ECON 103 - Statistics for Economists
Summer 2017

GENERAL INFORMATION

Instructor: Minsu Chang

Class Times: MTWRF 9:00-10:45 am, McNeil room 103

Office Hours: These will be two days a week, 10:45-11:45 am, McNeil room 363.

Course Website: Canvas page at `https://canvas.upenn.edu/courses/1359925`

Email Policy: Please direct all written communication concerning Econ 103 to the course Canvas page rather than to the instructor's personal email accounts.

COURSE DESCRIPTION AND PREREQUISITES

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

TEXTBOOK AND SOFTWARE

Required Text: The textbook for this course is *Introductory Statistics for Business and Economics*, 4$^{\text{th}}$ Edition by Thomas H. and Ronald J. Wonnacott (WW4). This book is ancient, so cheap used copies are plentiful. While I suggest that you complete the assigned readings, my lecture slides, which will be posted online at the start of each week, 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 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 through a series of tutorials that I will post. Additional R resources are listed on the last page of this syllabus.

Recommended Texts: I will not use these explicitly, but in the past instructors have recommended two supplementary texts for students who feel they may need extra help with the course material. First is the *Student Workbook to accompany Introductory Statistics for Business and Economics 4$^{\text{th}}$ 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.

GRADING

Two Options:

$$\text{Overall Score} = (20\% \times \text{Quizzes}) + (40\% \times \text{Midterm}) + (40\% \times \text{Final})$$

OR

$$\text{Overall Score} = (10\% \times \text{Participation}) + (10\% \times \text{Homeworks})$$
$$+(20\% \times \text{Quizzes}) + (30\% \times \text{Midterm}) + (30\% \times \text{Final})$$

After the first week of class, I will ask each of you whether or not you want to opt out of your participation and homework contributing towards your final grade. In the past, we have had some students state that they would prefer to be judged only on their performance in tests, as their learning style does not favor daily homework assignments and regular participation. However, I encourage you to include your homework and participation grades in your final grade for two reasons. First, these categories will be the easiest ones in which to score close to 100%. Second, to do well in ECON 103 requires consistent work every day, to make sure you are keeping up with the material and are practicing solving questions. By including participation and homeworks in your final grade, you are committing yourself to keeping up with the material. I will not curve grades in this class.

Participation: Each lecture will feature activities in which you can earn participation credit through in-class discussion. You will earn further participation credit based on the frequency and quality of your contributions on Canvas, including questions, answers, and follow-ups. If your attendance is high, and you participate actively in class and online, you will receive 100%: these are essentially free points. However, spamming Canvas with unhelpful contributions will not gain you credit. Simply reading posts on Canvas is not sufficient to earn participation points: you must contribute through questions, answers, and follow-ups.

Homeworks and R tutorials: There will be a series of short daily homeworks, to make sure you are keeping up with the material and know how to solve problems. I will set a few questions related to the material covered each day (except for Thursday, when you should prepare for the quiz on Friday). We will go through some of these the next day in class, after the lecture.

There will also be weekly R Tutorials (with full solutions and code) posted on Canvas. R material will account for approximately 25% of the points available on each midterm and final, as well as occasional questions on the quizzes. It is therefore very important that you keep up with the R material by completing these tutorials, though I will not collect these assignments.

You can opt for your homeworks (excluding R tutorials) to count for 10% of your final grade, and if you do, you should submit your answers to questions from that week each Thursday. I will not be able to grade these all in detail, so as long as you have made good, honest attempts to solve the majority of questions, you will receive full marks on the homeworks. Regardless of whether you opt for these to count towards your grade, you should aim to complete the homework every day. You may work in groups for these problems, if this helps you. If you work in groups and use the solution keys, do so responsibly: you gain nothing by simply copying others or reading the solutions before you have made a good attempt at the problem.

Quizzes: There will be 5 weekly quizzes, administered at the beginning of class every Friday. Each quiz will cover basic material from the classes that week, since the last quiz. When calculating your quiz average, I will drop your lowest score and weight the remaining quizzes evenly. No makeup quizzes will be given. Quizzes will not be returned and answers will not be posted but I will go over the solutions in class.

Exams: There will be one 90-minute in-class midterm and a 90 minute final in the last class. Dates for these can be found in the course calendar below. The midterm and final are weighted equally for your final grade. The midterm covers material up to Lecture 9, but the final is comprehensive: it will focus on the second half of the course but include several questions on earlier material. Attendance at all exams is mandatory. In exceptional circumstances, e.g. a death in the family or a documented illness, please let me know in advance. Exam regrade requests must be made within three days of receiving your graded exam. As I re-grade the entire exam, your score could rise or fall. Exams will be photocopied before being returned and you may write in pencil or pen. Scientific calculators are permitted, graphing calculators are not.

<div align="center">TENTATIVE SCHEDULE</div>

Day	Date	Lecture	OH	Quiz	Exam	R tutorial
Mon	22-May	1: Descriptive Stats & Graphics I				
Tue	23-May	2: Description Stats & Graphics II				Try R
Wed	24-May	3: Description Stats & Graphics III	Yes			
Thu	25-May	4: Basic Probability I	Yes			1
Fri	26-May	5: Basic Probability II		Quiz 1 (L1-4)		
Mon	29-May	No Class (Memorial Day)				
Tue	30-May	6: Basic Probability III				
Wed	31-May	7: Discrete Random Variables I	Yes			
Thu	1-Jun	8: Discrete Random Variables II				
Fri	2-Jun	9: Discrete Random Variables III	Yes	Quiz 2 (L5-8)		2
Mon	5-Jun				Midterm	
Tue	6-Jun	10: Continuous Random Variables I				
Wed	7-Jun	11: Continuous Random Variables II	Yes			
Thu	8-Jun	12: Continuous Random Variables III	Yes			
Fri	9-Jun	13: Sampling Distributions I		Quiz 3 (L9-L12)		3
Mon	12-Jun	14: Sampling Distributions II				
Tue	13-Jun	15: Confidence Intervals I				
Wed	14-Jun	16: Confidence Intervals II	Yes			
Thu	15-Jun	No Class				
Fri	16-Jun	17: Confidence Intervals III	Yes	Quiz 4 (L13-16)		4
Mon	19-Jun	18: Confidence Intervals IV				
Tue	20-Jun	19: Hypothesis Testing I				
Wed	21-Jun	20: Hypothesis Testing II	Yes			
Thu	22-Jun	21: Hypothesis Testing III	Yes			
Fri	23-Jun	22: Hypothesis Testing IV		Quiz 5 (L17-21)		5
Mon	26-Jun	23: Introduction to Regression				
Tue	27-Jun	24: Review	Yes			
Wed	28-Jun				Final	

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." 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/`