STAT:5100 Statistical Inference I, Fall 2019

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Course Web Pages:	Start at http://www.stat.uiowa.edu/~jblang/stat5100 [not on ICON!] [username: *yyyyyyyy* password: *yyyy*]
Lecture:	10:30A-11:20A MWF 31 SH
Instructor:	Professor Joseph B. Lang, 207 SH, 335-3129, joseph-lang@uiowa.edu
Student Drop-in Hours:	M 11:20-12:20, W 9:00-10:00, 11:20-12:20, or by appointment
Pre-Requisites:	MATH:2850 and STAT:3101 or equivalent
Department, College:	Statistics and Actuarial Science, Liberal Arts and Sciences
DEO:	Professor Kung-Sik Chan, 241 SH, 335-0712, kung-sik-chan@uiowa.
Main Office:	241 Schaeffer Hall

Required Text	**Other Texts**	**Description/Objectives**	**Organization**
Pace	**Guidelines**	**Grading**	**Miscellaneous**

Required Text:

Casella, G. and Berger, R.L. (2002). *Statistical Inference*. 2nd edn. Belmont, CA: Duxbury Press.

Supplementary Texts:

DeGroot, M.H. and Schervish, M.J. (2002). *Probability and Statistics*, 3rd ed. Boston: Addison-Wesley.

Hogg, R.V. and Tanis, E.A. (1997). *Probability and Statistical Inference*, 5th ed. Upper Saddle River, NJ: Prentice Hall.

Hogg, R.V. McKean, J.W., and Craig, A.T. (2005). *Introduction to Mathematical Statistics*, 6th ed. Upper Saddle River, NJ: Pearson Prentice Hall.

Wackerly, D.D., Mendenhall, W. and Scheaffer, R.L. (1996). *Mathematical Statistics with Applications*, 5th ed. Belmont, CA: Duxbury Press.

Course Description:

This is the first course in the two-semester, masters level, probability theory/distribution theory/statistical inference sequence STAT 5100-5101. This first course covers probability and distribution theory and introductory stochastic asymptotics. We will begin with a discussion of epistemic and aleatoric probability and then proceed to cover most of the material from Chapters 1-5 of Casella and Berger (2002). A non-exhaustive list of topics covered includes the axiomatic development of probability models; the equally-likely probability model and counting rules; properties of probability functions; independence of events; conditional probability; Bayes' rule; updating epistemic probabilities; random variables (continuous, discrete, and mixed); densities and cumulative distribution functions; expectations (mean, variance, mgf, etc); useful inequalities; commonly encountered distributions (e.g. binomial, geometric, negative binomial, Poisson, multinomial, Normal, multivariate Normal, etc.); joint, marginal, and conditional distributions of multivariate random vectors; independence of sigma algebras and random variables; distributions of functions of random variables; common sampling distributions and their derivation (e.g. Student's t, F, chi-squared); large-sample stochastic asymptotics (e.g., convergence in probability, almost surely, and in distribution; weak and strong laws of large numbers; central limit theorem; convergence of mgfs; delta method; etc.). Finally, we will use computer simulation to corroborate many of the important results.

Course Objectives:

The successful student will leave this course with a basic understanding of many of the important foundational concepts in probability, distribution theory, and stochastic asymptotics. He or she will be comfortable using a wide variety of mathematical tools for solving probability, distribution theory, and asymptotic problems. And, he or she will appreciate the usefulness of the computer program R for addressing questions and for simulating to corroborate findings and to check answers.

Course Organization:

Lectures. The 50 minute meetings on MWF 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. We will cover the material from Chapter 1 through much of Chapter 5, in Casella and Berger (2002). We will not necessarily cover this material one section at a time. At times, we will use an integrated approach that illustrates the concepts of several sections through multi-part examples. It follows that you will be expected to read several sections at a time with the goal of understanding the big picture.

Homework Exercises. Homework problems will be assigned about once per week, and posted on the course web page. You will typically have one week to turn in the assigned problems. Many of the problems will be assigned during the course of working through an example in lecture. Some of these problems will come from the book, or at least they will be based on problems in the book. By 10:30am 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.

Portfolios. You are encouraged to collect all of your worked exercises (graded and un-graded) in a portfolio. Although you will not turn it in, you will find that a well-organized portfolio can be useful for preparing for exams and will be a valuable resource throughout your career.

Computing. Some of your homework will require the use of the computer. I will give sample code as needed. The freeware package R will typically be used to perform calculations, create graphics, and carry out small-scale simulation studies.

Note: R is available on the HP machines in the UNIX Computing Lab (346 SH) and most all of the ITC labs, such as the Myers Computing Lab (41 SH). It can also be downloaded from http://cran.us.r-project.org to your personal computer.

Exams. There will be two outside-class midterms (Monday, 6:30-8:30pm, Sep 30 and Monday, 6:30-8:30pm, Nov 4) and one final exam (TBA) in this course. The exams will all be closed-book. You are allowed to use one (two-sided) crib sheet for the first midterm, two for the second midterm, and three (two-sided) crib sheets for the final. Bring along a pencil, calculator, and scratch paper.

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

Course Pace (tentative):

Chapter 1...Weeks 1 through 4
Chapter 2...Weeks 4 through 7 *[Exam #1, Mon, 6:30-8:30pm, Sep 30]*
Chapter 3...Weeks 7 through 10
Chapter 4...Weeks 10 through 13 *[Exam #2, Mon, 6:30-8:30pm,, Nov 4]*
Chapter 5...Weeks 13-15 *[Final Exam, TBA]*

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/STAT5100 [not on ICON!]. You should check the course pages daily.

Reading Ahead. It is vitally important that you read ahead (see the calendar page). If the material in a lecture is completely new to you, you will find it very difficult to get much out of lecture.

Effort Expectations. My effort expectations align with the guideline adopted by the college of LAS: "*for each semester hour credit in the course, students should expect to spend two hours per week preparing for class sessions (e.g., in a three-credit-hour course, standard out-of-class preparation is six hours).*" Of course, you need to keep in mind that the '*6 hours per week*' is an average taken over the weeks in the semester. 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.

Attendance and Participation. Students are expected to attend and participate in lecture. You will be asked many questions, and you will be strongly encouraged to ask lots of questions. If you miss a class, 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 10:30am. 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 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 one week 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 $\boldsymbol{S}$ will be computed as $\boldsymbol{S} = 0.20\boldsymbol{M_1} + 0.25\boldsymbol{M_2} + 0.25\boldsymbol{F} + 0.25\boldsymbol{H} + 0.05\boldsymbol{P}$, where $\boldsymbol{M_i}$ = percent credit on midterm i, $\boldsymbol{F}$ = percent correct on final, $\boldsymbol{H}$ = percent credit on homework and $\boldsymbol{P}$ = participation score on a 0-100 scale. Your participation score $\boldsymbol{P}$ 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 $\boldsymbol{S} \geq 90$ 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:

This course has a TA who will have regular student drop-in hours and a weekly help session. I also have regular drop-in hours. Sometimes it is effective to ask specific questions via email.
Course web pages; start at http://www.stat.uiowa.edu/~jblang/STAT5100.
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

Help with R software:

SimpleR. Go to http://www.math.csi.cuny.edu/Statistics/R/simpleR/index.html (*N.B. You may have to scroll down a bit to get to the simpleR table of contents.*)

An Introduction to R, by Elizabeth Slate and Elizabeth Hill

Try this one...An Introduction to R (https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf) , by W. N. Venables, D. M. Smith and the R Core Team (accessed 1/18/19)

College of Liberal Arts and Sciences: Policies and Procedures

[https://clas.uiowa.edu/faculty/teaching-policies-resources-syllabus-insert (accessed 08/01/19)]

Administrative Home

The College of Liberal Arts and Sciences (CLAS) is the administrative home of this course and governs its add/drop deadlines, the second-grade-only option, and other policies. These policies vary by college (https://clas.uiowa.edu/students/handbook).

Absent Students

All students have the responsibility of attending class and of contributing to the learning of their peers through active participation. Students are also responsible for knowing the absence policy of their courses, which will vary by instructor. All syllabi must confirm to the UI policy related to student absences, including the Holy Day obligations policy

Accommodations for Disabilities

UI is committed to an educational experience that is accessible to all students. A student may request academic accommodations for a disability (such as mental health, attention, learning, vision, and physical or health-related condition) by registering with Student Disability Services (SDS). The student should then discuss accommodations with the course instructor (https://sds.studentlife.uiowa.edu/).

Nondiscrimination in the Classroom

UI 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).

Academic Integrity

All undergraduates enrolled in courses offered by CLAS have, in essence, agreed to the College's Code of Academic Honesty. Misconduct is reported to the College, resulting in suspension or other sanctions, with sanctions communicated with the student through the UI email address (https://clas.uiowa.edu/students/handbook/academic-fraud-honor-code).

Electronic Communication

Students are responsible for official correspondences sent to their UI email address (uiowa.edu) and must use this address for all communication within UI (Operations Manual, III.15.2).

Making a Complaint

Students with a complaint should first visit with the instructor or course supervisor and then with the departmental executive officer (DEO), also known as the Chair. Students may then bring the concern to CLAS (https://clas.uiowa.edu/students/handbook/student-rights-responsibilities).

Final Examination Policies

The final exam schedule for each semester is announced around the fifth week of classes; students are responsible for knowing the date, time, and place of a final exam. Students should not make travel plans until knowing this final exam information. No exams of any kind are allowed the week before finals (https://clas.uiowa.edu/faculty/teaching-policies-resources-examination-policies).

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 must uphold the UI mission and contribute to a safe environment that enhances learning. Incidents of sexual harassment must be reported immediately. For assistance, definitions, and the full University policy, see https://osmrc.uiowa.edu/.

I hope you all have an enjoyable and successful semester. Good luck in all of your courses.

Last updated: 12/09/51620 23:42:52, Joseph B. Lang