STAT:1030 Statistics for Business, Summer 2018

Course Web Pages: Start at http://www.stat.uiowa.edu/~jblang/s8 [not on ICON!]
[username: xxxxxxx password: xxxxxxxx]

Meetings:
- 8:30A-11:20A (lecture) MTWR, 140 SH
- 11:30A-12:25P (discussion Section A11) MTWR 30 SH or (computer lab, tba) 41 SH
- 11:30A-12:25P (discussion Section A12) MTWR 150 SH or (computer lab, tba) 41 SH

Instructors:
- Professor Joseph B. Lang, 241 SH, 335-0712, joseph-lang@uiowa.edu
- Seung Wook Kim (teaching assistant, Section A11)
- Ruida Song (teaching assistant, Section A12)

Office Hours:
- MTWR 7:30-8:20A, between lecture and discussion, or by appointment, (241 SH)
- Your teaching assistant also has regularly-scheduled office hours.

Pre-Requisites:
- MATH:1005 or equivalent

Department, College:
- Statistics and Actuarial Science, Liberal Arts and Sciences

DEO:
- Professor Joseph B. Lang, 241 SH, 335-0712, joseph-lang@uiowa.edu

Main Office:
- 241 Schaeffer Hall

Required Text:
- Textbook Companion Site: http://bcs.whfreeman.com/psbe3e/.

Popular Press Books (not required):
- Darrell Huff (1954), How To Lie with Statistics
- John Paulos (1988), Innumeracy: Mathematical Illiteracy and its Consequences
- Howard Wainer (2000), Visual Revelations
- Joel Best (2002), Damned Lies and Statistics
- Joel Best (2004), More Damned Lies and Statistics
- Howard Wainer (2005), Graphic Discovery: A Trout in the Milk and Other Adventures
- Michael Blastland and Andrew Dilnot (2009), The Numbers Game: The Commonsense Guide to Understanding
Numbers in the News, in Politics, and in Life.

- Daniel Kahneman (2011), Thinking, Fast and Slow.
- Uri Bram (2011), Thinking Statistically.
- Nate Silver (2012), The Signal and the Noise: Why So Many Predictions Fail - But Some Don't.

Course Description*:

This is an introductory business statistics course that can be divided into five primary units. Unit 1, an overture, gives a brief introduction to the main concepts that are encountered in both descriptive and inferential statistics. Unit 2 focuses on describing samples using data; that is, we graphically and numerically describe patterns and relationships in observed data. The emphasis is on the discovery and communication of patterns and associations. This unit includes a discussion of estimation, interpretation, and prediction for straight-line regression. Unit 3 focuses on data collection protocol (e.g. design of experiments and random sampling theory) and introduces probability and process distribution theory. This unit serves as the foundational link between Units 2 and Unit 4. Unit 4 covers statistical inference for evidence-based decision making; that is, we study techniques for using data (or sample distributions) to reduce uncertainty about population and process distributions. We study how observed data can be used for estimation, prediction, and hypothesis testing. We emphasize interpretation and communication of findings. The final unit, Unit 5, introduces the student to the intriguing world of paradoxes and fallacies. Whenever possible, instead of requiring memorization of formulas or doing calculations by hand, this course stresses conceptual understanding. This makes the course both more interesting and more demanding.

*This course, STAT:1030, is approved for the general education "quantitative or formal reasoning" requirement. It is also a prerequisite for ECON:2800 Statistics for Strategy Problems.

Course Objectives:

Upon successful completion of this course, the student will be able to... 1) see the importance of data for describing and comparing samples; 2) identify and avoid using deceptive graphics and numerical summaries; 3) create simple but effective and appropriate graphics and compute numerical summaries in Minitab and/or Excel; 4) understand that using data to reduce uncertainty about populations or processes depends critically on how the samples are produced--randomization and replication play vital roles, 5) understand the rudiments of estimation and prediction via regression models, 6) understand basic inferential concepts and procedures, such as risk assessment and management, margin of error, confidence intervals, and p-values, 7) recognize and understand statistical paradoxes and fallacies (e.g. association does not imply causation, Simpson's paradox, switched-conditionals fallacy, regression fallacy, sampling fallacies, gambler's fallacies, data snooping).

More generally, the successful student will learn that business, and life more generally, is about making decisions under uncertainty. Statistical methods explicitly account for the uncertainty and are, therefore, an invaluable tool for decision making. Statistics can never completely or even accurately describe a sample. In addition, a sample may not be representative of a target population or process. Therefore, arguments based on statistics are always debatable and should be scrutinized. The student will learn to NEVER say that something is proven with statistics. They will learn to intelligently read and evaluate the integrity of most research and business or media reports that include basic statistical concepts (e.g. descriptions of data, margin of error, statistical significance, association vs. causation).

Course Organization:

Lectures. The 170 minute meetings on MTWR will typically be used to work through examples and to give a running summary of the material ("the big picture"), as seen from the instructor's perspective. Students will be expected to participate in the worked examples and carry out in-class group work. We will
cover the Overture material (on-line), topics from Chapters 1-8 in the required textbook, Fallacies and Paradoxes material (on-line), and, time permitting, miscellaneous topics from Chapter 10. We will use an integrated approach that illustrates the concepts of several sections simultaneously through multi-part examples. The lectures will not be a rehashing of your required reading. Instead you will be expected to read several sections at a time with the goal of understanding the big picture BEFORE class.

**Discussion (and Computer Lab).** Among other things, the 55 minute meetings on MTWR, in 30 SH or 150 SH, will be used to continue working through examples from lecture. On occasion, you will meet in the computer lab (41 SH) to learn how to use software (e.g. Minitab and/or Excel) to describe data and carry out basic inference. Your discussion instructor will also cover examples related to the homework problems.

**Homework Exercises.** Homework problems will be assigned twice per week, and posted on the course web page. Some of these problems will come from the book and some will come from worksheets available on the course web page. The data sets for the problems are available on the course web page. By 11:30am of the due date, you will turn in your stapled homework set for grading. Your homework must include a cover sheet that is blank except for your name in the upper right corner.

**Computing.** Your discussion instructor will serve as lab monitor and help with the computers and statistical software package Minitab, version 17. Minitab is very good for simple graphics and statistical analyses; it is easy to use; and it is available through virtual desktop ([https://its.uiowa.edu/support/article/100509](https://its.uiowa.edu/support/article/100509)) and at all the instructional technology centers (ITCs) on campus.

**Exams.** There will be one midterm (Thursday, May 24) and one final exam (Friday, June 8) in this course. The exams will be closed-book. You are allowed to use two (two-sided) crib sheets for the midterm and four (two-sided) crib sheets for the final. Bring along a pencil, calculator, and scratch paper.

**Point Earning Opportunities.** Point-Earning Opportunities (PEOs) will be given on occasion; some will be pre-announced. PEOs will be in the form of in-class exercises, minute papers, personal note summaries, and attendance checks.

**Course Pace (tentative):**

- Unit 1 (Overture): Week 1
- Unit 2 (Chapters 1-2): Weeks 1-2
- Unit 3 (Chapters 3-5): Week 2-3 [Midterm Exam, **Thursday, May 24**, 11:00am-12:15pm, 140 SH]
- Unit 4 (Chapters 6-8): Weeks 3-4
- Unit 5 (Paradoxes and Fallacies): Weeks 4 [Final Exam, **Friday, June 8**, 10:00am-12:00pm, 101 Biology Building East (BBE)]

**Course-Specific Guidelines and Policies:**

**Course Web Page.** Reading assignments, announcements, homework, exam descriptions, and supplementary materials will be made available on the password-protected course web page; start at [http://www.stat.uiowa.edu/~jblang/s8](http://www.stat.uiowa.edu/~jblang/s8) [not on ICON!]. You should check the course pages daily.

**Reading Ahead.** It is vitally important that you read ahead (see the calendar page). Class meetings will at times resemble a "flipped classroom," whereby students read all the material BEFORE class and the instructor works through relevant problems and helps students work through group projects. If the material in a lecture is completely new to you, you will find it very difficult to get much out of lecture.

**Course Notes.** Presentation slides will be made available in advance, on the course web page. You must come to class with a copy of these slides; you will refer to them when working on in-class projects and
you will annotate them during presentations. (The font is large, so you can print 4-6 slides per page.)

**Effort Expectations.** My effort expectations align with the guideline adopted by the college of LAS. For each lecture hour, expect to put in about two hours of out-of-class preparation. In this 4-week session, we meet about 10 hours per week in lecture, so expect to spend about 20 hours of out-of-class preparation per week—note that about 4 of those hours will be spent in discussion section. Of course, you need to keep in mind that the '20 hours per week' is an average taken over the four weeks in the summer session. It is also an average taken over a heterogeneous collection of students and courses. Thus, effort amounts will vary. It is fair to say, however, that the more effort you put in, the more you will get out of the course.

**Calculators.** You may use any calculator type in this course. A graphing or special statistics calculator is *not* required. However, you may find it useful to have a calculator that computes one-variable statistics (mean and standard deviation) for a set of stored numbers.

**Attendance and Participation.** Students are expected to attend and participate in lecture and discussion. You will be asked many questions, and you will be strongly encouraged to ask lots of questions. If you miss a class (which is the equivalent of missing a full week of classes during the regular semester), you run the risk of missing a point-earning opportunity, which cannot be made-up.

**Working Together.** Unless instructed otherwise, you may work together on the homework problems. However, you must write up your own solutions *in your own words*. If you are personally asked to write up your own solutions and subsequently turn in material that is obviously in the same words as a fellow student, the work will be considered to be plagiarized. Plagiarism will be dealt with according to the policies of the College of Liberal Arts and Sciences and the University (see additional information at the end of this syllabus).

**Late Homework.** Unless otherwise instructed, homework is due at 11:30am. Late homework has a discrete half-life of 24 hours; that is you get 50% credit if it is handed in late, but within 24 hours of the due time; you get 25% credit for the next 24 hours, etc. Homework not handed in directly to me or the discussion instructor must be handed in to a department secretary (located in 241 SH)—it must include a hand-in time and date, and must be signed by the department secretary. (It follows that you cannot hand in homework after the main office is closed.)

**Grading Questions.** Questions about grading must be asked within 2 working days of the graded work's return.

**Electronic Etiquette.** While in the classroom, you will not be allowed to send or check text messages, send or check email, browse the web, or use a cell phone. Social networking of any kind is not allowed. Please keep cell phones in your bag/backpack. If your cell phone is visible, it will be taken from you and placed in the front of class until the period has ended.

**Grading and Components for Evaluation**

Your final score $S$ will be computed as $S = 0.35M + 0.35F + 0.25H + 0.05P$, where $M$ = percent credit on the midterm, $F$ = percent correct on final, $H$ = percent credit on homework and $P$ = participation score on a 0-100 scale. Your participation score $P$ will be made up of your percent credit on point-earning opportunities.

Letter grades (including +'s and -'s) will be awarded according to a 90-80-70-60 schedule (e.g. if $S \geq 90$ then a grade of A- or better will be awarded). Class participation will be considered when a student "falls on the borderline" between two grades. These are guaranteed cutoffs, so it is possible (but unlikely) that everyone receives an 'A.' I do, however, reserve the right to lower (but not raise) the cutoffs. Note that with this grading scheme you are not "graded on a curve," and so you are not competing with fellow students. Therefore, you are not penalized for working together to better understand concepts.
Miscellaneous

Help outside of class:

Your discussion instructor will have regular office hours. I also have regular office hours. Sometimes it is effective to ask specific questions via email.

Course web pages; start at http://www.stat.uiowa.edu/~jblang/s8.

A list of tutors is maintained by the Department of Statistics and Actuarial Science at http://www.stat.uiowa.edu/courses/tutors.html.

Campus Resources for Students
Writing Center 110 English-Philosophy Building, 335-0188, www.uiowa.edu/~writingc
Speaking Center 12 English-Philosophy Building, 335-0205, www.uiowa.edu/~rhetoric/centers/speaking
Tutor Referral Service Campus Information Center, Iowa Memorial Union, 335-3055, www.imu.uiowa.edu/cic/tutor_referral_service

Computing:

Calculator help. There are many websites that describe how to use calculators, e.g. http://mathbits.com/MathBits/TISection/Openpage.htm.

Minitab help. See your discussion instructor or google Minitab help/introduction/tutorial.

College of Liberal Arts and Sciences: Policies and Procedures
[https://clas.uiowa.edu/faculty/teaching-policies-resources-syllabus-insert (Aug 22, 2017)]

Administrative Home
The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at https://clas.uiowa.edu/students/handbook.

Electronic Communication
University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences (Operations Manual, III.15.2).

Accommodations for Disabilities
The University of Iowa is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (which includes but is not limited to mental health, attention, learning, vision, and physical or health-related conditions). A student seeking academic accommodations should first register with Student Disability Services and then meet with the course instructor privately in the instructor's office to make particular arrangements. Reasonable accommodations are established through an interactive process between the student, instructor, and SDS. See https://sds.studentlife.uiowa.edu/ for information.

Nondiscrimination in the Classroom
The University of Iowa is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward
this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University’s Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity, diversity@uiowa.edu, or visit diversity.uiowa.edu.

Academic Honesty
All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty: "I pledge to do my own academic work and to excel to the best of my abilities, upholding the IOWA Challenge. I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled (CLAS Academic Policies Handbook).

CLAS Final Examination Policies
The final examination schedule for each class is announced by the Registrar generally by the fifth week of classes. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.

Making a Suggestion or a Complaint
Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS Academic Policies Handbook).

Understanding Sexual Harassment
Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI Office of the Sexual Misconduct Response Coordinator for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather
In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the Department of Public Safety website.

*These CLAS policy and procedural statements have been summarized from the web pages of the College of Liberal Arts and Sciences and The University of Iowa Operations Manual. See also the Student Attendance and Absences Policy at https://clas.uiowa.edu/faculty/student-attendance-and-absences.

I hope you all have an enjoyable and successful summer session.

Last updated: 12/02/50342 04:00:51, Joseph B. Lang