

## Syllabus for Stat 3202: Introduction to Statistical Inference for Data Analytics

**Instructor:** Dr. Sinnott

**Office:** 204C Cockins Hall

**Office Hours:** We 1-2pm; Th 2-3pm; and by appointment

**Office Phone:** 614-292-8110

**E-mail:** jsinnott@stat.osu.edu

**Prerequisite:** A grade of C- or better in Stat 3201: Introduction to Probability for Data Analytics

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**Lectures:** W and F 3:00-4:20pm in Pomerene Hall (PO) 0250

**Recitations:** M, either 3:00-3:55 pm or 4:10-5:05pm in PO 0155

**Credit Hours:** 4

**Course Teaching Assistant:** Your TA is either Ha Nguyen (nguyen.1833@osu.edu) or Guowei Li (li.7230@osu.edu). During recitation sessions, your TA will assist you in working through suggested problems, and she or he will work with you to perform some activities using the R software. You are also encouraged to visit office hours if you have further questions.

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**Required Text:** *Mathematical Statistics with Applications*, 7<sup>th</sup> edition, by Wackerly, Mendenhall, and Scheaffer, Brooks/Cole, Cengage Learning, 2008. An eBook for the text can be found for a reduced cost at <http://services.cengagebrain.com/course/site.html?id=3277984>.

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**Course Description and Learning Outcomes:** The course covers foundational inferential methods for learning about populations from samples, including point and interval estimation, and the formulation and testing of hypotheses. Statistical theory is introduced to justify the approaches. The course emphasizes challenges that arise when applying classical ideas to big-data, partially through the use of computational and simulation techniques.

Upon successful completion of the course, students will be able to

1. Describe the role of a parameter in a statistical model and its relationship to observed data
  2. Use data to estimate and describe uncertainty about the parameters of a statistical model
  3. Translate scientific hypotheses about a population into mathematical statements about parameters in a statistical model
  4. Formulate statistical procedures to test a hypothesis about parameters in a statistical model, and interpret the results in both statistical and application-specific terms
  5. Explain the difference between statistical and practical significance in massive data settings
  6. Appreciate the effect of missing data on statistical inference
  7. Evaluate and compare different statistical procedures for answering the same question
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**Course attendance policy:** You are expected to attend all lectures and recitations. Formal attendance records will not be kept; however, students are responsible for all material covered in class.

**Homework:** We plan for there to be a total of 10 homework assignments, one for each topic of the course. The lowest two homework scores will be dropped from the recorded grades. Except for the first week, homework will occur regularly during any week there is not an exam or project presentations. Grading will be based on a combination of completion, correctness, and presentation. For full credit, final answers must be appropriately justified. Homework will account for 20% of the overall grade.

**Lab:** Lab exercises using the R software will be carried out in approximately half of the recitation sessions. These lab exercises will be turned in via Carmen, and will together account for 10% of the overall grade.

**Projects:** There will be two data analysis projects, which will be completed in groups of 4-5 students. Each group will be provided with a data set and several questions related to it. The first project will focus on modeling and parameter estimation; the second project will focus on applying and extending the statistical methods learned in class. Students will present their work in class (10 minute presentations) and also submit a write-up of their results (approximately 3 pages of text, plus any additional figures and tables). Each project will be worth 10% of the overall grade.

**Exams:** There will be two in-class exams and a final exam. Statistical tables will be provided as needed. Calculators may be used on the exams, but the calculators on cell phones, PDAs, or any other communication device are NOT allowed. Like homework, you need to show your justification for or work on each quiz or exam problem to receive full credit. You may use one 8.5 x 11 inch sheet of paper (both sides), with whatever facts, formulas, or explanations you find helpful, for each exam. Each midterm will be worth 15% of the overall grade. The final exam will be worth 20% of the overall grade.

**Final Grade:** Your final course grade will be based on the following weighting of assessment components:

Homework – 20%	Projects (2) – 10% each
Midterm exams (2) – 15% each	Lab grade - 10%
Final exam – 20%	

Effort, class attendance, and class participation will be taken into account in borderline cases.

**Grading Scale:** The following grading scale will be used:

>90%	A/A-
80-90%	B-/B/B+
70-80%	C-/C/C+
60-70%	D/D+
<60%	E

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**Website:** The course website will be available at <http://www.carmen.osu.edu>. Check the website periodically for announcements about the class and other class material.

**R Software:** The R (<https://www.r-project.org/>) and RStudio (<https://www.rstudio.com/>) software will be used for the lab portion of the course. This software is installed in the recitation classroom. It is free software that you can download and install on your personal machines as well. Your TA will help you learn to use R for statistical analysis during recitation, but you should also expect to put in time outside of recitation doing data analysis with R for homework.

**Data Analytics Learning Center:** Graduate teaching assistants (GTAs) for STAT 3201, 3202, 3301, 3302, 3303 and 4620 will hold their office hours in the Data Analytics Learning Center (DALC) in Pomerene 151. The hours during which the GTAs for our course will hold office hours in PO 151 will be posted soon. You can meet with the GTAs for our course in the DALC during their office hours to discuss questions you have about the course material, homework assignments, R, etc.

You are welcome to stop by the DALC when it is open even if it is not currently being staffed by the GTA for our course, e.g. if you are looking for a place to study or work on an assignment for one of the supported courses. If the DALC is staffed by a GTA for another Statistics course when you stop by, they will help you if possible, but may not be able to answer all of your questions.

A complete list of hours during which the DALC will be staffed by GTAs for Statistics Department courses can be found at <https://data-analytics.osu.edu/dalc>.

In rare situations due to last minute emergencies, the GTA assigned to the DALC may not be able to attend their office hours. If the DALC is closed when the schedule indicates it should be open, we recommend waiting for a few minutes. If no one shows up in a reasonable amount of time, please email your instructor to let us know about the problem. You can also contact your GTA to see about arranging a make-up time to meet.

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### Important Dates:

A more detailed schedule will be available on Carmen, but some important dates to keep in mind are listed here.

Item	(Due) Date
Exam 1	2/8
Project 1, Presentations	2/27 and 3/1
Project 1, Report	3/4
Exam 2	3/29
Project 2, Presentations	4/17 and 4/19
Project 2, Report	4/22
Final Exam	Thursday, 4/25 4:00-5:45pm

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## Course Policies

**Makeup exams:** If you absolutely need a makeup exam and have a valid excuse, please see me (not your recitation instructor) for the necessary arrangements. However, you must notify me in advance in such a situation. A make-up exam may be a bit harder than the regularly scheduled exam and must be taken within a week of the missed exam. Exceptions to this policy will be permitted only in extreme situations such as serious injury immediately prior to an exam or severe illness requiring hospitalization.

**Grade Disputes:** If you feel a homework, exam, lab, or project was graded incorrectly, you have one week from the date it was returned to submit to the instructor a *written* explanation of why you believe the grading was done incorrectly. Please note that by disputing any grading, you agree to allow the course staff to review the entire assignment or exam for other errors missed during grading.

**Academic Misconduct:** Please help us to maintain an academic environment of mutual respect, fair treatment, and personal growth. You are expected to produce original and independent work for exams. Although students are encouraged to work together on homework and lab assignments, all students must submit their own written work IN THEIR OWN WORDS. It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

**E-mail Correspondence:** In order to protect your privacy, all course e-mail correspondence must be done through a valid OSU name.nn account.

**Special Accommodations:** Students with disabilities (including mental health, chronic or temporary medical conditions) that have been certified by the Office of Student Life Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614-292-3307, [slds@osu.edu](mailto:slds@osu.edu); [slds.osu.edu](http://slds.osu.edu).

**Diversity:** The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.