STAT 502 A Au 21: Design And Analysis Of Experiments

**Lecture:** MWF 9:30-10:20 AM

at **ECE 037**

**Instructor:** Emilija Perković;

Office hour: M 5:10 - 6:10 on zoom; you need to register in advance.

**LAB Session:** Friday 1.30 - 2.20 PM. The labs will be held over Zoom. The link is under Zoom on Canvas.

**TA:** Shane Lubold;

Office hour: Thursday from 11am-noon on Zoom. The link is under Zoom on Canvas.

**Course Description:**

This course introduces the theory and application of experimental design. Topics include randomization, blocking, confounding, analysis of experiments using randomization tests, analysis of variance, and analysis of covariance. Includes applications in R.

**In-Person Teaching Announcement**

This class is conducted in person. Students are expected to participate in class to fully benefit from course activities and meet the course’s learning objectives. Students should only register for this class if they are able to attend in person. To protect their fellow students, faculty, and staff, students who feel
ill or exhibit possible COVID symptoms should not come to class. When absent, it is the responsibility of the student to inform the instructor in advance (or as close to the class period as possible in the case of an unexpected absence), and to request appropriate make-up work as per policies established in the syllabus. What make-up work is possible, or how assignments or course grading might be modified to accommodate missed work, is the prerogative of the instructor. For chronic absences, the instructor may negotiate an incomplete grade after the 8th week, or recommend the student contact their academic adviser to consider a hardship withdrawal (known as a Registrar Drop).

**Textbooks/Lecture notes:**

- Oehlert, G., "A First Course in Design and Analysis of Experiments" (free at http://users.stat.umn.edu/~gary/Book.html (Links to an external site.))
- Lecture notes/slides/labs will be posted here. This page will be updated as the course progresses.

**Software:**

- We will use the statistical software environment R, which is freely available from http://www.r-project.org (Links to an external site.)
- I recommend using R in combination with Rstudio: https://www.rstudio.com/products/rstudio/download/ (Links to an external site.)

**Holiday Schedule (no classes on these days):**
• Veteran’s Day Wednesday, Nov 11
• Native American Heritage Day Friday, Nov 26

Other useful resources:
• w3school’s free R tutorial: https://www.w3schools.com/r/
  (Links to an external site.)
• Julian Faraway’s book on Linear Models with R: Practical Regression and ANOVA using R (Links to an external site.)

If you have questions about the course organization or material, please post them in the discussion tab.

Outline of course topics:
1. Experiments, test statistics, completely randomized designs, significance testing
2. Review of normal theory tests and confidence intervals, basic decision theory, power and sample size
3. Treatment effects model, ANOVA
4. SS decomposition, geometric interpretation
5. Treatment comparisons, model diagnostics
6. Factorial treatment designs
7. ANOVA decomposition for the additive model
8. ANOVA for the interaction model, model comparison, and normal-theory testing
9. Complete and incomplete block designs, Latin square designs
10. Fractional Factorial designs, aliasing, confounding, resolution
11. Split-plot designs, different size experimental units, repeated measures examples
Lab sessions information:
Please bring a laptop to the lab session. The TA will go over homework and answer questions that you may have concerning the homework due the following week.

Grading policy and exams:
All assignments will be graded through Gradescope.
Please upload your solutions there.

- Homework (70%). See the homework guidelines.
- Midterm (15%): Wednesday, Nov 3, in-class exam. Closed book, but one two-sided sheet of notes is allowed.
- Final Exam (15%): Wed, Dec 15th, 8:30 – 10:20 AM at ECE 037 (regular lecture classroom). Closed book, but you may bring one or two pages of notes (two-sided if you wish).

Make-up exams will not be given except in extraordinary cases (certified medical condition, family emergency, etc.)

Course Grades
Below we give some guidelines for the minimum amount of points required to reach a particular grade. These are minimum guarantees: your course grade could be higher than what this table suggests. Please do note that we do not make any guarantees of the course grades within these buckets.
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<thead>
<tr>
<th>Percent Earned</th>
<th>Course Grade</th>
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**Students with disabilities:**

If you would like to request academic accommodations due to a disability, don't hesitate to get in touch with Disabled Student Services, 448 Schmitz (206) 543-8924 (V/TTY). If you have a letter from Disabled Student Services indicating you have a disability that requires academic accommodations, please present this letter to me so we can discuss the accommodations you might need for the class.

**Academic Integrity:**

Collaboration and discussions are allowed and encouraged in this class, but copying or letting others copy your work amounts to plagiarism. This includes copying model solutions, e.g., from prior years. Although cheating occurs seldom in graduate classes, if it does, I will take the following action: assign a grade of 0.0 for the exam/homework where the cheating occurred, and report the incident to the Graduate School Committee on Academic Conduct, which will decide upon an appropriate University course of action.

**Religious Accommodations:**
Washington state law requires that UW develop a policy for the accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW’s policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/).

(Links to an external site.)

Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form (https://registrar.washington.edu/students/religious-accommodations-request/).

(Links to an external site.)

"Student conduct:

Follow the UW Student Conduct Code in your interactions with your colleagues and me in this course by respecting the many social and cultural differences among us, which may include, but are not limited to: age, cultural background, disability, ethnicity, family status, gender identity and presentation, citizenship and immigration status, national origin, race, religious and political beliefs, sex, sexual orientation, socioeconomic status, and veteran status.