STATISTICS 6410
Spring 2015, TR 9:10 – 11:00

COURSE INFORMATION

Instructor: William Notz
Office: 319 Cockins Hall, 1958 Neil Avenue
Phone: 292-3154
email: win@stat.osu.edu

Office Hours: TBA

Grader: Ziyue Chen, CH 304B

Text: *Design and Analysis of Experiments* by Angela Dean and Daniel Voss

Room: CH 240

LEARNING OBJECTIVES

• Understand basic principles of good design (randomization, replication, blocking).
• Understand and correctly interpret models for factorial experiments (main effects, interactions).
• Be able to analyze data from factorial experiments, including diagnostics, methods to address model inadequacy, and multiple comparisons.
• Understand the issues involved in determining the sample size for factorial experiments and be able to compute the needed sample size for balanced factorial experiments.
• Understand the difference between fixed and random effects, and be able to analyze mixed models.
• Be able to recognize and analyze data from experiments with some special types of randomization (blocking, split plots)
• Understand the concept of aliasing.
• Be able to design and analyze some basic two-level fractional factorial experiments.
• Be able to use software to design and analyze experimental data.

HOMEWORK and EXAMS

Approximately ten homework assignments will be given during the term. These will be graded by the course grader (a statistics graduate student) and only selected problems graded. If you have questions about how a problem has been graded or if you do not understand a problem, please speak to me. Also, I plan to post solutions on Carmen. Homework will usually be collected on Tuesdays.

There will be one midterm exam and a final. All will be in class. The midterm exam will (tentatively) be Tuesday February 24. The final exam will be Monday May 4, 8:00-9:45. Problems will be similar to the homework questions you have had, so if you understand the homework, you should be able to do well on the exams.

HOLIDAY

Monday January 19 is a holiday (Martin Luther King Day). March 16-20 is Spring break.

GRADING

Course grades will be based on the following formula

Midterm   25%
Final   30%
Homework   45%

SOFTWARE

Your textbook emphasizes the use of SAS for analyzing data. SAS is a very comprehensive statistical package, although it is nontrivial to learn to use.   It is very popular in business and industry, so that learning to use SAS is worthwhile (in fact, some employers look favorably on applicants who are familiar with SAS). For those of you who plan to use SAS, you can find a list of public computing sites (in addition to the Statistic Department's computers) where SAS is available at the web site https://ocio.osu.edu/software.

I will tend to emphasize the use of the JMP software package. It is menu driven and has several nice features for the design and analysis of experiments. It is produced by SAS. One advantage for OSU users is that you can get a Windows or Macintosh version for free from the Office of Information Technology (see below). JMP is also available at several public computing sites – see http://scc.osu.edu/

Another popular software package is Minitab. Minitab has a menu driven interface and is a bit easier to use than JMP. Minitab is available at several public computing sites. These can be determined by going to the web site https://ocio.osu.edu/software . Unfortunately, Minitab runs only on Windows machines and is only available to faculty and regular staff through OSU. A 30 day free trial version of Minitab can be downloaded at www.minitab.com/downloads.

JMP is will also do ANOVA
If you own a PC running a recent version of Windows, you can obtain a site-licensed copy of JMP and Minitab (Minitab).

For more information about site licensed software, see the OIT web site at http://www.oit.ohio-state.edu/site_license/.

A very popular software package is R. R is available for free for Unix, Windows, or Macintosh operating systems. Use Google to find the download site. R is not menu driven and so takes some effort to learn. One of the weakest features of R is, unfortunately, using it to design and analyze designed experiments. However, if you are interested in using R, let me know. The authors of your textbook are working on a revision that will include R commands and are seeking volunteers to try out the material they are developing.

TENTATIVE SYLLABUS

Topic	Chapters in the text	Week
Review (testing, confidence intervals, introduction to software		1
General principles	1, 2	1, 2
ONE-WAY ANALYSIS OF VARIANCE		
Completely randomized designs		2
One Way Analysis of Variance	3.1-3.5	3
Choosing sample size and power	3.6	4
Tests and confidence intervals for contrasts	4.1-4.3	4, 5
Multiple comparisons	4.4	5
Choosing sample sizes from confidence intervals	3.5, 4.5	6
Checking model assumptions	5	6, 7
MULTIFACTOR ANALYSIS OF VARIANCE		
Model	6.1-6.3, 7.1-7.2	7
Analysis of the complete model	6.4	8
Midterm Exam February 24		
Analysis of the complete model	7.3-7.4	9
Using software	6.8, 7.7	9
Choosing sample sizes	6.6	10
Multiple Comparisons	6.3-6.4, 7.4	10
Diagnostics		11
Single replicate experiments	7.5	11
Nested and Mixed models	17.7-17.8	12, 13
BLOCK DESIGNS and SPLIT PLOTs		
Randomized block designs and analysis	10	13
Simple split plots designs and analysis	19.1-19.3	14
FACTORIAL EXPERIMENTS		
Confounding in single replicate experiments	13.1-12.6, 13.8	14
Fractional factorials	15.2, 15.6	15

Final Monday May 4, 8:00 – 9:45, CH 240