BMTRY 702
Methods III: Advanced ANOVA and Regression

Instructor: Mulugeta Gebregziabher, PhD
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Class Hours: **Tue and Thu 10:30-12:30, Room 301 [8/21-12/6 2012]**

Office Hours: **Tue/Th 1-2 or** by appointment

Texts:
JL: John Lawson (2010). Design & Analysis of Experiments with SAS, CRC Press
FLW: Fitzmaurice, Laird and Ware (2004). Applied Longitudinal analysis. Wiley Inc.

References:
Little et al (2006) SAS for mixed Models, 2nd ed. SAS publishing.
Little and Rubin 2002. Statistical analysis of missing data (2nd ed). Wiley Inc.
Kutner et al (2005). Applied Linear Statistical Models, (5th ed). McGrawHill.

Prerequisite: **BMTRY 701, 706, 707**

Homework: Approximately once every other week

Exams: Two exams

Final Exam:

Grading:

Exam 1 (Oct 16)	30%
Exam 2 (Dec 10)	30%
Homework	40%

Web page: http://people.musc.edu/~gebregz/bmtry702

Course Policy

Work Expectations

Students are expected to attend class, participate in class discussions, and complete the assigned homework and exam. Students are also expected to complete assigned reading from the required materials.

Homework

There will be approximately between 4 to 5 homework assignments during the semester. I encourage you to work together in computing and discussing the problems. However, each student is expected to independently write up the submitted assignment using her or his own computing and giving explanations in her or his own words. For Assignments that involve computing please attach only relevant computer output to what you turn in. Group exercise assigned during classes will also count towards grades. The homework will account 40% of grade. **No late homework, unless arrangements have been made with the instructor for an extension.** Homeworks are due a week from date of assignment.

Exam

There will be one in class exam towards the middle of the semester and another one towards the end of the semester. The exams will count towards 60% of the grade.

Grading Option Policy

An incomplete grade is permitted only in cases of extraordinary circumstances and following consultation with the instructor. In such cases, an "I" grade will require a specific written agreement between the instructor and the student specifying the time and manner in which the student will complete the course requirements. Extension for completion of the work will not exceed one year.

Scholastic Dishonesty

Students are responsible for knowing the Medical University of South Carolina's policy on student conduct and scholastic dishonesty. Scholastic dishonesty as defined in the policy will be reported and will result in a grade of "F" or "N" for the entire course.

Plagiarism is an important element of this policy. It is defined as the presentation of another's writing or ideas as your own. Serious, intentional plagiarism will result in a grade of "F" or "N" for the entire course. For more information on this policy and for a helpful discussion of preventing plagiarism,

please consult University policies and procedures regarding academic integrity.

Withdrawal Policy

Students may withdraw from a course **through the second week** of the semester without permission. No "W" will appear on the transcript. **After the second week,** students are required to do the following:

1) The student must contact and notify their advisor and course instructor informing them of the decision to withdraw from the course.
2) The student must send an e-mail to Enrollment Services (ES). The email must provide the student name, ID#, course number, section number, semester, and year with instructions to withdraw the student from the course, and acknowledgement that the instructor and advisor have been contacted.
3) The advisor and instructor must e-mail the ES acknowledging the student is canceling the course. All parties must be notified of the student's intent.
4) The ES will complete the process by withdrawing the student from the course after receiving all e-mails (student, advisor, and instructor). A "W" will be placed and remain on the student transcript for the course.
5) After discussion with their advisor and notification to the instructor, students may withdraw up until the eighth week of the semester. There is no appeal process.

Course objectives

1. to learn how to design experimental studies
2. to learn how to analyze data from experimental studies
3. to learn how to fit and interpret Gaussian linear mixed models (ML, REML)
4. to learn how to fit and interpret generalized linear mixed models (ML, RSPL)
5. to learn how to handle missing data
6. to learn how to design and analyze fMRI data

Topics Covered and Approximate Schedule

Days 1-4 Single Factor Experiments (**JL-Ch 2**)
- Introduction
- Completely Randomized Design (CRD)
- Multiple Comparisons
- Statistical Power and centrality parameter
- Contrasts
- ANOVA vs Regression
- SAS Demo 1 (Proc GLM)
- **Homework 1**

Days 5-11 Multiple Factor Experiments (**JL-Ch 3 and 4**)
- Introduction
- Randomized Complete Block Design (RCBD)
- Analysis of Covariance (ANCOVA)
- 2^k factorial designs
- Sample size and power issues in factorial experiments
- **Homework 2**

Days 12-15 Repeated Measures Design (**JL-Ch 9 and FLW-Ch 3, ch-16**)
- Introduction
- Graphical descriptive methods, response profiles
- Pre and post design and analysis
- Covariance Pattern Models
- Random Coefficients Models
- SAS Demo 2 (Proc Mixed)
- **Homework 3**

Oct 16 **Exam 1**

Days 16-21 Linear mixed models (**FLW Ch 4, 7,8**)
- Introduction
- Normal Mixed Models
- Other Designs
- Crossover, Split-plot, Nested Designs
- **Homework 4**

Days 22-24 Generalized Linear Mixed Models (GLMM) **FLW ch10-12**
- General Linear Models
- General Linear Mixed Models
- Practical Application and Interpretation
- SAS Demo 3 (Proc GLMMIX)
- **Homework 5**

Days 25-26 Missing Data (**FLW ch14** Handout Molenberghs JSM course)
- Missing data mechanisms
- Dropouts
- Analysis of missing data methods
- SAS Demo 4 (Proc MI and MIANALYZE)

Days27-28 22 **fMRI classes**

Dec 10 **Exam 2**

Days to Remember'

Sept 3	Labor day
Sept 4	Last day for Add/Drop
Oct 16	Exam 1
Nov 2	Research Day (no class)
Nov 6	Election day (no class)
Nov 22-23	Thanksgiving days (no class)
Dec 4-6	Analysis of fMRI data
Dec 10	Exam 2

	Fall 2011 Calendar: BMTRY 702				
week	Week of	Tue	TH		
1	20-Aug	21	23		
2	27-Aug	28	30		
3	3-Sep	4	6		
4	10-Sep	11	13		
5	17-Sep	18	20		
6	24-Sep	25	27		
7	1-Oct	2	5		
8	8-Oct	9	11		
9	15-Oct	16	18		16 is exam1
10	22-Oct	23	25		
11	29-Oct	30	1		
12	5-Nov	6	8		
13	12-Nov	13	15		
14	19-Nov	20	22		
15	26-Nov	27	29		
16	3-Dec	4	6		fMRI week
17	9-Dec	10			10 is exam2