

STA 713: Experimental Design

where: CBC C321

when: 2:30 - 3:45 pm TR

instructor: Anton Westveld

anton.westveld@unlv.edu

<http://faculty.unlv.edu/westveld/Teaching/Sta713/Sta713.html>

Topics Covered and Approximate Schedule:

Weeks 1-2 : Introduction to **R**, experiments, test statistics, completely randomized designs, significance testing

Week 3 : Review of normal theory tests and confidence intervals, basic decision theory, power and sample size

Week 4 : Treatment effects model, ANOVA

Week 5 : SS decomposition, geometric interpretation

Week 6 : Treatment comparisons, model diagnostics

Week 7 : Factorial treatment designs

Week 8 : ANOVA decomposition for the additive model

Week 9 : ANOVA for the interaction model, model comparison, and normal-theory testing

Week 10 : Complete and incomplete block designs, Latin square designs

Week 11 : Fractional Factorial designs, aliasing, confounding, resolution

Week 12 : Split plot designs, different size experimental units, repeated measures

Weeks 13-16 : Additional topics TBA such as:

- More on design
- Observational data – Rubin causal modeling framework (matching)
- False Discovery Rate
- Bootstrapping
- Design and/or analysis of computer simulations

Format:

This is a course in statistical methodology and thus will be a mix of theory, application, and computing. The statistical package used in this course is **R** which is freely available at www.r-project.org.

Books:

I will primarily be using Peter Hoff's lecture notes on Experimental Design which can be downloaded from the website. Also you will need to find a copy of 'The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century' by David Salsburg. Two additional suggested resources for this material are:

- 'Design and Analysis of Experiments' by Douglas C. Montgomery
- 'Linear Models with R' by Julian J. Faraway
- Based on what additional topics we cover, the following two books may also be useful:
 - 'Matched Sampling for Causal Effects' by Donald B. Rubin
 - 'The Design and Analysis of Computer Experiments' by Satner, Williams, and Notz
- Additional resources for **R**:
 - 'Modern Applied Statistics with S-Plus' by Venables and Ripley
 - ['An Introduction to R'](#)

Assesment:

The requirements for this course are simple – attend class, complete the assignments (including the reading assignment) and project, and take the exams. This is a lecture-based workshop, which will proceed as quickly or slowly as is necessary.

1. Assignments: Some assignments will be computational or analytical in nature. Others may involve writing short essays or research notes. Clarity of presentation and argument are of utmost importance when preparing these assignments. There will be an assignment approximately every week or so. Assignments count for 30% of the final course grade. The late policy for assignments is that each turned in item receives an initial grade of x , then the actual grade is $y = x \exp(-d/10)$, where d is the number of days after the due date I receive the work. Everyone receives one grace day to be applied to one homework for the entire quarter. **I encourage students to work on the assignments together, but students must hand in their own work.**
2. Reading assignment: In this class we will be reading 'The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century' by David Salsburg. Near the end of class we will have a very informal discussion about the book. This along with class participation (in and out of the classroom) will count for 5% of the total grade.
3. Exams: There will also be two written examinations (mid-term and final). The midterm exam is worth 25% of the final grade and will have both an in class and a take home component. The final exam is also worth 25% and will only have an in-class component.
4. Project: The project will be worth 15%. More details to follow about the project.

Office Hours:

My office is B211 in Carol C. Harter Classroom building. My suggested office hours are immediately after class from 3:45 - 5:15 on Tuesday and Thursday. This will be discussed the first day of class. I will also be available by appointment.

Please Note:

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