SIE 430/530 ENGINEERING STATISTICS - Fall 2022
(Tuesday and Thursday 8:00 – 9:15am, AME S212)

Instructor: Jian Liu

Office Hours: Tue 9:30 – 10:30am
Or by appointment (OBA)

Office Hours for ONLINE students:
Tue 8:00-9:00 pm, OBA
Email: jianliu@arizona.edu

TAs: Masoud Eshghali &
Yeshuai He

Office Hours (Masoud): Mon & Wed,
4:00 – 5:00 PM, OBA
Email: masoudeshghali@arizona.edu

Office Hours for ONLINE students (Yeshuai):
Mon & Wed, 7:00 – 8:00PM, OBA
Email: hys@arizona.edu

This class is scheduled to be taught in the **IN-PERSON** modality and available for distance learning sections. All the students have access to Panopto lecture recordings.

All office hours held via Zoom: D2L –> UA Tools –>Zoom Meetings

Prerequisites: Calculus + SIE 305: Introduction to Engineering Probability and Statistics

Textbook: G. Casella and R.L. Berger, *Statistical Inference*, 2nd ed., Duxbury Thomson Learning, Pacific Grove, CA, 2002.

Course Website: We will be using the D2L system. (http://d2l.arizona.edu/). All class materials, including HW, handouts, etc. will be distributed from D2L. I will also be sending emails to the whole class throughout the semester using the class list on D2L. Please make sure you forward your D2L email to an email account that you frequently use.

Lecture videos will be available after each lecture on D2L –> UA Tools –> Panopto.

References:

- D. Wackerly, W. Mendenhall and R.L. Scheaffer, *Mathematical Statistics with Applications*, 7th ed., Duxbury Press, Belmont, California, 2008.
- A. Gut, *An Intermediate Course in Probability*, Springer, New York, 1995.
- W.W. Hines, D. C. Montgomery, D. M. Goldsman and C.M. Borror, *Probability and Statistics in Engineering*, 4th ed., Wiley, Hoboken, New Jersey, 2003.
- R.V. Hogg, J.W. McKean and A.T. Craig, *Introduction to Mathematical Statistics*, 6th ed., Pearson Prentice Hall, Upper Saddle River, New Jersey, 2005.
- S. M. Ross, *First Course in Probability*, 6th ed., Prentice Hall, Upper Saddle River, New Jersey, 2001.

Homework: The homework will be assigned on Thursdays and due on the following Thursday, *before 11:59 PM*. NO late submission is allowed unless it is requested and approved by the instructor in advance (e-mail or phone-call received *before* the day the assignment is due). **ALL students will submit pdf copies of their homework to a dropbox on D2L.**

Examinations:

Exam I: October 20, 8-9:15 AM for on-campus students (AME, S212), any 75-min time slot for distance learning students

Exam II: December 15, 8-9:30 AM for on-campus students (AME, S212), any 90-min time slot for distance learning students

(detailed arrangement will be announced in class.)

Makeup examinations MUST be requested at least one week prior to the date the exam is held. In case of medical or other personal/family emergencies, a formal excuse (doctor's note, etc.) is required.

Grading:	Homework	20%
	Exam I	35%
	Exam II	45%

Academic Integrity Policy: Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, homework, and exams must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity: http://dos.web.arizona.edu/uapolicies/. Any violation of the academic integrity code will be dealt with using the procedures detailed in the code.

Course Outline:

- Review of Probability Theory
  - Probability Set Function
  - Conditional Probability and Independence
  - Random variables, common distributions
  - Expectation (including Moment Generating Functions)
- Properties of a Random Sample
  - Order Statistics
  - Asymptotic Properties of the Sample Mean
  - Sampling from a Normal Distribution
- Point Estimation
  - Method of Moments
  - Maximum Likelihood Estimation
  - Bias, Efficiency and Consistency of Point Estimators
  - Best Minimum Variance Unbiased Estimator
- Hypothesis Testing I
  - Elements of a Statistical Test
  - Some Common Tests (concerning means, variances, etc.)
  - Goodness-of-Fit
- Hypothesis Testing II
  - Likelihood Ratio Tests
  - Optimal Tests and the Neyman-Pearson Lemma
- Confidence Interval Estimation
  - Inverting a Test Statistic

- Asymptotic Confidence Intervals
- Size and Coverage Probability

Classroom attendance:

- If you feel sick, or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel.
- Notify your instructors if you will be missing an in person or online course.
- Campus Health is testing for COVID-19. Please call (520) 621-9202 before you visit in person.
- Visit the UArizona COVID-19 page for regular updates.

Academic advising: If you have questions about your academic progress this semester, or your chosen degree program, please note that advisors at the Advising Resource Center can guide you toward university resources to help you succeed.

Life challenges: If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office can be reached at 520-621-2057 or DOS-deanofstudents@email.arizona.edu.

Physical and mental-health challenges: If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520-621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

Remain flexible: If pandemic conditions warrant, the University may require that we return to remote operations. If that is the case, we will notify you by D2L Announcement and email that we are moving to remote operations.

Class Recordings: Course recordings will be made for every lecture. If you do not wish to be identified by name, please contact the instructor immediately and solutions will be discussed according to FERPA Privacy Protection guide. For lecture recordings, which are used at the discretion of the instructor, students must access content in D2L only. Students may not modify content or re-use content for any purpose other than personal educational reasons. All recordings are subject to government and university regulations. Therefore, students accessing unauthorized recordings or using them in a manner inconsistent with UArizona values and educational policies are subject to suspension or civil action.

Inclusive Excellence Statements

This course supports elective gender pronoun use and self-identification; rosters indicating such choices will be updated throughout the semester, upon student request. As the course includes group work and in-class discussion, it is vitally important for us to create an educational environment of inclusion and mutual respect. (NOTE: You can download your class roster from UAccess)

Inclusive Excellence is a fundamental part of the University of Arizona's strategic plan and culture. As part of this initiative, the institution embraces and practices diversity and inclusiveness. These values are expected, respected and welcomed in this course.