EDMS 646: General Linear Models I  
1121 Benjamin Building, Thursdays: 4:15-7:00pm  
Spring 2017

Instructor: Ji-Seung Yang  
E-mail: jsyang@umd.edu  
Office: 1225 Benjamin Building  
Phone: (301)405-6073  
Office Hours: Thursdays 2:00-3:30pm, and by appointment  
Fax: (301)314-9245

TA: Kaiwen Man  
E-mail: kman@umd.edu  
Office: 0202 Benjamin Building  
Office Hours: T & W 12:30-1:30pm, and by appointment

Course Description

EDMS 646 is the second course of a three-course sequence in basic statistical methods EDMS 645, EDMS 646, and EDMS 651 offered by EDMS. The purpose of EDMS 646 is to provide solid and comprehensive training in quantitative methods, focusing on general linear models that include analysis of variance procedures/designs and multiple regression analysis. The course builds on topics which were introduced in EDMS 645. The topics in descriptive and inferential statistics include (i) normal distributions, (ii) z-tests, (iii) Student’s t distribution, (iv) t-tests, (v) bivariate correlation and simple linear regression. I am also assuming familiarity with SPSS/Windows. EDMS 646 covers topics on multiple regression, one-way ANOVA, multiple comparison procedures, factorial ANOVA, ANCOVA, and nested designs. This course focuses on the proper understanding and application of the general linear models in educational and psychological research, meaning that course material will be presented to facilitate your conceptual understanding of fundamental statistical methods typically employed in educational and psychological research settings. However, this does not mean that underlying statistical and mathematical theory will not be presented. Technical aspects of the statistical analyses will be presented and emphasized as the material warrants.

Objectives

It is my hope that students will be able to explain what the purpose of a general linear model is, understand its assumptions and various designs, understand the calculation of statistics introduced along the way, generate and interpret computer printouts of each analytic technique discussed, and have a better understanding of when the use of a given design/technique is appropriate. Conceptual understanding of fundamental statistical methods centering around analysis of variance and multiple regression analysis is the minimally satisfying level for all the students at the end of the
semester. For students who need more in-depth technical knowledge for further methodological research, additional materials will be provided to facilitate understanding of underlying statistical and mathematical theory.

**Strongly Recommended Books**

There is no required textbook for this course. However, there are some strongly recommended books for the sake of students’ learning as follows.

Reader friendly but less details on regression modeling

or

Focused on regression modeling

Balanced contents

- I might provide some chapters of these books if I think it is necessary.
- For those who will take EDMS651 subsequently, Fox (2008 or 2015) is strongly recommended along with Fox and Weisberg (2011).

**Secondary References**

Course Delivery

Course slides and supplemental materials will be made available by 9AM every Tuesday on ELMS CANVAS course delivery system (https://elms.umd.edu). An email notification will be sent out when new materials are posted on the board. It is your responsibility to print them or bring them to class.

Statistical Software

Students will also need access to a statistical package such as SPSS, SAS, STATA, or R. Students may use any software that students are familiar with, but the course will focus on R and SPSS examples. There will not be formal lab sessions unless the instructor make decisions to have one. However, lab materials (R and SPSS) will be distributed so that students can follow and learn how to conduct corresponding analyses that are covered in class.

The R software is free and easy to install on your own computer. It is currently maintained by the R Core development team. Students can download R at the home page of the R project (http://www.r-project.org). It is a very flexible environment that contains a wide variety of packages that allow students to do numerous mathematical and statistical operations ranging from data simulation to data analysis.

There are a couple of options for using SPSS.
Option 1: Buy nothing. Use a campus lab to do SPSS (any version above 19.0 will be fine)
You may want to check with labs on campus using the link (http://it.umd.edu/as/cl/othersoftware)
Option 2: Rent a full version from the University at a very reasonable rate.
(https://terpware.umd.edu/Windows/Title/1880)
Formal Course Assessment

Homework Assignments: There will be FIVE assignments throughout the semester, each of them designed to give students an opportunity to apply and practice concepts and techniques learned in class. It is expected that students will be using computer software (e.g., SPSS, SAS, or R) for their homework where computer work is required. Students are expected to refer to any materials from lecture, the textbook, and supplemental notes.

Students are encouraged to work in groups on homework and to turn in a single homework with the names of the group members (maximum of 3 students per group). It should be understood that all members of a group receive the same score on homework completed together. Moreover, taking turns to complete each homework assignment, while time efficient, is not recommended for the sake of students’ learning.

I do expect that students’ word-processed homework will conform as closely as possible to APA style presentation of tables, graphics, and references. Therefore, students should cut and paste relevant portions of the computer output into the appropriate places in your homework to show how you arrived at your solution. One of the goals of this class is to be able to write-up statistical results as if it were going into a journal article or a thesis. There will be an exemplary writing to show how to write-up statistical results at the beginning of the semester. For APA style reference, go to the website of Douglas Degelman for manuscripts following APA style.

Please note that late homework assignments will not be accepted unless pre-approval is given for exceptional circumstances. Only a hard copy of the homework assignment is accepted at the beginning of class on the specified due date. It might be wise to keep a photocopy or at the very least save assignments electronically for your own protection. Graded assignments will generally be returned during the next class. One of the three grades (check minus, check, and check plus) will be given to each homework assignment. Getting a check means that the student or the group gets full credit for the assignment. For the assignments with check minus, there is one more opportunity to re-submit the assignment to get full credit. However, this submission should be made no later than a week from the day the assignment is returned. The second version should be a hard copy as well and the first version should be attached to the second version for comparison. If an assignment ends up with a check minus without resubmission or so, the student or group will get only partial credit for the assignment depending on the level of completion. A ”check plus” means an excellent work, but there is no extra credit for the work other than getting full credit. So, a check plus is simply an acknowledgement for a great job.

Exams: There will be an in-class midterm exam and a final take-home exam. These exams, unlike homework assignment, should be taken individually.

The midterm exam will be closed book and closed class note; however, students may prepare and use up to one 8.5x11 two-sided pages of note. Students should bring a calculator to the exam, and note the sharing of calculators between students will not be allowed.

The final exam will be completed by you alone, without the aid of discussing the questions and solutions with other classmates, students outside the class or faculty. Students are on their honor to do exams completely independently.

Students found doing otherwise will be subject to the maximum University penalties.
Course Grades

Your assignments and exams will be combined using a weighted average grading scheme with the corresponding weights given below.

**Assessment Weight:**
Total homework points converted to a percentage 50%
Total midterm exam points converted to a percentage 25%
Total final exam points converted to a percentage 25%
Final letter grades will then be assigned based on the given scale.

**Overall Course Percent Grade:**

98.00% ∼ 100.00%: A+
92.00% ∼ 97.99%: A
88.00% ∼ 91.99%: A-
85.00% ∼ 87.99%: B+
82.00% ∼ 84.99%: B
78.00% ∼ 81.99%: B-
75.00% ∼ 77.99%: C+
72.00% ∼ 74.99%: C
68.00% ∼ 71.99%: C-
65.00% ∼ 67.99%: D+
62.00% ∼ 64.99%: D
58.00% ∼ 61.99%: D-
≤ 57.99%: F

**Notes:** With exceptions of computational error or human mistakes, grades will not be changed once they are posted. Incomplete option is not for poor performance in the course. Unless the student can provide very compelling reasons with proof documents, incomplete will not be given.

**Tentative Course Schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Chapters</th>
<th>Assignment Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 26</td>
<td>Introduction and review of hypothesis testing for means</td>
<td>Ch.1-6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Feb 2</td>
<td>Distributions of statistics to compare variances (R demo)</td>
<td>Ch.7&amp;9</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Feb 9</td>
<td>Quantitative vs Quantitative: Correlation and simple regression</td>
<td>Ch.10&amp;17</td>
<td>HW1</td>
</tr>
<tr>
<td>4</td>
<td>Feb 16</td>
<td>Quantitative vs Quantitative: Multiple regression I</td>
<td>Ch.18</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Feb 23</td>
<td>Quantitative vs Quantitative: Multiple regression II</td>
<td>Ch.18</td>
<td>HW2</td>
</tr>
<tr>
<td>6</td>
<td>Mar 2</td>
<td>Quantitative vs Categorical: Multiple regression III</td>
<td>Ch.18</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Mar 9</td>
<td>Quantitative vs Categorical: One-Way ANOVA</td>
<td>Ch.11</td>
<td>HW3</td>
</tr>
<tr>
<td>8</td>
<td>Mar 16</td>
<td>In-class exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-</td>
<td>Mar 23</td>
<td>Spring break (No Class)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Mar 30</td>
<td>Quantitative vs Categorical: Multiple factor ANOVA</td>
<td>Ch.13</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Apr 6</td>
<td>Quantitative vs Categorical: Multiple comparisons procedures</td>
<td>Ch.12</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Apr 13</td>
<td>Quantitative vs Categorical/Continuous: ANCOVA</td>
<td>Ch.14</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Apr 20</td>
<td>Quantitative vs Categorical/Continuous: Mixed effect models</td>
<td>Ch.15</td>
<td>HW4</td>
</tr>
<tr>
<td>13</td>
<td>Apr 27</td>
<td>Conferences: AERA/NCME (No Class)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>May 4</td>
<td>Multiple Quantitative Outcomes: Repeated measures</td>
<td>Ch.16</td>
<td>HW5</td>
</tr>
<tr>
<td>15</td>
<td>May 11</td>
<td>Review</td>
<td></td>
<td>Final exam distribution</td>
</tr>
</tbody>
</table>

Note1: If you have Statistical Concepts: A Second Course, take 10 off from the chapters above to find corresponding chapters.

Note2: The class on Feb 2 will be led by the TA as I will be serve for IES review panel.
Course Procedures and Policies

Please visit http://www.ugst.umd.edu/courserelatedpolicies.html for full course-related policies. Here are some of them that the instructor wants to emphasize.

**Accommodations for Emergencies & Email Communication :**
When the University closes on the day of class, we will have no class. Otherwise, I strongly urge you to be vigilant about your email and/or the course website on CANVAS if there are any threats (e.g. extreme weather) that could potentially prohibit having class at our regular time.

If you need to be absent from class or late for the class significantly (or leaving early), letting me know about it ahead of the time would be much appreciated. All students are expected to take the exams and/or submit assignments on the specified dates and no make-up exams are given. You must contact me before an exam if you are going to be absent or you will receive a zero for that assessment.

The primary communication tool will be emails. However, I would like to remind you that you should allow me at least 24 hours to take care of emails due to my other duties as a faculty member. Emergencies deserve prompt replies, but last minute questions with respect to assignments might not be well taken. I strongly recommend that you should plan ahead to meet the deadlines properly.

**Academic Accommodations :**
In compliance with and in the spirit of the Americans with Disabilities Act (ADA), I would love to work with you if you have a documented disability that is relevant to successfully completing your work in this course. If you need academic accommodation by virtue of a documented disability, please contact me as soon as possible to discuss your needs.

**Academic Integrity :**
The University of Maryland, College Park, has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible to uphold these standards for this course. It is imperative that you are aware of the consequences of cheating, fabrication, facilitation, and plagiarism. For more information on the code of Academic Integrity or the Student Honor Council, please visit http://www.studenthonorcouncil.umd.edu/code.html for details. Plagiarism and other forms of academic fraud are a violation of university regulations and unacceptable under any circumstance. These instances have to be and will be reported to the Honor Council in writing. Notes on plagiarism in this class: Due to the nature of reporting statistical results, some expressions are commonly used and should be phrased in the same/similar ways. However, how to approach a problem and end up with the solution is definitely a result of logic process, and this should not be stolen and used with proper citations.

**Religious observances :**
The University of Maryland policy on religious observances states that students not be penalized in any way for participation in religious observances. Students shall be allowed, whenever possible, to make up academic assignments that are missed due to such absences. However, the must contact the instructor before the absence with a written notification of the projected absence, and arrangements will be made for make-up work or examinations.

**Student Participation :**
The classes will be composed of lectures and small group/class discussions. Each student’s meaningful participation is very appreciated and will contribute to entire learning process, promoting critical thinking skills. Throwing questions and bringing in topic-related problems to class are always welcomed. Unexcused absences from more than one third of the lectures (5 times) will result in an F.