

Syllabus

NUTR 207: Statistical Methods for Nutrition Science and Policy

Friedman School of Nutrition Science and Policy, Tufts University, Fall 2017

Lectures: Mondays and Wednesdays, 1:30pm to 3:00pm, Behrakis Auditorium, Jaharis

Labs: Selected Mondays and Wednesdays, 3:30pm – 5:00pm, Sackler 507.

One half of class will participate in labs on Mondays (September 18, October 2, October 16, and November 20). The other half of the class will participate in labs on Wednesdays (September 20, October 4, October 18, November 15). Lab day assignments will be discussed the first week of class.

Instructor: Sean B. Cash, Ph.D.

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Office Hours: Mondays 12:00 – 12:50pm and Wednesdays 3:10 – 4:00 pm, or by appt., Jaharis 127

Teaching Assistants:

Jennifer Huang, jennifer.huang@tufts.edu | Skype address: music2092

Office Hours: Friday, 8:00 – 9:00 am (Jaharis 133)

Sara John, sara.john@tufts.edu | Skype address: sara.john

Office Hours: Tuesday and Thursday, 10:30 – 11:30 am (Jaharis 254)

Yvonne Socolar, yvonne.socolar@tufts.edu | Skype address: yvonesocolar

Office hours: Monday, 3:10 – 4:00 pm and Tuesday, 1:00 – 2:00 pm (Jaharis 155)

Tufts Graduate Credit: 1 credit

Prerequisites for taking this course: None, but familiarity with basic mathematical concepts is useful and expected

Course Description: In this class we will explore statistical techniques for analyzing social science data, with specific applications to nutrition, food policy, and agriculture and the environment. Although it is necessary to teach some theory, it is my intent that the course be practical and user-oriented. The primary goal here is to learn how to analyze data in ways that will be useful in your academic and professional careers, both in conducting your own work and critically assessing the work and claims of others.

For many students, this course is the first step in a 3-course sequence. This is a first semester graduate course in statistics for students in the AFE, FPAN, and NICBC programs. This one-semester course will provide students with an introductory level understanding of social science statistics concepts and methodologies, how they are applied, interpreted and presented in published research articles. Topics will include data gathering, experimental design, probability, descriptive statistics, graphical displays, hypothesis testing, nonparametric tests, analysis of variance, and ordinary

least squares regression (OLS). A distinctive feature of this course is its focus on methods that can be used with observational data, which frequently arise in the social sciences.

Class meeting times: Instruction will include lecture-based classroom meetings (twice per week in Behrakis Auditorium) as well as several scheduled computer lab training sessions. During the computer lab sessions, students will learn how to use Stata statistical software and will complete portions of the homework assignments. Attendance at these lab sessions is very important – you should plan ahead to make sure you can attend the scheduled sessions. Please see the course and assignment schedule below for additional information.

Class location: Class will be held in Jaharis Behrakis Auditorium EXCEPT for November 20th class, which will be held in Sackler DeBlois Auditorium (Room 108), and December 11th class, which will be held in Sackler 114

Course Objectives: Students who take this course will be able to:

- Understand how data are collected for addressing questions relevant to food and nutrition science and policy;
- Identify different types of data on the basis of how they are collected and what they measure;
- Describe and identify common sources of bias affecting data collection and interpretation for given studies;
- Explain and apply principles of probability and sampling to statistical study design;
- Identify and explain common fallacies of interpreting statistical results in media reports, policymaking, and other applied contexts;
- Utilize appropriate tools for both numerical and graphical descriptive analysis of quantitative data;
- Understand the concept of a sampling distribution and apply it to defining confidence intervals and hypothesis tests;
- Explain and apply key concepts of inferential statistical analysis, including hypothesis testing, estimation, model construction, and prediction;
- Begin NUTR 307, our spring course in regression analysis, with no additional preparation; and
- Explain fully why the cartoon on the last page of the syllabus is funny.

Description of assignments, tests, and other required activities:

Your grade in this class will be determined by problem sets, participation and in-class exercises, and two exams. Points will be awarded for each assignment, and an overall course score will be calculated from the weights given below. Your course score will then be mapped into a letter grade on the basis of “natural breaks” in the distribution of class grades. Please note that these breaks may be used to raise, but never lower, grades from a standard grade distribution (e.g., 90% will always be at least an A-).

Problem Sets: **40%** of your grade will be based on four take-home assignments, tentatively due September 25, October 16, November 8, and December 4. Each assignment will be distributed on Canvas approximately two weeks before it is due. Problem sets are to be submitted in hard copy, stapled, at the *start* of class. You are encouraged to work in small groups on these problem sets, but each student is responsible for handing in her or his own answers.

Participation and in-class exercises: Regular attendance in class and labs is a necessary (but not sufficient!) condition for mastering this material and passing the course. **10%** of your grade will be based on class and lab participation and submission of in-class exercises and brief quizzes. Quizzes are designed to provide you with an opportunity to assess your understanding of the course material on an ongoing basis, rather than (for example) finding out that your understanding is deficient by failing a major exam. In-class exercises and quizzes will be used regularly throughout the semester, but you can definitely expect to see brief quizzes the weeks of September 18 and October 2.

Exams: There will be an in-class midterm examination on **Wednesday, October 25**, worth **20%** of the grade. The final exam will be worth **30%** of your overall grade, and will be held on **Monday, December 18** at 1:30 pm in Behrakis Auditorium. Additional information on the format, grading and content of the exams will be distributed prior to each exam.

Research Ethics Training Certificate: The online human subjects research ethics training is a School-wide requirement for graduation and should be completed by the end of the fall semester. Completion of this requirement will be discussed in class, and will count toward your participation grade. Please submit a copy of the completion certificate to both the teaching assistants and to the Office of Student Affairs when you complete the training. Most students in NUTR 207 should be completing the required “Social-Behavioral-Educational Researchers” group modules. For more information, please see <http://viceprovost.tufts.edu/sberirb/research-training-requirements/citi/>

Summary of Assignments and Grading

Assignment(s)	Grading Weight
Problem Sets (4 total)	40%
Participation in quizzes and in-class assignments	10%
Midterm Examination, October 25	20%
Final Examination, December 18	30%
Total	100%

Penalties for late or incomplete assignments: No late assignments will be accepted and a zero grade will be recorded for missing work. If you think you may have difficulty completing a problem set on time, please ask us for an extension as early as possible. *No extensions will be granted fewer than 48 hours before an assignment is due.* We will try to accommodate busy schedules, but not poor planning.

Grading Questions: If you believe that an assignment or exam question was graded incorrectly, you are welcome to raise the issue with us. If you simply don't like your grade and come to argue with us for more points, you will probably find that there are better uses of your time. In any case, we will follow a simple rule: *We will not discuss any grade during the first day after the assignment has been returned.*

Jennifer, Sara and Yvonne will grade the problem sets. If you have a question about how your problem set was graded, please speak with one of them first. Your professor will not change a problem set grade that has not first been discussed with the TAs. If you have a grading question on an exam, please come to Dr. Cash's office hours or set up a separate appointment.

Course texts and Materials:

Texts: The required primary textbook for this course is *Statistical Methods for the Social Sciences*, 4th edition, A. Agresti and B. Finlay, 2008 (referred to as "A&F" in the reading list). There will be required readings from this textbook on a regular basis. Copies also on reserve at the Hirsh Library. *Please note that there is a new 5th edition of this textbook available as of Summer 2017; please be careful to obtain the 4th edition.*

Hamilton's *Statistics with STATA* (version 12) is a recommended text that can come in handy when completing the assignments. M. Campbell's *Statistics at Square One* is an additional (and inexpensive) reference that you may find useful, and is used in other courses offered at Friedman. J. Wooldridge's *Introductory Econometrics: A Modern Approach* is the primary textbook for NUTR 307 in the Spring, and is a useful resource in the last weeks of this course. Additional readings and reference handouts will be distributed in class or made available on Canvas or the reserve room.

Since the material in this course builds on itself from week to week, it is important that you keep up with the readings as they are assigned. Assigned readings are to be completed *before* the relevant class meeting. Note that the readings are not a replacement for coming to lecture and taking notes on the lecture material.

There are several useful online resources for learning statistics. Jerry Dallal, former professor here at Tufts, has a useful online primer and Kindle e-book at <http://www.tufts.edu/~gdallal/LHSP.HTM>. Another useful resource can be found at <http://www.sjsu.edu/faculty/gerstman/StatPrimer/>. A particularly fun statistics reference is *The Cartoon Guide to Statistics* by Larry Gonick & Woollcott Smith (on reserve).

Additional Materials: You should have a USB flash drive with at least 1GB capacity for the lab sessions. It is also a good idea to make online backups of your files (in this and all classes!). Dropbox and Box are both excellent options for this here, and in your other courses as well.

You will also need an inexpensive solar powered scientific calculator that can handle logs, parentheses, etc., and can be brought to class regularly, as we can not allow you to use your phones on quizzes or exams. Good options include the Casio FX260 SLR3 or FX-300ES, or Texas Instruments 30XIIS. These can be purchased for \$10 - \$20.

Stata statistical software will be used throughout the course, as well as in NUTR 307 and 311. We will demonstrate how to use Stata in class and provide examples that you can do on your own. Stata will be used for class assignments and lab session exercises. At your option, Stata software version 15 (Intercooled package) can be ordered at discount price of \$89 (annual license) or \$198 (perpetual license). You can use Stata in our Tufts computer labs so you don't need to purchase it yourself. However, you might want to do so while you are a student since the student discount is considerable. Purchasing Stata after you are no longer a student is far more expensive. Student pricing information is available at <http://www.stata.com/order/new/edu/gradplans/student-pricing/>

Academic Conduct

School Policy on Academic Conduct: Academic integrity, including avoiding plagiarism, is critically important. Each student is responsible for being familiar with the standards and policies outlined in the Friedman School's *Policies and Procedures* manual (<http://nutrition.tufts.edu/documents-and-forms/policies-and-procedures-handbook-students>). It is the responsibility of the student to be aware of, and comply with, these policies and standards. In accordance with Tufts University's policy on academic misconduct, violations of standards of academic conduct will be sanctioned by penalties ranging from grade reduction or failure on an assignment, grade reduction or failure of a course, up to dismissal from the school, depending on the nature and context of any infraction (<https://students.tufts.edu/student-affairs/student-life-policies/academic-integrity-policy>).

Instructor's Philosophy on Misconduct: The material you submit to show mastery of the course material must be your own work. I take proper academic conduct seriously, as it is unfair to other students when academic misconduct is not addressed. The policy followed here is quite simple: Any plagiarism or cheating will result in my awarding a failing grade for the assignment and the class, and all violations will be reported to the Academic Dean for Education.

Classroom Conduct and Disruptions: Because this class relies heavily on both lecture and group discussion, it is important that everyone be able to participate fully without disruption or distraction. Please make sure that all communications devices are silent and put away during the class, as even subtle interruptions are distractions to your classmates and me. Reading and sending text messages should wait until after class. If

you use a laptop to take notes or to refer to materials that were distributed electronically, it is important that you do so with the wireless turned off. I reserve the right to ask anyone who is attending the class in body but not in mind to leave the room.

Accommodating Disabilities: Tufts University is committed to providing equal access and support to all students through the provision of reasonable accommodations so that each student may access their curricula and achieve their personal and academic potential. If you have a disability that requires reasonable accommodations, please contact Matthew Hast, the Friedman School Assistant Dean of Student Affairs, at matthew.hast@tufts.edu or 617-636-6719 to make arrangements for determination of appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision.

Contacting Professor Cash: My drop-in office hours are held on Mondays from 12:00 – 12:50pm, Wednesdays from 3:10 – 4:00pm, or by appointment, in Jaharis 127. You should feel free to come by with any questions or comments you have. The teaching assistants' office hours are as listed on the front page.

We will use the class email list for announcements and clarifications. Please make sure to check your university email account regularly. The primary use of the Canvas site will be to distribute handouts and additional readings. Please do not use email or the Canvas site to submit any assignments unless specific arrangements have been made to do so.

You are also free to ask me specific questions over e-mail, although it doesn't work well for broader questions. For example, "How do I answer this week's assignment?" is a short question that requires a long answer that you probably won't receive over email. Of course, email is great for any administrative questions you may have.

Course & Assignment Schedule:

This schedule is tentative and subject to modifications at the discretion of the instructor.

September 6	<p>Introduction: Thinking about data</p> <p><u>Readings</u>: A&F Chapter 1; Steve Lohr, "For Today's Graduate, Just One Word: Statistics," New York Times (6 August 2009).</p> <p><u>Assignments</u>: In-class introductory and data generation activities</p>
September 11, 13	<p>Sampling and measurement</p> <p><u>Readings</u>: A&F Chapter 2 (plus last week's readings, since you probably didn't do them before our first class!)</p> <p><u>Assignments</u>: Problem Set 1 distributed</p>

September 18, 20	<p>Descriptive statistics</p> <p><u>Readings:</u> A&F Chapter 3</p> <p><u>Assignments:</u> There will definitely be an in-class quiz this week</p> <p><u>Lab:</u> Attend computer lab #1 in Sackler 507 on either Monday or Wednesday as assigned, 3:30 – 5:00 pm</p>
September 25, 27	<p>Descriptive statistics (continued); probability</p> <p><u>Readings:</u> A&F Chapter 4.1</p> <p><u>Assignments:</u> Problem Set 1 due September 25</p>
October 2, 4	<p>Probability distributions; Statistical inference: estimation and confidence intervals</p> <p><u>Readings:</u> A&F Chapter 4 (sections 4.2 - 4.7)</p> <p><u>Assignments:</u> There will definitely be an in-class quiz this week. Problem Set 2 will be distributed. Fun will be had!</p> <p><u>Lab:</u> Attend computer lab #2 in Sackler 507 on either Monday or Wednesday</p>
October 11	<p>Note: <i>There are no classes on Monday, October 9 (Indigenous Peoples Day).</i></p> <p>Introduction to statistical inference</p> <p><u>Readings:</u> A&F Chapter 6</p> <p><u>Assignments:</u> Try your best to not show up to class on Monday.</p>
October 16, 18	<p>Statistical inference: Significance tests (continued); comparison of two groups (begin)</p> <p><u>Readings:</u> A&F Chapter 7 (sections 7.1 – 7.3)</p> <p><u>Assignments:</u> Problem Set 2 due no later than 1:29pm on October 16.</p> <p><u>Lab:</u> Attend computer lab #3 in Sackler 507 on either Monday or Wednesday</p>
October 23, 25	<p>Catch-up, in-class review session (October 23), and midterm exam</p> <p><u>Readings:</u> Review A&F Chapters 1 - 6</p>

	<p><u>Assignments</u>: Midterm examination in class on October 25 (20% of grade). Problem Set 3 distributed.</p>
October 30, November 1	<p>Comparison of two groups (continued), chi-squared tests</p> <p><u>Readings</u>: A&F Chapter 7 (section 7.4 - 7.8), 8.2; Campbell & Swinscow Chapter 8 (on reserve)</p> <p><u>Assignments</u>: Prepare statistics-themed Halloween treats, distribute normally.</p>
November 6, 8	<p>One-way analysis of variance</p> <p><u>Readings</u>: A&F Chapter 12.1 - 12.2</p> <p><u>Assignments</u>: Problem Set 3 due November 8</p>
November 13, 15	<p>Correlation and linear regression</p> <p><u>Readings</u>: A&F Chapter 9</p> <p><u>Assignments</u>: Problem Set 4 distributed</p> <p><u>Lab</u>: Attend computer lab #4 in Sackler 507 on Wednesday (November 15th) or on Monday NEXT week</p>
November 20	<p>Regression (continued); human subjects recruitment</p> <p><u>Readings</u>: A&F Chapter 9</p> <p><u>Assignments</u>: Make good use of your Thanksgiving leftovers.</p> <p><u>Lab</u>: Attend computer lab #4 in Sackler 507 on Monday if you did not attend on Wednesday last week</p> <p><u>NOTE</u>: Class will be held in Sackler 114</p> <p>****There are no classes on Wednesday, November 22, in observance of the Thanksgiving holiday****</p>
November 27, 29	<p>Multivariate relationships, introduction to multiple regression and preparation for NUTR 307</p> <p><u>Readings</u>: A&F Chapter 10, 11.1; selections from Wooldridge</p> <p><u>Assignments</u>: Did you complete your CITI training?</p>

December 4, 6	<p>Multivariate regression (continued), Catch up and wrap-up</p> <p><u>Readings</u>: Review all assigned readings in preparation for the final.</p> <p><u>Assignments</u>: Problem Set 4 due December 4 AND keep your spirits up and your chin down.</p>
December 11	<p>TA-lead review session</p> <p><u>NOTE</u>: Class will be held in Sackler DeBlois Auditorium (Room 108)</p>
December 18	<p>Final examination</p> <p>The final examination will be held in Behrakis Auditorium from 1:30 - 3:30 pm. Please mark this time on your calendar now and keep it in mind when making December travel plans!</p>

A study outline of learning objectives will be available as a separate document on Canvas. The final reading schedule for each section will be announced approximately two weeks in advance on Canvas and in class.

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