW 4
Fri 9/28	Social Networks: Group Feedback on Project Design	
Mon 10/1	Social Networks: Pilot Testing Project Questionnaires	
Wed 10/3	Project Feedback	
Fri 10/5	Plagues as Networks	HW 5
Mon 10/8	Plagues as Networks	
Wed 10/10	Plagues/Homophily	Data Collection
Fri 10/12	Diffusion through Networks	
Mon 10/15	Diffusion through Networks/Midterm Project Work	
Wed 10/17	Midterm Project Work	Data Collection Deadline
Fri 10/19	Mid-Semester Break; no class	
Mon 10/22	Midterm Project Presentations	
Wed 10/24	Midterm Project Presentations	
Fri 10/26	Midterm Project Presentations	
Mon 10/29	Midterm Project Presentations	
Wed 10/31	Midterm Project Presentations/Report Work	
Fri 11/2	Midterm Project Report Work	Midterm Project
Mon 11/5	Information Networks: Citation, Patents, Authorship	
Wed 11/7	Information Networks: Citations, Power Laws	
Fri 11/9	Social Network Research Proposal Presentation	
Mon 11/12	Information Networks: Recommender Networks	
Wed 11/14	Information Networks: Recommenders; Ecological Networks	HW 6
Fri 11/16	Biological Networks	
Mon 11/19	Group Project Proposal/Planning	
Wed 11/21, Fri 11/23	Thanksgiving Break; no class	
Mon 11/26	Special Topics/Visualization	
Wed 11/28	Special Topics/Visualization	
Fri 11/30	Special Topics/Visualization	
12/3, 12/5, 12/7	Final Project Presentations	Report due Wed 12/12