

Course Announcement Fall 2025, MATH 583: Advanced Topics in Statistics:
ANOVA: Design and Analysis of Experiments
time: MWF 3:00-3:50 place: ENGRA 0322

Statistics is the science of extracting useful information from data and perhaps the best known application of statistics is to summarize data. The field of statistics known as ANOVA or experimental design is used to “improve almost anything,” including crop production, medical procedures and manufactured goods. Typically researchers have lots of ideas for improving things, and ANOVA is very effective for finding the good ideas. Here the ideas are imposed as “treatments,” and ANOVA is used to compare the treatments. For example, in agriculture eight treatments might be compared for grain yield. Suppose fertilizer, herbicide and irrigation can be applied at high or low levels. Then a treatment HHL is a fertilizer-herbicide-irrigation combination.

ANOVA is also widely used to compare populations in fields such as psychology. For example, the populations could be defined by race–gender and compared for the amount of time spent studying.

The text will be Box, G.E.P, Hunter, J.S., and Hunter, W.G. (2005), *Statistics for Experimenters*, 2nd ed., Wiley, NY (\$120). You may also use the 1st edition or ch. 5-9 of Olive (2010) *Multiple Linear Regression and 1D Regression* (<http://parker.ad.siu.edu/Olive/regbk.htm>).

This course covers analysis of variance (ANOVA) and experimental design. Randomization, fixed and random effects one way ANOVA, two way ANOVA, one way block designs, factorial experiments and split plot (repeated measures) designs will be emphasized.

Overlap with other classes: Math 484 covers regression and experimental design, but my Math 484 places much more emphasis on regression. Animal Science ANS 500, Engineering ENGR 540, and QUAN 508 = Psychology PSYCH 522 also cover ANOVA and experimental design. QEM 525 is similar, and the Math department was asked if we had anyone who could teach the course.

The *prerequisites* for this class are Math 221 and Math 483. You should be familiar with the normal, gamma, binomial, Poisson and exponential distributions, confidence intervals and hypothesis testing.

Heavy use of the computer will be made. SAS and R will be used as well as Arc.

Undergraduates who got an A in Math 483 will be allowed in the class. I taught the course once before to 11 students. 10 got an A, including the undergraduate who took the class, and 1 student got a B.

For more information contact David Olive, 261 Neckers.
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Math 583, Section 001, Fall 2025. MWF 3:00-3:50 EGRA 0322

Instructor: David Olive

Text: Box, G.E.P, Hunter, J.S., and Hunter, W.G. (2005), *Statistics for Experimenters*, 2nd ed., Wiley, NY.

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Course Webpage: (<http://parker.ad.siu.edu/Olive/M583doe.html>).

Office hours: MWThF TBA

I am also available by appointment and on a walkin basis, especially before and after class.

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Final (emphasis is on the above topics) Dec. TBA but the final may be replaced by a class project where you actually do an experiment.

The grading and schedule below are tentative. (Drop day is TBA)

Except for the last week of classes, 2 homeworks may be turned in one class period late (ie on Monday) with no penalty. A third late will be accepted with 25% penalty. One or more sheets of notes will be allowed on quizzes and exams. A calculator is permitted.

Grading:

HW	400		Quizzes	100	
exam1	100	exam 2	100	exam 3	100
final	200	or project		total	1000
min. grade	points	min. grade	points	min. grade	points
A	900-1000	B	800-899	C	700-799
D	550-699				

Week of	MON	WED	FRI
Aug 18	Intro, 1.3	Intro, 3.1	3.1,3.2
Aug 25	lab	3.2,3.3, Q1	3.3, 3.4, 3.5, HW1
Sept 1	no class	3.5,4.1, Q2	4.1, HW2
Sept 8	4.1	4.1,4.2, Q3	4.2, HW3
Sept 15	lab	4.2,4.4	Exam 1
Sept 22	4.4	5.1, Q4	5.2,5.3,5.4, HW4
Sept 29	lab	5.5, Q5	5.5, HW5
Oct 6	5.6	5.6	Exam 2
Oct 13	5.7,5.8	5.9,5.10, Q6	5.11, HW6
Oct 20	lab	5.11, 5.12, Q7	5.12, HW7
Oct 27	5.13	5.13, Q8	5.14, HW8
Nov 3	5.14	5.17, Q9	8.1, HW9
Nov 10	lab	8.1, Q10	8.2, HW 10
Nov 17	8.2	9.1,9.2, Q11	9.2 HW11
Nov 24	no class	no class	no class
Dec 1	9.2, 10.1?	Exam 3	10.2?