THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

STAT 4202: Into Math Stat 2

Spring 23

Instructor:	Nasser Sadeghkhani
Email:	sadeghkhani.1@osu.edu
Days and time:	M 3:00 PM-3:55 PM @ Jennings Hall 155 and Online on WF

Office Hours: W F 4:00-5:00 pm or by appointment. My office is located at 205B Cockins Hall.

TA:

- Haotian Xie. xie.908@osu.edu
- Jae Chang. chang.2090@osu.edu

Course Description:

- This course is the second part in a series of two courses (STAT 4201-STAT 4202) which cover the fundamentals of mathematical statistics and statistical inference. STAT 4202 focuses on the statistical inference part and covers topics such as: decision theory, point estimation, hypothesis testing, regression, ANOVA and non-parametric tests.
  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. GE data course.

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.
- Construct distribution-free hypotheses testing procedures.

GE Course Information :

- This course satisfies the GE requirement in Data Analysis. The goal of the course is to help students develop skills in drawing conclusions and critically evaluating results based on data. Upon successful completion of this course students will be able to:
- Understand basic concepts of statistics and probability;
- Comprehend methods needed to analyze data and critically evaluate statistical arguments;
- Recognize the importance of statistical ideas.

Course delivery:

- This four-credit course will be delivered **in-hybrid**. On **Mondays** the classes are in-person from 3:00 PM to 3:55 PM, and the other two sessions are offered as asynchronous classes that include 45-50 minute videos that you can watch over and over again and they are usually released on Wednesdays and Fridays.
- On occasion the Monday lectures might be recorded.
- On occasion partial lectures notes will be posted on Carmen one week in advance of every session on Carmen (depending on the topics) Students are expected to fill in the blanks during the lecture and to take additional notes on the examples covered (in the class or during watching the videos).
- All the videos, and the corresponding annotations are posted every week in the Module on Carmen.

Main Reference:

- **John E. Freund's Mathematical Statistics with Applications (8th edition) by Irwin Miller and Marylees Miller.**
- The textbook for this course is being provided via CarmenBooks. Through CarmenBooks, students obtain publisher materials electronically through CarmenBooks. The fee for this material is included as part of tuition ans it listed as CarmenBooks fee on your Statement of Account.
- To access the textbook, just click on "CarmenBooks" in the menu on the left-hand side of the screen on our class Carmen page, and follow the on-screen instructors, including signing a form.

Course Requirements:

- Instructions, materials, assignments, announcements and other information will be posted to the course CarmenCanvas site.
- Students are expected to use the discussion board to ask any content questions (you are welcome to email me and the TA, but using the boards is highly encouraged instead of emailing). Furthermore, students are encouraged to answer each other's questions and to read the questions in the board before posting a new one in case their question has already been answered.
- Questions about homework and quiz grading should be directed to a teaching assistant first. Exam grading questions should be directed to the instructor.
- Students are expected to check the CarmenCanvas course site regularly, and are encouraged to customize CarmanCanvas notifications to stay abreast of course announcements and activities https://resourcecenter.odee.osu.edu/carmencanvas/setting-notification-preferences)

Evaluation:

- The evaluation will be determined based on **7** assignments and Quizzes, **two** midterm exams, and **one** final exam.

- **Assignments 15%, Quizzes 10% First Midterm 20%, Second Midterm 25%, Final 30%**
- Grades will be recorded on Carmen

Important Dates:

Assignments	Almost biweekly (on Carmen)
Quizzes	Almost biweekly (in recitation)
Midterm #1	M–Feb 13 (in class)
Midterm #2	M–Mar 27 (in class)
Final Exam	F–Apr 28, 4:00-5:45 PM

Grading Scale:

93–100	A
90–92.9	A-
87–89.9	B+
83–86.9	B
80–82.9	B-
77–79.9	C+
73–76.9	C
70 –72.9	C-
67 –69.9	D+
60 –66.9	D
Below 60	E

Assignment Policy:

- The assignments will be posted on Carmen.
- You answers must be uploaded electronically through Carmen in a single PDF file.
- Pay attention to the due date, it is usually 9-10 days after the assignment is posted. No late assignment will be accepted. Under very exceptional circumstances if you are unable to complete an assignment on time, please get in touch with me asap, so we can discuss your situation.
- You are encouraged to work together on the homework, but **do not** copy any part of a assignment.
- Each time a homework assignment is due, there will be a quiz given during the following recitation. Each quiz will consist of a single problem, taken with minor modification from the homework assignment due that day. You will be given a sufficiently large time window, but there will be a time limit for you to complete the quiz. Quizzes will be closed-note, closed-book, and are to be completed individually for each student.

Exam Policy:

- All exams are closed book/closed notes.
- You can bring one page formula sheet.
- Midterm 1 and 2 coverage will be announced prior to each exam.
- There will be **no make-up** exams. If exceptional circumstances (sudden onset of illness (doctor's note is required), unexpected family situations, etc.) arise, contact me **before the exam**, so we can discuss your situation.

Class Policy:

- **Arrive to class on time (in person classes on Mondays)**
- Be courteous when using mobile devices. Make sure your cell phone is turned fully off, or silent. No texting, reading emails, playing games, or whatever else it is that people do with those wretched gizmos.

Health and safety:

The Ohio State University Wexner Medical Center's Cornavirus Outbreak site (https://wexnermedical.osu.edu/features/coronavirus) includes the latest information about COVID-19 as well as guidance for students, faculty and staff.

Student academic services:

Student academic services offered on the OSU main campus http://advising.osu.edu/welcome.shtml.

Student support services:

Student support services offered on the OSU main campus http://ssc.osu.edu.

Ohio State's academic integrity policy:

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/.

Copyright disclaimer:

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Accessibility accommodations for students with disabilities:

- The University strives to make all learning experiences as accessible as possible. 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. SLDS contact information: slds@osu.edu; 614-292-3307; https://slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

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.

Course topics/Schedule

Below are tentative topics to be covered. Note that they are tentative and may be subject to change.

- **Jan 09:** Review and Introduction.
- **Jan 11, 13, 18:** Estimators, Bias, and MSE (10.1-10.3).
- **Jan 20, 23:** Consistency and Sufficiency (10.4-10.5)
- **Jan 25, 27, 30:** Method of Moments and Maximum Likelihood Estimation (10.7-10.8)
- **Feb 01, 03, 06, 08:** Estimation of means, proportions, and variances (11.1-11.7)
- **Feb 10:** Review for Midterm Exam 1
- **Feb 13: Midterm Exam 1**
- **Feb 15, 17, 20:** Hypothesis Testing (12.1-12.3)
- **Feb 22, 24, 27:** The Likelihood Ratio Test (12.4-12.6)
- **Mar 01, 03, 06, 08:** Tests for means, variances, and proportions (13.1-13.6)
- **Mar 10:** Tests for Independence (13.7)
- **Mar 13, 15, 17:** Spring Break
- **Mar 20:** Tests for Goodness of Fit (13.8)
- **Mar 22:** Intro to Linear Regression (14.1-14.2)
- **Mar 24:** Review for Midterm Exam 2
- **Mar 27: Midterm 2**
- **Mar 29, 31, Apr 03:** Linear Regression and Correlation (14.3-14.5)
- **Apr 07, 07, 10:** Nonparametric Tests (16.1-16.4)
- **Apr 12, 14:** Analysis of Variance (15.1-15.2)
- **Apr 17, 19, 21:** Decision Theory and Bayesian Estimation (9.1-9.6; 10.9)
- **Apr 24:** Review for Final Exam
- **Apr 28: Final exam**