

SIE 430/530 ENGINEERING STATISTICS - Fall 2014
(Tuesday and Thursday 8:00 – 9:15am, AME S212)

Instructor: Jian Liu
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Hours: Tue 9:30 – 10:30am
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TA: Haomiao Yang
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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.

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 the end of the class*. 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). Distance-learning students may submit pdf copies of their homeworks to a dropbox on D2L.

Examinations:

Exam I: October 6, Thursday, 8:00-9:15AM,
Exam II: December 15, Thursday, 8:00-9:30AM

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

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.