ECON 103: Statistics for Economists, Spring 2020

Syllabus

Course Instructor:

Wayne Y. Gao
Email: waynegao@upenn.edu
Office: PCPSE 630
Office Hours: Tuesday, 1:30pm-3:30pm

Lecture Time and Location: Tuesday & Thursday, 9:00am-10:30am, ANNS 110

Teaching Assistants:

Alice Gindin: agindin@sas.upenn.edu
Sean McCrary: smccrary@sas.upenn.edu
Xiaoliang Wang: xlwang@sas.upenn.edu

Recitation Time and Location:

Monday, 10am-11am, MCNB 285 (McCrary)
Monday, 11am-12pm, MCNB 285 (McCrary)
Monday, 12pm-1pm, MCNB 309 (Wang)
Monday, 1pm-2pm, WILL 216 (Wang)
Friday, 9am-10am, WILL 204 (Gindin)
Friday, 10am-11am, WILL 204 (Gindin)

Course Description:

The course focuses on elementary probability and statistical techniques. The course covers basic descriptive statistics, elementary probability theory, sampling, estimation, confidence intervals, hypothesis testing and regression. The course emphasizes practical application of these techinques in economic data analysis, and students are required to perform simple statistical analyses on their own using the statistical computation package "R".

This course is intended primarily for ECON majors, and cannot be taken by students who has already completed Statistics at least at the level of STAT 430 (including the sequence STAT 430 and 431). Such students must take an additional 200-level course to satisfy the requirements of the ECON major. This course fulfills the College's Quantitative Data Analysis requirement.

Prerequisites:

The prerequisite for this course is multivariate calculus (Math 104 followed by Math 114 or Math 115). To do well in this course you will need to be comfortable with algebra, manipulating sums, differentiation and partial differentiation, integration, and solving unconstrained optimization problems.

Course Website

We will use *Canvas* to make course announcements, post course material, answer questions about course material and respond to private messages from individual students regarding personal issues. All written communication for ECON 103 should be directed to *Canvas, not* to the instructors' personal email accounts.

You are encouraged to use *Discussion,* a forum-like function in *Canvas* for Q&A about course material. By asking your questions and answering others' questions on *Discussion,* you create a positive externality: other students benefit from your questions/answers and you benefit from theirs. The instructor and TA's will actively moderate *Discussion* on *Canvas* both to answer questions and approve (or correct) answers written by your fellow-students.

Textbook:

The official textbook for this course is "*Introductory Statistics for Business and Economics*", 4th Edition, by Thomas H. Wonnacott and Ronald J. Wonnacott (WW4). This book is old, with plenty of cheap used copies. While I suggest that you complete the assigned readings in WW4, my lecture slides are the final authority on course material. In particular, you are not responsible for material in the textbook unless it is also covered in lecture, but you are responsible for material from lecture even if it is not covered in the textbook.

Required Software:

We will use the statistical package `R` via a front-end called `RStudio` throughout the course. Both `R` and `RStudio` are open source and free. First, download and install `R` from http://cran.r-project.org/. Second, download and install `RStudio` by visiting `https://rstudio.com/products/rstudio/download/` and clicking "Download" under the free `RStudio` Desktop version. You might need to further choose the right version for your operating system (Windows/Mac). If you have trouble, ask your TA or the instructor for help in office hours.

Supplementary Material

Workbook: "*Student Workbook to Accompany Introductory Statistics for Business and Economics*", 4th Edition. This workbook contains fully worked out solutions to all odd-numbered

problems from the textbook along with additional practice problems and solutions. Used copies are available on Amazon.

R Textbook: *"The R Student Companion"*, by Brian Dennis. This If you are having trouble with R and prefer a printed book to the free online resources listed below.

Free online resources to learn R:
http://cran.r-project.org/other-docs.html
http://www.twotorials.com/
https://www.r-bloggers.com/how-to-learn-r-2/
http://cran.r-project.org/doc/contrib/Farnsworth-EconometricsInR.pdf
https://stats.idre.ucla.edu/r/

Leisure reading: *"Naked Statistics: Stripping the Dread from the Data"*, by Charles Wheelan.

Departmental Course Policies:

All Economics Department course policies are in force in ECON 103 even if not explicitly listed on this syllabus. See https://economics.sas.upenn.edu/undergraduate/course-information/course-policies for full details.

Academic Integrity:

All suspected violations of the code of academic integrity as set forth in the Pennbook will be reported to the Office of Student Conduct. Confirmed violations will result in a failing grade for the course. We will check photo identification cards at exams, so please bring yours.

Homework:

Homework assignments will be posted on Canvas each week, starting from the third week of the semester. Although homework will neither be collected nor graded, it is crucial that you keep up with the homework on a weekly basis if you hope to do well in the course. Solutions to homework problems will be provided. Be sure to use these responsibly: you gain nothing by merely reading the answers. As an extra incentive for you to keep up with the homework, one problem from each exam (including midterms and finals) will be taken almost directly, with possibly very mild modifications, from your assigned homework.

Grading:

Grades for this course will be determined based on seven in-class *quizzes*, two in-class *midterms*, and a comprehensive *final exam* that will take place during the exam period. Specifically,

Course Score = (20% × Quizes) + (20% × Midterm1) +(20% × Midterm2) + (40% × Final).

We typically try to target an average GPA in the range between 3.0 and 3.2, or slightly above a B average. In a nutshell, I will give about 30% "A"s and "A-"s, 40-50% "B"s and 20-30% "C"s. If necessary, I will curve the Course Scores (defined above) so that the final grades approximately fall into these ranges. Grades below "C-" are reserved for cases in which a student fails to attain the bare minimum level of basic competence in statistics, an absolute rather than relative standard. The grade boundaries are: "A" range = 90-100, "B" range = 80-89, "C" range = 70-79, "D" range = 60-69. The top two points of each range would be a "plus" and the bottom two points a "minus".

Quizzes:

There will be seven short in-class quizzes over the course of the semester. Unless otherwise indicated, each quiz will cover the material from the most recent lectures since the last quiz or midterm. When calculating your quiz average, I will drop your two lowest scores and weight the remaining quizzes evenly. There will be no makeup quizzes so be sure to use your two "free skips" carefully. Quizzes will not be returned and answers will not be posted, but your TA will be happy to go over your quiz with you in office hours if you wish.

Exams:

There will be two 70-minute in-class midterm exams and a 2-hour final exam during the exam period. Each midterm is worth 20% and the final is worth 40% of your grade. Neither midterm is comprehensive, but the final is: it will focus on the final third of the course but also include several questions on earlier material. There will be no makeup midterms: if you miss one midterm, your final exam will be worth 60% to compensate; if you miss two midterms, it will be worth 80%. The makeup final will take place at the beginning of next semester and is outside of the instructor's control: eligibility as well as the time and date are determined by the Department of Economics. Cheat sheets are not permitted on exams. Scientific calculators are allowed but graphing calculators are not. You may write in pencil or pen on your exam as it will be photocopied before being returned to you. We will check ID cards at each exam. Also, please note that it is not advisable to make early flight arrangements before knowing when your final exam will be held. Accommodation for sudden emergencies should be discussed with and will be determined by the Undergraduate Chair.

Regrade Requests:

Exam regrade requests must be made in writing within a week of receiving your graded exam. As we regrade the entire exam, your score could rise or fall. You may not discuss your answers with the TA or the instructor before submitting a regrade request.

Course Schedule (Tentative)

Date	Day	Lecture	Quiz
Jan. 16	Thu	Introduction	
Jan. 21	Tue	Summary Statistics I	
Jan. 23	Thu	Summary Statistics II	
Jan. 28	Tue	Basic Probability I	Q1
Jan. 30	Thu	Basic Probability II	
Feb. 04	Tue	Basic Probability III	
Feb. 06	Thu	Discrete RVs I	Q2
Feb. 11	Tue	Discrete RVs II	
Feb. 13	Thu	Discrete RVs III	
Feb. 18	**Tue**	**MIDTERM 1: in-class, no lecture**	
Feb. 20	Thu	Continuous RVs I	
Feb. 25	Tue	Continuous RVs II	
Feb. 27	Thu	Sampling Distributions & Estimation I	Q3
Mar. 03	Tue	Sampling Distributions & Estimation II	
Mar. 05	Thu	Reserve Lecture	Q4
Mar. 10	Tue	SPRING BREAK: no lecture	
Mar. 12	Thu	SPRING BREAK: no lecture	
Mar. 17	Tue	Confidence intervals I	
Mar. 19	Thu	Confidence intervals II	Q5
Mar. 24	Tue	Confidence intervals III	
Mar. 26	**Thu**	**MIDTERM 2: in-class, no lecture**	
Mar. 31	Tue	Hypothesis testing I	
Apr. 02	Thu	Hypothesis testing II	
Apr. 07	Tue	Hypothesis testing III	
Apr. 09	Thu	Regression I	Q6
Apr. 14	Tue	Regression II	
Apr. 16	Thu	Regression III	
Apr. 21	Tue	Reserve Lecture	Q7
Apr. 23	Thu	Applications I	
Apr. 28	Tue	Applications II	
		FINAL EXAM: to be scheduled	

See the College's Academic Calendar for important dates such as deadlines for course selection, course drop, grade type change and course withdrawal.