COURSE SYLLABUS

MATH 6383 Exp. Design & Categ. Data  Instructor Name: Xiaohui (Sophie) Wang
Fall 2017  Contact Info: 665-3454, xiaohui.wang@utrgv.edu
Class meet: TR 5:55~7:10pm, EMAGC 1.302  Office location: MAGC 3.802
Office hours: TR 3:00-4:00pm

Textbook and Resource Material

SAS:
We will also use SAS for some statistical analyses. We will use SAS OnDemand for Academics (free version of SAS). Check the following two websites for info and how to register:
http://support.sas.com/software/products/ondemand-academics/#s1=2
We will not be tied up by learning a lot programming in SAS, but rather use some commands to implement the needed analyses. So you don't need be afraid of programming.

Course Description and Prerequisites
Design and analysis of experiments, including one-way and two-way layouts; factorial experiments; balanced incomplete block designs; crossed and nested classifications; fixed, random, and mixed models; split plot designs, inference for categorical data, contingency tables, generalized linear models, logistic regression, logit and loglinear models. Prerequisite: MATH 6364, Statistical methods.

Instructor's note on the prerequisite: The prerequisite was put there mainly for graduate students with statistics major. Actually, most students enrolled in this course, especially those from non-math/stat majors, only have some basic statistics background from their undergraduate statistics course(s). Review on basic but important statistics concepts will be provided during the first week of the semester.

Learning Objectives/Outcomes for the Course
• To be able to form researchable research questions and hypothesis;
• To be able to understand research design procedures and complications;
• To be able to determine proper research design and methods;
• To be able to perform literature review and gain certain capability to write research proposal and report.
• To be able to use SAS for some data analysis;
• To be able to interpret research findings and communicate with other people
• To be able to recognize the limitations of specific research design/procedures.

Learning Objectives for Core Curriculum Requirements (well, this course is not core course, but we will still honor these objectives.)
This course will address the core outcomes set by the Texas Higher Education Coordinating Board (THECB) by
• Critical Thinking Skills: self-motivated learning via lectures, in-class discussion, reading assignments, and case-study project.
• Communication Skills: in-class discussion, homework assignments, study groups, case-study project.
• Empirical and Quantitative Skills: homework assignments, case-study project.
• Teamwork: homework assignments, case-study project.
• Social Responsibility: study groups, case-study project.
• Personal Responsibility: self-motivated learning throughout the semester.

Grading Policies

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Attendance</td>
<td>5%</td>
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<tr>
<td>Homework (reading, data analysis, etc.) and Quizzes</td>
<td>15%</td>
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<tr>
<td>Topics-wise Summary Sheets</td>
<td>10%</td>
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Course grades will be determined by 90~100=A, 80~89=B, 70~79=C, 60~69=D, 50~59=F. In addition, discussion participation (during class or via BB) will be used to determine border grades. Curve may be given for each exam depending on overall performance. There is NO extra credit. A grade of Incomplete (I) can be given ONLY in the event that an authorized absence or circumstances beyond your control were the cause of your missing a small portion of the course. This grade is not to be given because you feel that you have too much other work or study to do or because you think that you will not earn an acceptable grade in the course.

**Attendance:**
Attendance will be recorded via sign-in paper. If you do homework of other courses during this class meeting time, you will be count as absent for that class. If you miss four or more class meetings, the instructor may DROP you from the class. Students with no more than 2 missing classes will get full credit for attendance.

**Homework and Pop-up Quizzes:**
There will be some reading assignments throughout the semester. Some homework problems are from exercise problems at the end of each chapter. Some homework will be performing some data analysis using statistical software. You will also need to write brief narrative paragraphs based on your analysis results. One lowest homework grade will be dropped when calculating total grades at the end of the semester. Quizzes might be used for checking the completeness of reading assignment, as well as your mastery of course knowledge. The lowest quiz grades will be dropped when calculating total grades at the end of the semester.

**Topic-wise summary sheets:**
You will be required to do summary sheets throughout the semester. Ask me if you need more guidance. General suggestion on what summary sheets to make: to summary each specific design, list 1) when to use the specific design, 2) how to implement the design, 3) the statistical model, 4) SAS codes for analysis (if applicable), and 5) some considerations/limitations etc.

**Midterm Exam:**
Exam on paper during class time. It will include multiple choice problems and open-end problems.

**Final Exam:**
Comprehensive exam on paper. It will include multiple choice problems and open-end problems.

**Case-study project:**
You will be assigned to do a case-study project. Below are some information for the project as of now.

1. Two reports will be collected for grading purpose: Midterm report and Final report.
2. The project reports are required to be written in a WORD file and submitted via Blackboard.

**Midterm Report/Presentation:**
Midterm Report and presentation will due on TBD during class time. Class presentation might be required.

**Final Project/Presentation:**
Final Report will be due on TBD. Presentation will be at Fall Student Statistics Research Conference, Sat, Dec. 9, 2017 (tentative date).
Calendar of Activities
We plan to finish the corresponding chapters in the textbook according to the following timeline (tentative):

**Week 1: Review and introduction to basic and important statistics concepts.**
What is statistics? Population and sample, Parameter and statistic, Different types of variables and data, Dependent and independent variables, etc.

**Week 2-3: Introduction to experimental design and Complete Randomized Designs. Text Chap 1&2.**
Chap 1: What is the goal of the experiment? From research hypothesis (RH) to treatment design and experiment design. Selection of variables, factors, experiment units, blocking, number of replications.
Chap 2: CRD. How to and what to randomize, Power of a hypothesis test, and Sample size selection.

**Week 3-4: Treatment Comparisons and Assumptions/Diagnostics. Text Chap 3&4.**
Chap 3: What research questions go with what type of comparisons, Multiple comparisons (all pairs, vs control, finding the best treatment), General contrasts, and Inflated error rate.
Chap 4: Residual analysis of model assumptions. What to do if assumptions are violated?

**Week 5: Experiment to Study Variances. Text Chap 5.**
Chap 5: fixed and random effects, statistical model for both fixed and random effects, experiments with unequal numbers of replications and subsamples.

**Week 6-7: Factorial Treatment Designs. Text Chap 6&7.**
Chap 6: Three treatment factor effects, Fixed factor levels with equal replications, unequal replications.
Chap 7: Random effect for factorial treatment designs, Mixed models, Nested factors.

**Week 8: Complete Block Designs. Text Chap 8.**
Chap 8: blocking to increase precision, Latin Squares.

**Midterm Exam. (Week 8 or 9)**

**Week 9-10: Incomplete Block Designs and Fractional Factorial Designs. Text Chap 9, 10, 11, & 12**
Chap 9: BIB, PBIB, Efficiency of incomplete blocking.
Chap 10: Choosing incomplete block designs
Chap 11: Incomplete block designs for $2^n$ treatment structure
Chap 12: Aliases, resolution, design of $2^{np}$ fractional factorial

**Week 11-12: Split-Plot Designs, Repeated Measures Experiments and Crossover Designs. Text Chap 14, 15, &16**
Chap 14: Different size of experiment units, split block designs, split-split-plot design.
Chap 15: Split-plot analysis of repeated measures
Chap 16: Crossover designs

**Week 13-14: categorical data, contingency tables, generalized linear models, logistic regression.**

**Review, Final Exam (Week 15 & Week 16)**

Some important dates for Fall 2017 include:

- Sept. 1 (Fri.)  
  Last day to withdraw (drop all classes) and receive an 80% refund

- Sept. 11 (Mon.)  
  Last day to withdraw (drop all classes) and receive a 70% refund

- Sept. 13 (Wed.)  
  Census Day (last day to drop without it appearing on the transcript)

- Sept. 18 (Mon.)  
  Last day to withdraw (drop all classes) and receive a 50% refund

- Sept. 25 (Mon.)  
  Last day to withdraw (drop all classes) and receive a 25% refund

- Nov. 15 (Wed.)  
  Last day to drop a class (grade of DR) or withdraw (grade of W)

- Nov. 23 – Nov. 25 (Thurs. – Sat.)  
  Thanksgiving Holiday. No classes.

- Dec. 7 (Thurs.)  
  Study Day. No classes.

**Other Course Information**
Please check Blackboard and the instructor’s teaching website at faculty.utrgv.edu/xiaohui.wang/teaching.html.

**Copyright Statement:**
The handouts and notes used in this class are copyrighted. By handouts and notes, I mean all materials generated for this classes, which include but are not limited to syllabi, quizzes, exams, in-class materials, review sheets and additional problems sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless I expressly grant permission.
UTRGV Policy Statements
The UTRGV disability accommodation, mandatory course evaluation statement and sexual harassment statement are required on all syllabi. Additional policy statements are optional, such as those covering attendance, academic integrity, and course drop policies.

STUDENTS WITH DISABILITIES: Required on all syllabi. Do not modify.
Students with a documented disability (physical, psychological, learning, or other disability which affects academic performance) who would like to receive academic accommodations should contact Student Accessibility Services (SAS) as soon as possible to schedule an appointment to initiate services. Accommodations can be arranged through SAS at any time, but are not retroactive. Students who suffer a broken bone, severe injury or undergo surgery during the semester are eligible for temporary services. Brownsville Campus: Student Accessibility Services is located in Cortez Hall Room 129 and can be contacted by phone at (956) 882-7374 (Voice) or via email at ability@utrgv.edu. Edinburg Campus: Student Accessibility Services is located in 108 University Center and can be contacted by phone at (956) 665-7005 (Voice), (956) 665-3840 (Fax), or via email at ability@utrgv.edu.

MANDATORY COURSE EVALUATION PERIOD:
Students are required to complete an ONLINE evaluation of this course, accessed through your UTRGV account (http://my.utrgv.edu); you will be contacted through email with further instructions. Students who complete their evaluations will have priority access to their grades. Online evaluations will be available:
- Fall 2017 Module 1: Oct. 5 – Oct. 11
- Fall 2017 Module 2: Nov. 29 – Dec. 5
- Fall 2017 (full semester): Nov. 15 – Dec. 6

SCHOLASTIC INTEGRITY:
As members of a community dedicated to Honesty, Integrity and Respect, students are reminded that those who engage in scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and expulsion from the University. Scholastic dishonesty includes but is not limited to: cheating, plagiarism (including self-plagiarism), and collusion; submission for credit of any work or materials that are attributable in whole or in part to another person; taking an examination for another person; any act designed to give unfair advantage to a student; or the attempt to commit such acts. Since scholastic dishonesty harms the individual, all students and the integrity of the University, policies on scholastic dishonesty will be strictly enforced (Board of Regents Rules and Regulations and UTRGV Academic Integrity Guidelines). All scholastic dishonesty incidents will be reported to the Dean of Students.

SEXUAL HARASSMENT, DISCRIMINATION, and VIOLENCE:
In accordance with UT System regulations, your instructor is a “Responsible Employee” for reporting purposes under Title IX regulations and so must report any instance, occurring during a student’s time in college, of sexual assault, stalking, dating violence, domestic violence, or sexual harassment about which she/he becomes aware during this course through writing, discussion, or personal disclosure. More information can be found at www.utrgv.edu/equity, including confidential resources available on campus. The faculty and staff of UTRGV actively strive to provide a learning, working, and living environment that promotes personal integrity, civility, and mutual respect that is free from sexual misconduct and discrimination.

COURSE DROPS:
According to UTRGV policy, students may drop any class without penalty earning a grade of DR until the official drop date. Following that date, students must be assigned a letter grade and can no longer drop the class. Students considering dropping the class should be aware of the “3-peat rule” and the “6-drop” rule so they can recognize how dropped classes may affect their academic success. The 6-drop rule refers to Texas law that dictates that undergraduate students may not drop more than six courses during their undergraduate career. Courses dropped at other Texas public higher education institutions will count toward the six-course drop limit. The 3-peat rule refers to additional fees charged to students who take the same class for the third time.