

Statistics and Applications: STAT/MATH 380- Section 601

Instructor: James Clothier

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Office Hours/Open Discussion (via Zoom): T/TR- 2:00-3:30 pm, or by appointment

Lecture: Posted online routinely via UNL drop box (link on Canvas)

Required Textbook: *Probability and Statistics for Engineers and Scientists*, 9th Edition by Walpole et al.
(FREE PDF AVAILABLE THROUGH LINK ABOVE)

Prerequisites: MATH 107: Calculus II

Course Information:

The STAT 380: Statistics and Applications course is an undergraduate level course for students in the mathematics and statistics stream. It introduces probability theory topics such as random variables, their probability distributions, expected values, covariance and correlation; and statistical concepts such as sampling distributions, estimation, testing of hypothesis, and simple regression analysis. This course lays the foundation for many 400-level courses in Engineering, Mathematics and Statistics, and is also offered for Honors credit.

ACE Outcome 3:

The STAT/MATH 380 course is accredited as an Achievement Centered Education (ACE) course and satisfies ACE outcome 3: to use mathematical, computational, statistical, or formal reasoning (including reasoning based on principles of logic) to solve problems, draw inferences, and determine reasonableness. Therefore, the reinforced skill for STAT/MATH 380 is Critical Thinking.

Course Objectives:

By the end of the course, the student will be able to:

- Understand the essential theoretical concepts (and logic behind them) including common discrete and continuous probability distributions, sampling distributions and data description techniques, hypothesis testing problems, and modeling approaches.
- Recognize a classical distribution model when presented with details of an experiment, translate a research question into a logical probability statement in terms of a mass/density or cumulative probability function, perform calculations, and interpret the results.
- State a hypothesis testing problem (or estimation) for a given research question, perform the testing, construct the corresponding confidence intervals, and report statistical inferences.
- Fit a linear regression model to given data sets, estimate the regression coefficients, provide the equation of the model, interpret the relationship in words, and make predictions using the model.

Grading:

Grading for this course will be based on homework exercises, participation and 2 exams (including the final). An average of 90% will ensure an A-, 80% for a B-, 70% for a C- and 60% for a D-.

Homework exercises: 40%

Homework assignments will be posted on Canvas. Each student should submit the homework assignments independently, however, you should work with your group members. All homework assignments should be submitted before the deadline. Students are expected to compare their solutions with their group members, and to discuss their questions and concerns with the instructor. There is no makeup possible for any assignments unless prior arrangements are made with the instructor. Homework can be submitted typed, scanned, *clear pictures*, etc., but the file format should be a PDF. I will be as flexible as possible because I understand it is mostly mathematical. I reserve the right to ask for alternative submissions if I cannot interpret your work.

Participation: 10%

Because we cannot meet in class, it is important to have some mechanism to ensure everyone is participating in the course. Associated with each video will be a '*word of the video*.' This word will need to be submitted through Canvas within a few days after the video has been posted to receive credit. The other portion of participation will be awarded if you receive no problematic feedback from your groupmates.

Exams: 50%

There will be two examinations through the course of the term, including the final. All the exams are to be completed alone. A missed exam will result in a zero unless you contact me ahead of time with adequate documentation (instructor, physician, or organization note). Exams will be available to begin for a couple days, however, a set timer will countdown when the exam is opened. Like homework, some of the portions will need to be submitted typed, scanned, *clear pictures*, etc., but the file format should be a PDF.

Calculators:

You will need a calculator for in-class activities, quizzes, and exams. You may use any calculator that contains basic statistical functions; an advanced calculator is not needed to be successful in this course.

Groups:

Because the class is online, checking your understanding with peers will be harder than normal. Groups will be randomly assigned on the first day of class to encourage this. Groups can be reassigned at the instructor's discretion. There will not be any group work, however, *you are responsible for keeping open communication and responding to a group member in need of discussion/help* (within reason, of course). Disregard for one's group will result in a participation penalization.

Canvas Discussion:

Any question that does not pertain to your personal grade must be submitted through the Canvas discussion board. For example, "is homework graded for completion?" is not a question pertaining to your personal grade. Conceptual questions and questions like the one above belong on the discussion board. For *appropriate questions*, 1 extra credit point will be awarded to students who respond correctly before I am able to get around to it.

Department Grade Appeal Policy:

Students who believe their academic evaluation has been prejudiced or is capricious have recourse for appeals in the following order: their instructor; the Chair of the Department of Statistics; the undergraduate academic grading appeals committee; and lastly, the college grading appeals committee.

Disabilities:

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska-Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.

Academic Integrity:

You are encouraged to work together on problems and exercises, but the work you turn in must be your own (unless the assignment specifically states otherwise). Work on exams must be your own. University policy will be followed in cases of academic dishonesty:

In cases where an instructor finds that a student has committed any act of academic dishonesty, the instructor may in the exercise of his or her professional judgment impose an academic sanction as severe as giving the student a failing grade in the course. Before

imposing an academic sanction, the instructor shall first attempt to discuss the matter with the student. If deemed necessary by either the instructor or the student, the matter may be brought to the attention of the student's major adviser, the instructor's department chairperson or head, or the dean of the college in which the student is enrolled.

For additional details see: <http://stuafs.unl.edu/academic-integrity>

Disclaimer: Information contained in this syllabus was, to the best knowledge of the instructor, considered correct and complete when distributed at the beginning of the term. However, the instructor reserves the right, acting within the policies and procedures of UNL, to make changes in course content or instructional technique without notice or obligation. However, any changes will be explained to the class, including reasons for the change.

Tentative Schedule

| Day | Topic | Assignments/quizzes |
|---------------------|----------------------------------|--------------------------|
| Week 1 (7/13- 7/17) | | |
| Monday | Syllabus, Chapter 2 | |
| Tuesday | Chapter 2 | |
| Wednesday | Chapter 3 | |
| Thursday | Chapter 3 | |
| Friday | Chapter 4 | |
| Week 2 (7/20- 7/24) | | |
| Monday | Chapter 4 | |
| Tuesday | Chapter 4 and Chapter 5 | |
| Wednesday | Chapter 5 | |
| Thursday | Chapter 6 | |
| Friday | Chapter 6 | |
| Week 3 (7/27- 7/31) | | |
| Monday | Chapter 6 and Review (Chp 2-6) | |
| Tuesday | Exam 1 | Exam 1 (Chp 2-6) |
| Wednesday | Chapter 8 | |
| Thursday | Chapter 8 | |
| Friday | Chapter 8 | |
| Week 4 (8/3- 8/7) | | |
| Monday | Chapter 9 | |
| Tuesday | Chapter 9 | |
| Wednesday | Chapter 9 | |
| Thursday | Chapter 10 | |
| Friday | Chapter 10 | |
| Week 5 (8/10- 8/14) | | |
| Monday | Chapter 10 | |
| Tuesday | Chapter 10 | |
| Wednesday | Chapter 11 and Review (Chp 8-11) | |
| Thursday | Exam 2 | Exam 2 (Chp 8-11) |