

## Statistics 5301 (Spring 2019): Intermediate Data Analysis I

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**Professor:** Yunzhang Zhu, email: zhu.219@osu.edu

**Office Hours:** in 204B Cockins Hall

- Monday 5:00pm-6:00pm
- Wednesday 5:00pm-6:00pm
- by appointment

**Grader:** Lingfei Zhao, email: zhao.2412@osu.edu

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**Lectures:** Monday and Wednesday, 8:00am-9:50am in Page Hall 020

**Class Notes:** Copies of class notes will be available on Carmen.

**Class Attendance Policy:** You are expected to attend all lectures.

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### Course Description, Learning Goals and Objectives:

Statistics 5301 is a first course in a two-semester non-calculus sequence in data analysis covering descriptive statistics, design of experiments, probability, statistical inference, one-sample  $t$ , goodness of fit, the two sample problem, and one-way ANOVA.

**This course satisfies the General Education (GE) requirement in Data Analysis.**

**Expected Learning Outcomes:** Students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

Students in Statistics 5301 are expected to be able to identify an appropriate analysis for data collected in a study, carry out such an analysis, examine whether the assumptions behind the analysis are reasonable, and recognize the strengths or weaknesses of the study based on how the data were collected. Doing so requires understanding basic concepts in statistics and probability; the ability to create graphical and numerical summaries of data; understanding how the design of a study affects the conclusions that can be made; and the ability to carry out basic statistical analyses (by hand or using statistical software). Students will conduct analyses of data, including a discussion (in plain English) of what conclusions can be drawn.

The goal of statistics is not calculation, but gaining understanding from numbers. This means that the correct numerical answer will only receive partial credit. The remainder of the credit will be available for choosing the best method of solution and explaining why the method is appropriate. You will also need to interpret your answers in the light of the practical problem.

**Prerequisites:** The sequence is intended for students with “limited” formal mathematics background (a solid grounding in high school algebra is beneficial). However, in terms of data analysis and interpretation, the conceptual level of the course is high. While many of the students in the course are graduate students (it is a required course in many programs), it is certainly an appropriate sequence for junior and senior level undergraduates.

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**Books:** There is no required textbook for the first half of the course. You may find the book:

*Introduction to the Practice of Statistics* (5th Edition onwards)  
by D. S. Moore and G. P. McCabe [IPS]

useful, but it is optional.

For the second half of the course the required text is:

*The Statistical Sleuth: A Course in Methods of Data Analysis*, 3rd Edition  
by F. Ramsey and D. Schafer, 2012 [SS]

Note: *The Statistical Sleuth* is also required for Stat 5302.

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

Homework (including one quiz scheduled for <b>Monday, January 14</b> , in class)	20%
Midterm 1 (currently scheduled for <b>Wednesday, February 13</b> , in class)	20%
Midterm 2 (currently scheduled for <b>Wednesday, March 27</b> , in class)	25%
Final Exam (currently scheduled for <b>Thursday, April 25</b> , 8:00am-9:45am )	35%

**Exams:** There will be two in-class midterms 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. You may use one 8.5x11 inch sheet of paper (both sides), with whatever facts, formulas, or explanations you find helpful, for each exam. The final exam will be cumulative, but will emphasize the more recent material. Re-grade requests on the midterms must be submitted to the instructor in writing within one week of the day the midterms are handed back.

**Makeup exams:** If you absolutely need a makeup exam and have a valid excuse, please see me 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.

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**Homework:** There will be 10 homework assignments and one quiz that will count as a homework. Homework must be turned in during lecture on the date it is due. Homework is **not** accepted by email. Late homework is not accepted, but the lowest two homework scores will be dropped. If you are unable to come to class the day a homework assignment is due, please contact the instructor in advance. Re-grade requests on the homework problems must be submitted in writing to the course grader within one week of the day the assignments are returned. If you are missing multiple homework due to extreme situations, you may have the option (up to the approval of the instructor) of replacing the missing grades with the grade of your final exam. You are encouraged to work together on the homework, but DO NOT COPY any part of a homework. Each student must produce his/her own homework to be handed in.

Feel free to ask me for help after you have attempted the questions. The grader for the course does not have the time to provide detailed explanations on each question. To make up for this, I will try to make homework solutions detailed enough to allow you to understand how the question could be approached. Homework solutions will be available on Canvas.

**Homework preparation rules:** Put your name and the homework assignment number on the top right-hand corner of **every page**. All homework must be submitted on 8.5"x11" paper. **Staple** the pages together. We are not responsible for lost pages. Submit the problems in order, **making sure that the computer output and discussion are placed together** (do not put the computer output at the end of homework). Include both R code and output in your homework, and make it clear what parts of the output are relevant and show how they answer the questions posed in the homework. Raw computer output is NOT an acceptable answer to a homework question.

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**Computing:** This class requires you to use the statistical software package called R (<https://www.r-project.org/>). This software is free. Some students may wish instead to use RStudio (also free; <https://www.rstudio.com>).

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### Academic Misconduct

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/>.

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### Disability Statement

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu/>.