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Teaching Assistants (TAs): Rachel Gilson, Jorge Lorenzo, Davis Rao, Hangyul Song, Allen Wu

Office Hours
Tuesday and Thursday from 12:00 noon to 1:00 PM. Depending on demand I will also schedule some office hours for Wednesday which will be posted to Blackboard. You do not need an appointment, just drop by. If you would like to meet outside of the posted times get in touch with me and we can schedule an appointment for a mutually agreeable time.

Class Meeting Times and Locations
All sections meet on Tuesday and Thursday in GBS 331. Section 000 meets from 8:30 to 9:45 AM, section 001 meets from 10:00 to 11:15 AM and section 002 meets from 2:30 to 3:45 PM.

GBS Course Description
Introduction to statistical analysis for managerial decision making. Introduces methods of data description, statistical inference, statistical modeling, and statistical decision theory. Methods applied to practical business problems. Hands-on computer work included.

Course Objectives
This course is about using data to make decisions. Recent years have seen an explosion of the amount of data available to managers. Making sense of that data has become an operational imperative. The tools of statistics are one of the ways managers can make sense of the data and use it to make more effective decisions.

In this course we will introduce the concepts of descriptive and inferential statistics and their use in managerial decision making. Specifically in this course we will:

- Discuss basic probability theory and its use as a basis for inferential statistics
- Develop ability in the use of Excel for statistical analysis
- Develop an understanding of how to ask and answer “what if”: types of questions that managers need to address using statistics
- Provide the basis for a number of other topics taught in the Goizueta Business School

We will address these topics both from a conceptual standpoint (what can the technique do for us, how can it help us make better decisions) and the technical standpoint (how is the technique applied, what steps need to be taken to arrive at an answer). Both of these standpoints are important and need to be understood. In particular, my experience has been that the better you know how to actually apply the techniques of statistics (and use Excel in all ways), the more valuable you will be to a potential employer. Conceptual understanding is important but you have to be able to apply your conceptual knowledge.

Course Textbook
The required text for the course is Levinson, Stephan, Krehbiel, Berenson, “Statistics for Managers” 6th ed.
Course Notes
The notes that I use for lecture will be posted to Course Documents on Blackboard. They were originally more cryptic but I filled in some material so they are somewhat more readable, but ultimately their purpose is to be just notes, not a textbook. I post them so that you can download them if you wish and use them instead of taking notes yourself. This will free you up to concentrate more on the material in class and to participate more fully in the class. You may of course take your own notes if you prefer.

Recitation Periods
These will be optional hour long sessions, scheduled for evening times and run by the TAs. They are open to all students in the three sections of this course. The schedule for these sessions will be posted to Blackboard. During each session the TA running the session will present solutions to a number of sample problems. These will not be the quiz problems but will have similarities to them. Students having trouble with the material are especially encouraged to attend these sessions.

Quizzes and Quiz Problems
There will be 6 quizzes during the semester. These quizzes will be in class and will be approximately ½ hour each. A number of possible quiz problems are identified in the course schedule at the end of this syllabus. The specific questions on each quiz will be taken from the quiz problems listed in the course schedule. Depending on their level of difficulty there may be two, three or four problems on a quiz while you can see there are many more than that listed for each quiz in the course schedule. You will not know which specific problems will be on the quiz but they will be taken from the list of possible problems. Please do not ask the TAs or me how to solve the quiz problems – since they will be on the quiz you need to figure them out yourself (my point, essentially, if that I am giving you a huge advantage by telling you what will be on the quiz, please do your part by figuring them out yourselves). You may of course ask about similar problems and I would be glad to help you with those. Also, the TAs will work on similar problems in the recitation sessions which again is another reason to attend those sessions if you are having trouble.

Notice also that there is no homework in the course. Each of you should study the way that works best for you but one suggestion would be to think of the quiz problems as homework, work out the answers as we cover the material and review them for the quiz focusing especially on how you solved them as opposed to memorization. If you did that I think you would do fine in this class.

Quiz Notes and Calculators
You are allowed to bring a 3X5 card to each of the quizzes. You may write anything you want on one side of the card and use that material in the quiz. On the other side of the card you should write only your name and the time that your section meets. The cards will be collected with the completed quizzes.

You may bring an 8 ½ X 11 sheet of paper to the final exam. You may put any information that you want on both sides of this sheet. It will not be collected.

No other notes, books or other printed material are allowed during the quizzes or the final exam.

You are allowed to use a calculator in the quizzes and the final exam but you are not allowed to share calculators. No other electronic devices including but not limited to phones, iPods, computers, tablets, etc. are allowed during quizzes or the final exam. Make sure you bring your calculator to quizzes and the final. Do not ask me to share a calculator or to use your phone as a calculator and I do not have any calculators for students to borrow.
Course Grading
Each of the 6 quizzes will be worth 10 percent of your grade. There will be a cumulative final that will be worth 25% of your grade. The remaining 15% of your grade will be based on class participation.

The final will be given at the time set by the Registrar’s office. You must take the final at the scheduled time and exceptions to this policy are exceedingly rare. In particular, having a scheduled flight home before the date of the final is not an acceptable excuse for taking the final at a time different than the date and time scheduled by the registrar, even for an international flight.

If at any point you have questions or concerns about your grade you should see me.

Challenge Questions
These are optional, extra credit questions that will be posted periodically to Blackboard. A due date will be posted with the questions and no submissions will be accepted after the due date. There will be no exceptions to this policy. As befitting a challenge, these questions will be more difficult than the quiz problems, but of course they are optional. You are not allowed to work on these questions with anyone else and the TAs will not help you with them. All work on these problems is entirely individual.

There will be no extra credit offered, other than the challenge questions.

Note on Grading
There is often more than one way to solve a problem and any correct answers solved using a sound methodology will receive full credit. Answers that are not entirely correct will receive partial credit based on the extent to which the answer is correct. **In order to receive credit, either full or partial, you need to show your work.** This is especially important if your answer is not totally correct. If you show enough work to demonstrate that you knew how to solve the problem, and your answer is correct, you will receive full credit. If your answer is not correct the grader will be looking for what parts of your answer showed insight into the problem and what parts demonstrated a sound methodology and in this case it behooves you to be as clear and complete as possible.

Class Participation
Woody Allen supposedly said “showing up is 80% of life”. It may not be 80% of class participation but clearly if you don’t show up you can’t get credit for participation. An attendance sheet will be circulated each class; it is a violation of the honor code to sign someone else in or to ask someone else to sign you in – don’t do it! Excessive absence will most definitely negatively impact your grade.

Outside of showing up, your class participation grade will be helped by positive, insightful comments and questions and will be hurt by negative or disrespectful interactions or other violations of class etiquette.

Class Etiquette: Please turn off all laptops, tablets, iPods, cell phones, pagers and similar devices while class is in session. Please be on time. Plan on staying for the entire class session. Arriving late, stepping out during class or leaving early are all disruptive to the class and inconsiderate of your fellow students and the instructor.

Class Attendance: Students are expected to attend all classes. Material may be covered in class that is not covered in depth in the book. If a student does miss class, s/he is responsible for obtaining any notes, handouts, assignment changes, or administrative notices from other students. Missing a class will not be accepted as an excuse for late assignments or for not knowing changes in the course administrative details.
**Blackboard Learn**
We will use Blackboard extensively in this course. It is your responsibility to check the course website on a frequent basis for special announcements, changes to the syllabus or other planned activities, recitation schedules, etc. If you have questions relating to the quizzes, the course material, assignments or to any of the course policies or procedures, please post them to the discussion boards in Blackboard. This allows everyone to see the question and answer. **Please do not post any questions relating to your personal situation on the discussion boards;** questions of a personal nature should be sent to me via e-mail or asked of me in person during office hours or before or after class.

**Accommodations**
Students with accommodations through the Office of Disability Services must get me their documentation ASAP so I can plan for their accommodations. It is the students’ responsibility to follow up with me about schedules, etc., for accommodations.

**Supporting videos**
The TAs will be posting videos to support the class meetings. These videos will primarily focus on the mechanics of the topics. Additionally, there are some really good supporting videos on YouTube that you can watch to help you with the basic mechanics. For descriptive statistics, basic probability, random variables, sampling, confidence intervals and regression check out Khan Academy.

**Academic Honesty**
The course is governed by the Goizueta Honor Code with which all students enrolled at Goizueta must comply. If you have any questions about your responsibilities under the honor code you should see me. I take this extremely seriously and will pursue any violation of the honor code through the university’s procedures. Students found to be in violation of the honor code will receive a course grade of XF – failure due to academic dishonesty.

**Course Schedule:**
The course schedule is shown on the next page. It is tentative and may change. Any changes will be posted to Blackboard. Every effort will be made to not change the dates of the course quizzes. Except where noted in the schedule, the quizzes will cover whatever material we have completed up to and including the class previous to the quiz.

The Readings column gives the section and chapter numbers where the material being covered can be found in the textbook. We will not cover everything in these sections or chapters and we will cover some things that are not in your textbook. The course notes, posted to Blackboard, include everything we will be covering in this course.

The quiz problems are from the textbook except for the ones that begin with \( P \) (for Professor). The Professor’s problems are listed after the course schedule.

Most of the problems from chapter 13 have an asterisk (*) next to them. These problems require you to do a regression in Excel. There are a number of questions with asterisks but they collectively refer to only three regressions – they keep using the same output and ask you to interpret different parts of the output. You should do the regressions and be prepared to answer the questions. In the quiz any required Excel regression output will be provided to you and you will only have to answer the questions concerning the output.
<table>
<thead>
<tr>
<th>Date(s)</th>
<th>Main Topics</th>
<th>Readings</th>
<th>Quiz Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/13</td>
<td>Course introduction</td>
<td>1</td>
<td>Quiz 1 Problems 1.2, 1.6, 1.8</td>
</tr>
<tr>
<td>1/15, 20</td>
<td>Basic probability</td>
<td>4.1, 4.2</td>
<td>4.5, 4.8, 4.9, 4.13, 4.15, 4.21, 4.25, 4.26, <strong>P1, P2</strong></td>
</tr>
<tr>
<td>1/22</td>
<td>Introduction to random variables, Bernoulli and binomial random variables</td>
<td>5.1, 5.3</td>
<td>5.1, 5.2, 5.23, 5.25</td>
</tr>
<tr>
<td>1/27</td>
<td>Quiz 1 (1/2 hour); Poisson random variables</td>
<td>5.4</td>
<td>Quiz 2 Problems 5.31, 5.41</td>
</tr>
<tr>
<td>1/29, 2/3, 5</td>
<td>Introduction to continuous random variables, uniform, normal and exponential random variables</td>
<td>6.1, 6.2, 6.4, 6.5</td>
<td>6.3, 6.7, 6.9, 6.23, 6.25, 6.27, 6.29, 6.31, 6.35</td>
</tr>
<tr>
<td>2/10</td>
<td>Quiz 2 (1/2 hour); Sampling</td>
<td>7.1, 7.2</td>
<td>Quiz 3 Problems 7.5, <strong>P3</strong></td>
</tr>
<tr>
<td>2/12, 17, 19</td>
<td>Sampling distributions, organizing and graphing data</td>
<td>7.3, 7.4, 7.5, 2.1, 2.5, 2.6, 2.7</td>
<td>7.19, 7.21, <strong>P4</strong>, 7.25, 7.27, 7.31, 2.5, 2.39, 2.53, 2.55, 2.62, 2.68 for part c of 2.68 also explain why</td>
</tr>
<tr>
<td>2/24</td>
<td>Quiz 3 (1/2 hour); Measures of central tendency</td>
<td>3.1, 3.4</td>
<td>Quiz 4 Problems 3.1, 3.7, 3.9, 3.11 a, b, c only, <strong>P5</strong>, 3.37, 3.40, <strong>P6, P7</strong></td>
</tr>
<tr>
<td>2/26, 3/3, 5</td>
<td>Measures of dispersion, correlation and covariance, points estimates, confidence interval for the mean (σ known)</td>
<td>3.2, 3.5, 3.35, class notes, 8.1</td>
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</tr>
<tr>
<td>3/17</td>
<td>Quiz 4 (1/2 hour - note, quiz 4 will not cover any confidence intervals); Confidence interval for the mean (σ unknown)</td>
<td>8.2</td>
<td>Quiz 5 Problems 8.5, 8.9, 8.15, 8.16, 8.17, 8.29, 8.31, 8.33, 8.37, 8.45, 9.11, 9.15, 9.21, 9.23, 9.25, 9.45, 9.47, 9.53, 9.57, <strong>P8</strong></td>
</tr>
<tr>
<td>3/31</td>
<td>Quiz 5 (1/2 hour); Begin simple regression</td>
<td>13.1, 13.2</td>
<td>Quiz 6 is the last quiz. Material after quiz 6 (i.e., multiple regression) will be covered on the final, which will be cumulative.</td>
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<td>4/2, 7, 9</td>
<td>Finish simple regression, begin multiple regression</td>
<td>Rest of Chapter 13, 6.3, 14.1</td>
<td></td>
</tr>
<tr>
<td>4/14</td>
<td>Quiz 6 (1/2 hour - note, quiz 6 will not cover multiple regression); More multiple regression</td>
<td>14.2</td>
<td></td>
</tr>
<tr>
<td>4/16, 18</td>
<td>Finish multiple regression</td>
<td>Rest of Chapter 14, 15.1</td>
<td></td>
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<tr>
<td>4/23</td>
<td>Application using most of material in course</td>
<td>15.4</td>
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Professor’s Problems

P1) The local newspaper is sending their restaurant reviewer out to review a new restaurant that specializes in fried and baked chicken. There is a 20% chance the reviewer will order fried chicken and an 80% chance the reviewer will order baked chicken. If the reviewer orders fried chicken, the probability of a good review is .8 and if the reviewer orders baked chicken the probability of a good review is .7.
   a) Draw a fully labelled probability tree for this problem.
   b) What is the probability of a good review?
   c) You know that the review was in fact good. What is the probability that the reviewer ordered fried chicken?
   d) Is what the reviewer ordered independent of whether the review was good or not?

P2) A manufacturer knows that a particular machine used in its factory is in good condition 90% of the time. When the machine is in good condition, 1% of the items it produces are defective. When the machine is not in good condition, 10% of the items produced by this machine are defective. The foreman, who does not know if the machine is in good condition or not, takes a random part produced in the current production run.
   a) Draw a fully labelled probability tree for this problem.
   b) What is the probability that the part selected by the foreman is defective?
   c) Say that the foreman inspects the part and determines that it is defective. What is the probability that the machine is in good condition?

P3) Explain the difference between sampling error and non-sampling error. What causes non-sampling error? How can you reduce sampling error?

P4) The manager of a soda bottling plant has determined that the mean amount of soda in 16-ounce bottles bottled at the plant is 16.1 ounces with a standard deviation of .2 ounces. As part of the quality control program, the manager takes a random sample of 64 bottles and calculates the sample mean.
   a) What is the sampling distribution of the mean?
   b) What is the probability that the sample mean is less than 16.05 ounces?
   c) What is the probability that the sample mean is greater than 16.075 ounces?
   d) The manager is concerned about the time and money spent taking samples of size 64. If the manager wanted to sample only 16 bottles, what advice would you give the manager?

P5) Consider the relative frequency histograms on the next page. These are the relative frequency histograms of two data sets which we will call A and B.
   a) Which is greater, the mean of the A data or the mean of the B data, and why?
   b) Which is greater, the standard deviation of the A data or the standard deviation of the B data, and why?
   c) What is the total area contained in the bars for the A relative frequency histogram?

The final part of this question does not refer to either the A or B data sets.
   d) If the standard deviation of a data set is zero, what can you say about the members of the population?
P6) Jack and Jill want to estimate the mean selling price for houses in Atlanta. They determine an appropriate sample and start collecting data. By noon they have a random sample of 50 houses. At this point Jack takes a copy of the data they have collected and goes home to take a nap. Jill, being much more industrious, keeps the data on the first 50 houses and collects data on an additional 50 randomly selected houses. Jack and Jill each will use as their estimator the sample mean from the data they have.

a) Is Jack’s estimator unbiased? Why or why not?
b) Is Jill’s estimator unbiased? Why or why not?
c) Whose estimator is better and why?
P7) The Vitamix Dog Food Company has just purchased a new mechanical packing device to fill 50 pound bags of dog food. They are concerned about the variation in the weights of the bags. They take a sample of 15 bags and get the following results, in pounds:

51.2   47.5   50.8   51.5   49.5  
51.1   51.3   50.7   46.7   49.2  
52.1   48.3   51.6   49.2   51.5  

(a) Calculate a point estimate of the population mean bag weight  
(b) Calculate a point estimate of the population variance of bag weights.

P8) Explain the difference between practical significance and statistical significance.