RES-EC 212
Introductory Statistics for Social Sciences
Spring 2016

Jung Hwan Koh∗

Lecture Hours: Tu/Thru 1am ~2:15pm
Location: Emerson # 140

Office Hours: Mon. 1~3pm or by appointment (Tentative)
Office Location: Stockbridge #410

1. Overview / Objectives

This course is designed as the first of a two-course sequence in the Department of Resource Economics. When completing this course, you are expected to:

• have a working understanding of the methods and skills used to organize, play, and summarize data;

• conduct meaningful analysis and draw inferences from the data.

As an introductory course, the knowledge and skills learned in this course can be used in your day-to-day decision making.

2. Course Expectation

We will cover a lot of topics that might not be familiar in a short period of time. Topics and materials you will see at each class is based on an assumption that you already understand previously discussed topics. You might not understand current topics without knowledge of previous ones. Even though I will review previous topics at the beginning of each class, I recommend that you review topics and materials in accordance with class progress.

Since majority of topics are cumulative, attending all classes is very important as well as mandatory. I expect everyone to be at class on time. Thus, I can start and finish classes on time, so we can use class time more efficiently. It would be helpful for those who take another courses next to this course. In addition, I want you to wait for the class to be formally dismissed before you start to pack up your things or get up to leave.

I understand that everyone has his/her own pace of learning new topics and subjects. If you don’t understand topics, you should talk with me. I will do my best to meet you if my schedule is allowed. If you have any questions,

∗jkoh@resecon.umass.edu / I will try to reply all your emails within 24 hours.
even during classes or outside of classes, don’t hesitate ask or contact me. Also, we will do in-class exercises requiring math calculation. **Don’t forget to bring a calculator to classes.**

During the class, I expect you to **be courteous to your classmates and me.** If not, I may ask you to leave the class room. In addition, cell phones are not allowed during the class period. If you use your phone for any reason, you may be panelized.

3. **Prerequisites**

Knowledge of high school algebra. You must have access to a personal computer and reliable access on the Internet. You will be assigned online-exercises.

4. **Course Textbook and Required Materials**

4.1 **Textbook**

- **Applied Statistics in Business & Economics**, Volume 1, Doane & Seward, 4th Edition with ConnectPlus access: If you buy a used copy of this book you may also need to buy access to Connect separately. The book is available at the bookstore.
  
  – Publisher Online (McGraw-Hill): Book, Minitab software & Connect code at $61.50 + shipping as of 01/14/16
  – Amazon: Book, Minitab software & Connect code at $69.41 as of 01/14/16

- **Warning!!** Don’t open your textbook seal until you are certain that you will take this class.

4.2 **Software / Laptop**

- **Microsoft Excel**: You will be asked to do several in-class exercises and assignments to sort and analyze data. Excel, a basic but powerful tool for data analysis, will be used for those exercises and assignments. Mac version of Excel has limited functions, but many of the students use Mac. For in-class works or post-lab assignments, we will use Mac version of Excel.

- **Laptop**: A laptop will be required for in-class works. I will let you know when you need your own laptop.

4.3 **Calculators** You do not need fancy calculators with graphic features and text sorting functions. Those will also not be allowed for your exams. I recommend **calculators which have memory buttons and do square roots, factories, and other basic calculation**. **TI-30** or equivalents have enough features for this course (I have used different types of calculators, such as TI-30 and CASIO fx-115. These work well for this course. Both are under $20). In addition, you cannot use cell-phones as calculators during the exams.
5. Course Website

**Moodle**  All lecture materials, such as lecture slides, and assignments as well as announcements will be posted on the Moodle.

**Connet** Pre-lecture quizzes, assignments, some of quizzes will be assigned via Connect. Make sure that the textbook package comes with an access code for Connect.

6. Grading System and Policies

<table>
<thead>
<tr>
<th></th>
<th>% of Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance &amp; Class Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Pre-Lecture Quizzes (on Connect)</td>
<td>5%</td>
</tr>
<tr>
<td>Assignment (on Connect)</td>
<td>10%</td>
</tr>
<tr>
<td>Quizzes (on Connect or in-class)</td>
<td>10%</td>
</tr>
<tr>
<td>In-Class Work / Post-Lab</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm 1</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>15%</td>
</tr>
<tr>
<td>Final</td>
<td>20%</td>
</tr>
</tbody>
</table>

6.1 Attendance and Class Participation  Attending classes is important since what you learn from this course is cumulative. If you miss a class, it will make it difficult to catch up or understand. **Two absences will be excused, if you have proper excuses for absence; you should submit evidences of your excuses, such as doctor’s notes and other materials.** In addition, it is your responsibility to get necessary material for any classes you miss. In addition, class participation is highly encouraged. Unlike other courses, this course has only 30 students. More chances to speak up and ask questions will be provided during the class period. The combined of attendance and class participation will account for 10% of your course grades.

6.2 Pre-Lecture Quizzes (on Connect) Pre-Lecture Quizzes will be assigned through the Connect. **There will be a pre-lecture quiz before each class on Connect.** This helps you to preview class material before classes. **It is due the beginning of each class.** The combined scores of all quizzes will count to 5% of your course grade. **The lowest quiz will be dropped at the end of the semester.**

6.2 Assignments and Quizzes (on Connect) There will be weekly connect assignment on Connect. **All assignments are based on the class textbook or lecture notes. Each homework should be completed by Saturday 11:30pm.** They will count to 10% of your course grade. **The lowest grade will be dropped.** You will have unlimited attempts for Connect assignment.
Quizzes will be assigned on a bi-weekly basis on Connect, or upon a chapter will be finished. These are based on completed assignment and the textbook. **Each quiz is due Saturday 11:30pm.** Unlike assignments, you will be given two attempts for quizzes. Only the highest grade will be taken. Each attempt is two hours long and the clock begins if you enter the quizzes, even if by mistake (sorry, but you should be careful!!). You may see a different sets of questions for each attempt. Quizzes are not like pre-lecture quizzes or assignments and you will not have access to feedback during the time the quiz is up. Only after the quiz has expired can you see the feedback. These restrictions are meant to make quizzes more like exams in that they measure your knowledge and your readiness for actual exams. Once the quiz has expired you can revisit them with feedback turned on to practice for the exams, but you cannot change your quiz grade.

In addition to the quizzes on Connect, there will be in-class quizzes, especially before the exam. They will be administrated during the class period. It will not take longer than 15 minutes.

### 6.3 In-Class Work / Post-Labs

Upon completing new concepts from the lectures, we will spend one class period to learn how to use data to apply the concepts. Lab assignments will be given and graded. These count to 7.5% of your course grade. **In-class works are due during the class period.** Approximately, we will have a lab session every two or three weeks. **The lowest grade will be dropped.**

To solidify the concepts, **you will complete post-lab assignments, which will be due one week after your lab session.** Please don’t consult with your class mates for this assignment, but feel free to come to me with any questions. Your combined score from these assignments will account for 7.5% of your course grade. **The lowest grade will be dropped.**

### 6.4 Exams

There are three scheduled exams. Two mid-terms will be conducted in the middle of the semester: **Feb. 23 and Mar. 31. These midterm exams will be administrated at night, outside of the class period.** Exact schedule will be announced. On the exam days, we will not have formal classes, but review session or Q&A sessions (optional). The final exam will follow the University schedule.

The format of the exams is the combination of multiple-choice questions and long calculation based questions. Practice exams will be posted on Moodle a week before the exams. Formula sheets for the exams will be provided.

### 7. RAP Component

This course is a RAP (Residential Academic Program) course. RAP courses are designed to:

1. Support students in achieving a smooth transition to college life. I will check in with the class about this periodically.
2. Ensure first year students are aware of the multitude of resources and opportunities that are available at UMass Amherst. I will introduce you to the Learning Resource Center, the Writing Center, and other resources referenced in the Student Resource Booklet.

3. Develop an awareness and appreciation for the specific skills (inquiry and analysis, problem solving, critical and creative thinking, etc.) that are found in all Gen Ed courses. I will elaborate on when and how our curriculum incorporates Gen Ed Skills and will invite you to reflect on them as well.

4. Promote the practice of thinking about, talking about, and making connections between classes and life experience in order to deepen engagement, understanding and ultimately increase the value of a college education. I will ask you to reflect on this in discussion and in writing over the semester.

5. Provide first-year students with structured guidance in the development/advancement of various skills necessary to be successful in their college experience and be prepared to be engaged members of a global community upon graduation. I will utilize material from the Student Resource Booklet to incorporate these topics as they come up in our course.

8. Additional Policies

8.1 Accommodation Policy Statement
The University of Massachusetts Amherst is committed to providing an equal educational opportunity. If you have a documented physical, psychological, or learning disability on file with Disability Services or the Center for Counseling and Psychological Health, you may be eligible for reasonable accommodation, please notify me within the first two weeks of the semesters so that we may make appropriate arrangements.

8.2 Academic Honesty and Writing
While students in this course are encouraged to share ideas and information, you are expected do your own work. The sources you use must also be properly cited. Any questions you should be placed in quotation marks, and reference with footnote that names your source.

The University has an excellent writing center staffed by very helpful people that can help you immensely in the writing process. They can be found at:

http://www.umass.edu/writingcenter/.

For tips on writing and how to properly cite sources, see the History Department’s writing resource webpages at:

http://www.umass.edu/history/research/writing_resources.html.

And always remember that I am here to help (that is my job after all). If you have any questions about the writing process or exactly what and how to
cite sources, please ask first rather than writing to get a bad grade or possibly plagiarize. You can email me, talk to me before or after class, ask in class or come to my office hours.

9. List of Topics

What is Statistics?
- Define statistics and explain some of its uses
- List reasons for students to study statistics
- State common challenges facing people using statistics
- List and explain common statistical pitfalls
- Distinguish descriptive from inferential stats

Data Collection
- Use basic terminology for describing data and samples
- Explain the distinction between numerical and categorical data
- Recognize levels of measurement in data and ways of coding data
- Recognize a Likert scale and how to use it
- Explain the difference between time series and cross-sectional data
- Use the correct terminology for samples and populations
- Explain the common sampling methods and how to implement them
- Find everyday print or electronic data sources
- Describe basic elements of survey design, survey types, and sources of error

Graphical Display
- Create a frequency distribution for a data set
- Make a histogram with appropriate bins
- Identify skewness, modes and outliers in a histogram
- Make an effective line chart using Excel
- Know the rules for effective bar charts
- Make and interpret a scatter plot using Excel
- Make simple tables in Excel
- Recognize deceptive graphing techniques
Descriptive Statistics

- Explain the concepts of central tendency, dispersion, and shape
- Use Excel to obtain descriptive statistics and visual displays
- Calculate and interpret common measures of central tendency and dispersion
- Apply the Empirical Rule and recognize outliers
- Calculate quartiles and other percentiles
- Make and interpret box plots
- Calculate and interpret a correlation coefficient
- Calculate the mean and standard deviation from grouped data
- Explain the concept of skewness

Probability

- Describe the sample space of a random experiment
- Distinguish among the three views of probability
- Apply the definitions and rules of probability
- Calculate the odds from given probabilities
- Determine when events are independent
- Apply the concepts of probability to contingency tables
- Interpret a tree diagram
- Use Bayes’ theorem to calculate conditional probabilities
- Apply counting rules to calculate possible event arrangements

Discrete Probability Distributions

- Define a discrete random variable
- Solve problems using expected value and variance
- Define probability distribution, PDF, and CDF
- Know the mean and variance of a uniform discrete model
- Find binominal probabilities using tables or Excel
Continuous Probability Distributions

- Define a continuous random variable
- Calculate uniform probabilities
- Know the form and parameters of the normal distribution
- Find the normal probability for given x using tables or Excel
- Solve for x for a given normal probability using tables or Excel
- Use the normal approximation to a binomial

Sampling Distribution and Estimation

- Define sampling error, parameter, and estimator
- Explain the desirable properties of estimators
- State the Central Limit Theorem for a mean
- Explain how sample size affects the standard error
- Construct a 90, 95, or 99 percent confidence interval for a mean and proportion
- Know when to use a T-table instead of a z-table to estimate a mean
- Calculate sample size to estimate a mean or proportion

One Sample Hypothesis Test

- Explain the difference between null and alternate hypotheses
- Define Type I error, Type II error, and power
- Formulate a null and alternate hypothesis for a mean or proportion
- Find critical values of z or t in tables
- Do a hypothesis test for a mean with known or unknown standard deviation
- Do a hypothesis test for a proportion
- Use tables or Excel to find the p-value in tests of the meaningful