Introduction to Mathematical Statistics II

STAT 4202

Course Information

- Instructor:
  Prof. Yunzhang Zhu
  425 Cockins Hall
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- Teaching assistants:
  Fangyi Wang, Email: wang.15022@buckeyemail.osu.edu, Tutoring hours: Wednesday 12:40pm-1:35pm (Cockins Hall 122) and 4:10pm - 5:05pm (online via Zoom)
  Pin Hsun Mao, Email: mao.575@buckeyemail.osu.edu, Tutoring hours: Monday 3:00pm to 3:55pm (Cockins Hall 122)

- Prerequisites: C- or better in 4201, Math 4530, or 5530H, or permission of instructor. Not open to students with credit for 3202, 6201, 6302, or 6802.

- Lecture Time: 3:00 P.M. - 3:55 P.M., M,W,F, University Hall – Room: 014. **The instruction mode for this course will be in-person (see https://teaching.resources.osu.edu/StudentInstructionalModes). So please expect to attend most classes in person.**

- Office Hours: Monday and Wednesday 11:00 A.M. - 11:55 A.M. and by appointment (via email). My office is located at Cockins Hall 425.

- Recitations: It is required to sign up for a lab/recitation session. The TAs will help you review important concepts and do practice problems in these sessions. Quizzes will also be regularly given during the recitations. Homework assignments should be turned in at the beginning of the recitation session.

- Course website: Most course material will be available on Canvas https://carmen.osu.edu/. Please check it regularly for class announcements and class material.

Course textbook

- *John E. Freund's Mathematical Statistics with Applications (8th edition) by Irwin Miller and Marylees Miller* (reserved at OSU library, available at Amazon)

- The textbook and/or courseware for this course is being provided via CarmenBooks. Through CarmenBooks, students obtain publisher materials electronically through CarmenCanvas, saving them up to 80% per title. The fee for this material is included as part of tuition and is listed as CarmenBooks fee on your Statement of Account. In addition to cost-savings, materials provided through CarmenBooks are available immediately on or before the first day of class. You can access this eBook through the CarmenBooks reader link in the course navigation.

Course Description

This course is the second part in a series of two courses (STAT4201-STAT4202), which cover the fundamentals of mathematical statistics and statistical inference. STAT 4202 focuses on point and interval estimation, statistical tests, and regression, with rigorous mathematical treatments and various applications. A list of tentative topics is given below.

- Chapter 10: Point Estimation (3 weeks)
- Chapter 11: Interval Estimation (2 weeks)
- Chapter 12: Hypothesis Testing (2 weeks)
- Chapter 13: Hypothesis Testing Involving Means, Variances, and Proportions (3 weeks)
- Chapter 14: Regression and Correlation (2 weeks)
- Chapter 15: ANOVA (1 week)
- Chapter 16 Nonparametric Tests (1 week)
- Chapter 9 Decision Theory (1 week)

Course Learning Outcomes

By the end of this course, students should successfully be able to:

- Calculate and evaluate point estimators.
- Formulate, construct and interpret confidence intervals about parameters in a statistical model.
- Formulate statistical hypotheses, construct appropriate hypotheses tests and interpret results.
- Formulate linear regression models, fit these models and interpret the results.
- Formulate one-way ANOVA models, fit these models and interpret the results.

Homework & Quiz

Homework assignments will be posted on the course website. There will be $8-10$ homework assignments, each containing about 10 problems. Each homework will have some problems graded for accuracy and some graded for completion. You are encouraged to discuss homework problems with other students. There will be $5-7$ quizzes, each containing 1 or 2 problems. The grades of the first quiz (quiz 0) will not be counted toward to their final grades. All quizzes will be close-book/close-notes. You may bring a calculator, but cheat sheet is not allowed for quizzes. The quiz problem(s) will be similar to homework problems. For most weeks, there will be a quiz and/or a homework assignment due in recitation. Your lowest homework and quiz score will be dropped at the end of the semester, so late homework will **NOT** be accepted and **NO** makeup quizzes will be given.

Exams

All exams will be closed-book. 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 8.5 x 11 inch sheet of paper (both sides, handwritten), with whatever facts, formulas, or explanations you find helpful for both Midterms, and you may bring two such sheets for the final exam.

There will be **NO** makeup exams. The only excuses for missing an exam are a serious illness requiring hospitalization or a major family crisis. Proof must be provided in the form of an official document. A note from a family member alone is not sufficient.

You have until one week after receiving your grades on the exams to dispute the grade; the same applies to any homework/quiz grade. After that no grade will be changed for any reason. Note that when asking for a question to be re-graded, the entire assignment/exam may be re-graded. So please be aware that you may run the risk of losing more points than you gain back.

Important note: To receive full credit on homework, quizzes and exams, you need to show your justifications for all work. Answers without work will receive only partial credit.

The final exam will be cumulative, but will emphasize more on the recent material. The two midterm exams will be in the regular lecture room University Hall - Room: 014; and the location of the final exam will be posted later according to the university arrangement. The exams are **TENTATIVELY** scheduled for:

Midterm I	Wednesday, Sept. 27 (lecture time)
Midterm II	Friday, Nov. 3 (lecture time)
Final Exam	Friday, Dec. 8, 12:00pm-1:45pm

The dates for the exams are tentative and I reserve the right to change the dates; at least one week of notice will be provided in case of a change.

Evaluation

Your final grade for this course will be determined by your performance on homework, quizzes, the midterm, and the final exam. The weights for each are as follows:

Homework	20%
Quiz	20%
Midterm I	20%
Midterm II	20%
Final Exam	20%

Questions about homework and quiz grading should be directed to a teaching assistant first. Exam grading questions should be directed to the instructor.

GE Course Information

This course satisfies the General Education foundation requirement in Mathematical and Quantitative Reasoning or Data Analysis which has the following goals and expected learning outcomes:

Goals: Successful students will be able to apply quantitative or logical reasoning and/or mathematical/ statistical methods to understand and solve problems and will be able to communicate their results.

Expected Learning Outcomes (ELOs): Successful students are able to:

- Use logical, mathematical and/or statistical concepts and methods to represent real-world situations.
- Use diverse logical, mathematical and/or statistical approaches, technologies and tools to communicate about data symbolically, visually, numerically and verbally.
- Draw appropriate inferences from data based on quantitative analysis and/or logical reasoning.
- Make and evaluate important assumptions in estimation, modeling, logical argumentation and/or data analysis.
- Evaluate social and ethical implications in mathematical and quantitative reasoning.

This course also satisfies the Legacy General Education requirement in Data Analysis. which has the following goals and expected learning outcomes:

Goals: Students develop skills in drawing conclusions and critically evaluating results based on data.

Expected Learning Outcomes:

- Students understand basic concepts of statistics and probability.
- Students comprehend methods needed to analyze and critically evaluate statistical arguments.
- Students recognize the importance of statistical ideas.

Other comments

- **E-mail correspondence:** In order to protect your privacy, all course e-mail correspondence must be made through a valid OSU name.nn account. Please make sure to include "STAT 4202" in the subject line. In addition, I may not respond to questions which can be answered by looking at the syllabus or Carmen, and/or were announced in class. Please allow up to 48 hours for responses to other inquiries made via email.
- **Group tutoring:** The Mathematics and Statistics Learning Center provides group tutoring. More information can be found at https://mslc.osu.edu/tutoring/statistics-shared-off
- **Attendance:** While I will not be taking attendance, you are expected to attend every class session. If you miss class then it is your responsibility to get any and all material covered from a classmate. Arriving late or leaving early is distracting to you, your classmates, and me and will not be tolerated.
- **Calculators:** Please note that at no time will you be permitted to share a calculator with another student, use a calculator with a CAS, or use any internet enabled device (e.g., a cell phone) as a calculator.
- **Electronic devices:** Use of communication devices and technology for activities other than class work disrupt the learning process for you and others in the class and will not be tolerated. Cell phones and other electronic devices should be turned off or silenced during class.
- **Recording of Class:** Audio, video, and photographic recording of class content (e.g., lectures) is strictly prohibited without written authorization from the instructor. The transmission or dissemination of all course content onto public, commercial, or social media sites is strictly prohibited.

Academic Integrity

Although students are encouraged to work together on homework assignments, each student must submit their own written work in his or her own words. Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with University Rule (http://oaa.osu.edu/procedures).

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/).

Disability Statement

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based

on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. The Office of Student Life Disability Services is located in 098 Baker Hall, 113 W. 12th Avenue; telephone 614-292-3307; email: slds@osu.edu.

If you are isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the Safe and Healthy Buckeyes site for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Religious Accommodation Statement

It is Ohio State's policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the course begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student's responsibility to ensure that all course assignments are completed.

Statement on title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at http://titleix.osu.edu or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu.

Disclaimer

Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advanced notice.