Statistics for Economists
Economics 103
Spring 2018

Course Instructor: Francis DiTraglia

Office: MCNB 535

Office Hours: M 2–4pm

Recitation Instructors:

	Assa Cohen	Philippe Goulet Coulombe	Gabrielle Vasey
Office:	MCNB 421	MCNB 342	MCNB 420
Office Hours:	T 6:30–8:30pm	W 1–3pm	R 1–3pm

Lecture Time and Location: TR 9-10:30AM ANNS 110

Recitations Times and Locations:

Section 201	Section 202	Section 203	Section 204	Section 205	Section 206
Philippe	Gabrielle	Philippe	Gabrielle	Assa	Assa
MCNB 285	WILL 204	MCNB 167-8	WILL 204	MCNB 285	WILL 216
M 10–11am	F 9–10am	M noon–1pm	F 10–11am	M 11am–noon	M 1–2pm

Course Website: `http://ditraglia.com/Econ103Public` At this url you can download all lecture slides, problem sets, etc. You can view your grades and log-on to the course discussion forum, Piazza, at `https://canvas.upenn.edu`.

Email Policy: Please direct all written communication concerning Econ 103 to the course discussion forum – Piazza – rather than to the instructors' personal email accounts. For personal issues, use Piazza's private messaging feature to communicate directly with the course instructors.

Course Description: This course will teach you how to learn from data and understand uncertainty using the ideas of probability theory and statistics. After completing this course you will be able to carry out simple statistical analyses of your own using the computer package R.

Prerequisites: The prerequisites for this course are Math 104 followed by 114 or 115.

Required Text: The textbook for this course is *Introductory Statistics for Business and Economics*, 4th Edition by Thomas H. and Ronald J. Wonnacott (WW4). The price in the bookstore is outrageous; buy a used copy on Amazon instead. I will list suggested readings on Piazza each week during the semester. Any readings that do not come from the text will be downloadable from Piazza. While I strongly encourage you to complete the reading assignments, my lecture slides are the final authority on course material.

Required Software: We will use the statistical package R via a front-end called RStudio throughout the course. Both R and RStudio are free and open source. Installation instructions appear on the last page of this syllabus. RStudio is also available in the Undergraduate Data Analysis Lab (UDAL) in McNeil rooms 104 and 108–9. You will be taught to use R in lecture, recitations, and through as series of tutorials that I will assign as homework. (See "Homework" below.) Additional R resources are listed on the last page of this syllabus.

Recommended Texts: I recommend two texts for students who need extra help with the course material. First is the *Student Workbook to accompany Introductory Statistics for Business and Economics 4th Edition*. Used copies are available on Amazon. The workbook contains fully worked out solutions to all odd-numbered problems from the textbook along with additional practice problems and solutions. If you're having trouble with R and prefer a printed book to the free online resources listed below, I suggest consulting *The R Student Companion* by Brian Dennis.

Departmental Course Policies: All Economics Department course policies are in force in Econ 103 even if not explicitly listed on this syllabus. See: `http://economics.sas.upenn.edu/undergraduate-program/course-information/guidelines/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 identification cards at exams so please to bring yours.

Piazza: We will be using an online discussion forum called Piazza, accessible via Canvas, for all written communication in this course. We will use Piazza to make course announcements, answer questions about course material and respond to private messages from individual students regarding personal issues. By asking your question and getting an answer on Piazza, you create a positive externality: other students benefit from your questions and you benefit from theirs. You can even post anonymously if asking questions publicly makes you uncomfortable. The instructor and RIs will actively moderate Piazza both to answer questions and approve (or correct) answers written by your fellow-students. We will award extra credit for constructive questions, answers, and notes that you post on Piazza, even if you post anonymously. See below under "Extra Credit" for details. As mentioned above under "Email Policy," all written communication for Econ 103 should be directed to Piazza, not to the instructors' personal email accounts.

Homework: I will post homework assignments on Piazza each week during 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 will to homework problems will be provided. Be sure to use these responsibly: you gain nothing by merely reading the answers. As an extra incentive to keep up with the homework, one problem from each exam (including midterms and finals) will be taken directly from your assigned homework for the relevant portion of the course.

Assignments and Grading

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

Overall Score = (30% × Quizzes) + (20% × Midterm 1) + (20% × Midterm 2) + (30% × Final).

You can earn extra credit worth up to 5% of your course grade: see "Extra Credit" for details.

Course Curve: If necessary, I will curve overall course scores (*not* individual assignments) so that approximately 30% fall in the A-range, 40-50% fall in the B-range, and the bulk of the remaining 20-30% fall in the C-range. I reserve grades below a C-minus for those cases in which a student fails to attain a minimum level of basic competence in statistics, an absolute rather than relative standard. If you are in danger of failing to meet this minimum standard, you will receive a course problem notice. I will only curve the course in your favor, so the most stringent possible grade boundaries are: A-range = 90-100, B-range = 80-89, C-range = 70-79, D-range = 60-69. (In this case, the top two points of each range would be a "plus" and the bottom two points a "minus.")

Quizzes: There will be ten short, in-class quizzes over the course of the semester. For dates, see the semester calendar on the last page of this document. 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 three lowest scores and weight the remaining quizzes evenly.

There will be no makeup quizzes so be sure to use your three "free skips" carefully. Quizzes will not be returned and answers will not be posted but, your RI 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. Dates appear on the semester calendar on the last page of this document. Each midterm is worth 20% and the final is worth 30% of your grade. Neither midterm is comprehensive, but the final is: it will focus on the final third of the course but include several questions on earlier material. To give you a sense of the style and level of difficulty to expect, I have posted all of my past exams with full solutions on the course website. There will be no makeup midterms: if you miss one midterm, your final exam will be worth 50% to compensate; if you miss two midterms, it will be worth 70%. 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 Economics Department. 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.

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

Extra Credit: You can earn extra credit worth up to 5% of your course grade for active in-class and online participation. Participation will be added to your overall course score after averaging all course assignments. For example, if your overall weighted average on exams and quizzes is 83%, your final score after factoring in extra credit will be between 83% and 88%, depending on how much extra credit you earn. Extra credit will be awarded for constructive questions, answers, and notes on Piazza, as well as for attendance and participation in in-class polls and activities. This includes both lectures and recitations. Even if you post anonymously on Piazza, we can still award you extra credit for online participation. Extra credit is discretionary and will calculated at the end of the semester by the course instructor in consultation with your RI. As such, there is no precise formula that we can provide you in advance.

Installing R and RStudio

First, download and install R from `http://cran.r-project.org/`. Second, download and install RStudio by visiting `http://rstudio.org/download/desktop` and clicking the link listed under "Recommended for Your System." If you have trouble, ask your RI or the instructor for help in office hours. Here are links to some additional free resources to help you learn R:

- `http://cran.r-project.org/other-docs.html`

- `http://www.twotorials.com/`

- `http://www.r-bloggers.com/google-developers-r-programming-video-lectures/`

- `http://cran.r-project.org/doc/contrib/Farnsworth-EconometricsInR.pdf`

- `http://www.ats.ucla.edu/stat/R/`

TUESDAY	THURSDAY
Jan 9th **Winter Break – No Lecture**	11th **1** Introduction *No Recitations 1/12 or 1/15*
16th **2** Summary Statistics I	18th **R/RStudio Clinic instead of Lecture**
23rd **3** Summary Statistics II **Quiz #1**	25th **4** Regression I
30th **5** Basic Probability I **Quiz #2**	Feb 1st **6** Basic Probability II
6th **7** Basic Probability III / Discrete RVs I **Quiz #3**	8th **8** Discrete RVs II
13th **Midterm I** – Material through Feb. 8th	15th **9** Discrete RVs III
20th **10** Discrete RVs IV **Quiz #4**	22nd **11** Continuous RVs I
27th **12** Continuous RVs II **Quiz #5**	Mar 1st **13** Sampling Dists. & Estimation I
6th **Spring Break – No Lecture**	8th **Spring Break – No Lecture**
13th **14** Sampling Dists. & Estimation II **Quiz #6**	15th **15** Confidence Intervals I
20th **16** Confidence Intervals II **Quiz #7**	22nd **17** Confidence Intervals III
27th **Midterm II** – Material through March 22nd	29th **18** Hypothesis Testing I
Apr 3rd **19** Hypothesis Testing II **Quiz #8**	5th **20** Hypothesis Testing III
10th **21** Statistical Power **Quiz #9**	12th **22** Regression II
17th **23** Regression III **Quiz #10**	19th **24** Additional Topics TBA
24th **Final Review Session instead of Lecture**	26th **Reading Day – No Lecture**