STAT 502: Analysis of Variance and Design
Monday through Friday, 9:35 – 10:50am, 007 Life Sciences

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Description: This course aims to provide an introduction to the statistical concepts and techniques for conducting analysis of variance and assessing their validity. We will also be working with R software. This can be downloaded free for MAC or PC here http://www.r-project.org/

Text: The text for this course is the second half of *Applied Linear Statistical Models*, 5e, by Kutner, Nachtsheim, Neter, and Li. (custom printing ISBN: 9781121669376)

Course Website: All assignments, announcements, and due dates are posted on the PSU Canvas page for this course. Please check it daily.

Grading: Required work is divided into the following categories:

20%	Homework assignments
15%	Three quizzes
40%	Two midterm exams
25%	Comprehensive final exam

Homework: The homework consists of weekly exercises assigned throughout the week and collected during class the following Monday. There will usually be one per week. Late work is accepted up to 24hrs with a 10% penalty. Collaborative work is allowed (and encouraged!), but each of you must write up and submit your own answers; copying is not allowed.

Quizzes: The three in-class quizzes are scheduled for July 5, July 19, and Aug 2 (all Wednesdays). These will be around 15-20 minutes long and open-book.

Exams: The two in-class midterms are scheduled for July 12 and July 26 (both Wednesdays). The final exam will be on Friday, August 11. All exams are closed-book, but you may bring a calculator and a single, two-sided sheet of notes (2 such sheets allowed for the final). Conflicts on exam dates must be resolved in advance. Allow 24 hours for email response.

Letter Grades: Semester grades are assigned according to this scale. Rounding is to the nearest whole percentage point.

93 – 99%	A	77 – 79%	C+
90 – 92%	A-	70 – 76%	C
87 – 89%	B+	60 – 69%	D
83 – 86%	B	0 – 59%	F
80 – 82%	B-		

Academic Integrity: All Penn State and Eberly College of Science policies regarding academic integrity apply to this course. See http://science.psu.edu/current-students/Integrity/Policy.html for details.

Code of Mutual Respect: The Eberly College of Science Code of Mutual Respect and Cooperation (http://science.psu.edu/climate/code-of-mutual-respect-and-cooperation/Code-of-Mutual-Respect%20final.pdf/view embodies the values that we hope our faculty, staff, and students possess and will endorse to make the Eberly College of Science a place where every individual feels respected and valued, as well as challenged and rewarded.

Disabilities Statement: Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services web site athttp://equity.psu.edu/ods/.

Campus Emergencies: Campus emergencies, including weather delays, are announced on Penn State Live (http://news.psu.edu/) and communicated to cell phones, email

	Week	Topic(s)	Text Ch.
June 28 - 30		Review of t-test and regression	6
July 3 - 7	1	Single factor ANOVA, inference for parameters, contrasts and pairwise comparisons	16, 17
July 10 - 14	2	Power and sample size, residual diagnostics, transformations	18
July 17 - 21	3	Two factor ANOVA and randomized complete block design	19, 21
July 24 - 28	4	Analysis of covariance and random effects	22, 25
July 31 - Aug 4	5	Mixed and nested effects	25, 26
Aug 7 - 11	6	Repeated measures, split-plot, and Latin square	27, 28

Learning Objectives

Upon successful completion of this graduate course, the student will be able to:

- Understand the contexts in which ANOVA is appropriate
- Use the notation and formulas used to compute values fundamental to ANOVA
- Understand the statistical model for analysis of variance and the relationship between ANOVA and regression
- Implement single factor or One-way ANOVA analyses
- Implement multiple factor ANOVA analyses
- Extend treatment designs to include random effects
- Understand the importance that experimental design and randomization has in being able to interpret results
- Understand the structure of split-plot ANOVA designs and analysis
- Include a continuous covariate variable in ANOVA (ANCOVA)
- Understand the use of the General Linear Model
- Fit and test polynomial models for a quantitative factor
- Recognize and analyze repeated measures designs
- Recognize and analyze cross-over repeated measures designs