Statistics for Economists
Economics 103
Fall 2015

Course Instructor: Francis DiTraglia

Recitation Instructors: Matt Cook, Rossa O'Keeffe-O'Donovan, Rodrigo Azuero-Melo

Office Hours: *For times and locations, see the semester calendar on the course website.*

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

Course Email: Please direct all email related to this course to `econ103penn@gmail.com` rather than your instructor or RI's personal account. Email is reserved for *personal issues only.* Please direct all questions concerning course material or logistics to the course discussion board, Piazza.

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. To help you determine if this course is right for you we will administer a short math quiz early in the semester. Although it will not count towards your grade, you must pass this quiz to be allowed to take the first midterm. You may re-take the math quiz as many times as necessary until you pass.

Lecture Recordings: Audio and screen captures of all lectures will be automatically recorded and posted on Canvas. This is a great way to get caught up if you miss a lecture.

Required Text: The textbook for this course is *Introductory Statistics for Business and Economics*, 4^{th} Edition by Thomas H. and Ronald J. Wonnacott (WW4). If you purchased your copy from the Penn bookstore, you got ripped off! Return it and get a cheap used copy on Amazon. The document "Recommended Readings" on the course website provides reading assignments to accompany each lecture. While I strongly suggest that you complete the assigned readings, my lecture slides, which will be posted online after each lecture, are the final authority on course material. 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 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 primarily through a 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* 4^{th} *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 failure for the course. Because it will be used to determine your class participation grade, operating a clicker on behalf of another student is cheating. If you are discovered using a clicker other than your own or have votes in a class that you did not attend, you will face the penalties described above. We will check identification cards at exams so please be sure to bring yours.

Piazza: We will be using an online discussion forum called Piazza for this course, which you can access directly from Canvas. Piazza is where we will make course announcements and answer questions about course material and logistics. 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. The instructor and RIs will actively moderate Piazza both to answer questions and approve (or correct) answers written by your fellow-students. As an incentive, I will award "free points" worth 5% of your grade for making active use of the forum. See "Participation" below for more details.

Attendance: Regularly attending lectures is the only way to earn clicker participation points. As described above under "Required Technology" you will *automatically* be excused from clicker participation for four lectures, but there will be no further exemptions of any kind. Similarly, regularly attending recitations is the only way to avoid a string of zeros on the quizzes (see "Quizzes" below). I will drop your two lowest quiz grades, including absences.

Recitation Sections: To ensure that you will be permitted to take the quiz, you *must* attend the recitation section for which you have registered. Seating is extremely limited in some of the recitation classrooms and there is unfortunately very little that the instructor or RIs can do about this. In particular, we cannot create additional spaces in recitation sections that have filled.

Assignments and Grading

$$\text{Final Grade} = (5\% \times \text{Clicker Participation}) + (5\% \times \text{Piazza Participation}) + (20\% \times \text{Quizzes}) + (20\% \times \text{Midterm 1}) + (20\% \times \text{Midterm 2}) + (30\% \times \text{Final})$$

If necessary, I will curve final course grades (*not* individual assignments) so that approximately 20-30% fall in the A-range, 40-50% fall in the B-range, and the bulk of the remaining 20-40% 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".)

Clicker Participation: Each lecture will feature activities in which you can earn participation credit by voting with your clicker. If you attend a given lecture and participate in the majority of the clicker activities, you will be counted as "present." If you are "present" at at least 80% of the semester's lectures, I will award you 100% for clicker participation; otherwise I will deduct points proportionally. Hence, you are *automatically* excused from two full weeks of lectures. This includes absences and forgotten or malfunctioning clickers. There will be no further exceptions.

Piazza Participation: You will earn further participation credit based on the frequency and quality of your contributions on Piazza, including questions, answers, and follow-ups. If you participate actively, you will receive 100%: these are essentially "free points." You *must* contribute to earn points, but spamming the boards with unhelpful contributions will not gain you credit. Simply *reading* posts on Piazza is not sufficient to earn participation points: you *must* contribute.

Homework: I have posted a number of problem sets and R Tutorials (with full solutions) on the course website. Throughout the semester I will update the course calendar with "due dates" for these assignments. Although homework will neither be collected nor graded, you should aim to complete each assignment by my suggested due date. Unless you keep up with the course assignments, it will be impossible for you to do well on the exams and your course grade will suffer. Be sure to use the solution keys responsibly: you gain nothing by simply reading them.

Quizzes: Your RIs will administer a number of short quizzes in recitation over the course of the semester: dates appear on the semester calendar on the course website. Each quiz will cover basic 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. No makeup quizzes will be given so use your two "free skips" carefully. Quizzes will not be returned and answers will not be posted but the RI's will go over each quiz in recitation.

Exams: There will be two 70-minute in-class midterm exams and a 2-hour final exam during the exam period. Dates, times and locations will appear on the semester calendar on the course website. Each midterm is worth 20% and the final is worth 30% of your grade. Neither midterm is comprehensive, but the final is: it will focuse 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. Attendance at all exams is *mandatory* and there will be no makeup midterms. In exceptional circumstances, e.g. a death in the family or a serious documented illness, please contact the instructor in advance via the course email address. 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. 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. Exams will be photocopied before being returned and you may write in pencil or pen. Scientific calculators are permitted but graphing calculators are not. We will check ID cards at each exam.

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."

Additional R Resources

While not required, these references may be useful if you need some extra help learning R, or want to go beyond the material covered in the course.

- Contributed Documentation – Comprehensive R Archive Network (CRAN)
  `http://cran.r-project.org/other-docs.html`

  Comprehensive list of freely available reference material for R.

- R Twotorials – Anthony Damico
  `http://www.twotorials.com/`

  Ninety energetic, two-minute video tutorials on statistical programming with R.

- Google Developers R Programming Video Lectures
  `http://www.r-bloggers.com/google-developers-r-programming-video-lectures/`

  R Programming video tutorials from beginning to advanced.

- Econometrics in R – Grant Farnsworth
  `http://cran.r-project.org/doc/contrib/Farnsworth-EconometricsInR.pdf`

  If you'd like to keep using R in Econ 104, this is what you should read.

- Resources to help you learn R – UCLA Academic Technology Services
  `http://www.ats.ucla.edu/stat/R/`

  A wealth of information about R, conveniently arranged in one place.

- R in a Nutshell – Adler
  `http://proquestcombo.safaribooksonline.com/book/programming/r/9781449377502`

  Electronic version of the book of the same name published by O'Reilly (Accessible on the UPenn Network). Provides a comprehensive reference guide to R.

- R-bloggers
  `http://www.r-bloggers.com`

  A blog aggregator for R news and tutorials, with lots of applications.