Course Description

EDMS 651 is the final course of a three-course sequence in basic statistical methods EDMS 645, EDMS 646, and EDMS 651 offered by EDMS. The purpose of EDMS 651 is to provide solid and comprehensive training in quantitative methods, focusing on regression-based techniques for analyzing quantitative social science data. We will begin the course with advanced topics in multiple regression analysis (e.g., mediation analysis, path analysis, and missing data analysis) after reviewing basic multiple regression techniques that were covered in EDMS 646. Not only general but also generalized linear models for nonnormal outcome variables (e.g., logistic, multinomial logistic, and Poisson regression models) are covered during the second half of the semester. Then extended regression-based techniques such as nonlinear, nonparametric, and bootstrapping regressions are introduced at the end of the semester. This course focuses on the proper understanding and application of the general/generalized 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 or generalized 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 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.


or


Statistical Software Related


**Secondary References**


Course Delivery

Course slides and supplemental materials will be made available by 9AM every Wednesday 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 if you have not changed the default setting. 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 only (with an exception of Mplus for mediator analysis). There will not be formal lab sessions unless the instructor sees the needs. However, lab materials 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.

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., STATA, 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 the electronic copy of the homework assignment is accepted at
the **beginning of class** on the specified due date. Graded assignments will generally be returned by 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 also an electronic 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.

**Tentative Course Schedule**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Reading</th>
<th>Assignment Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Aug 29</td>
<td>Introduction and review of multiple regression analysis I</td>
<td>5,6,7</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sep 5</td>
<td>Review of multiple regression analysis II</td>
<td>11,12,13</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Sep 12</td>
<td>Review of multiple regression analysis III</td>
<td>11,12,13</td>
<td>HW1</td>
</tr>
<tr>
<td>4</td>
<td>Sep 19</td>
<td>Mediator analysis and path analysis</td>
<td>TBA</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sep 26</td>
<td>Measurement error issues in MRA</td>
<td>TBA</td>
<td>HW2</td>
</tr>
<tr>
<td>6</td>
<td>Oct 3</td>
<td>Missing data analysis</td>
<td>20, TBA</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Oct 10</td>
<td>Logistic regression I</td>
<td>14</td>
<td>HW3</td>
</tr>
<tr>
<td>8</td>
<td>Oct 17</td>
<td>In-class exam</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Oct 24</td>
<td>Review midterm, Logistic regression II</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Oct 31</td>
<td>Multinomial logistic regression</td>
<td>14</td>
<td></td>
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<tr>
<td>11</td>
<td>Nov 7</td>
<td>Other generalized linear models</td>
<td>15</td>
<td>HW4</td>
</tr>
<tr>
<td>12</td>
<td>Nov 14</td>
<td>Extension: Bootstrap</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Nov 21</td>
<td>Thanksgiving- No class</td>
<td></td>
<td></td>
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<tr>
<td>14</td>
<td>Nov 28</td>
<td>Extension: Nonlinear &amp; nonparametric regression</td>
<td>17,18</td>
<td>HW5</td>
</tr>
<tr>
<td>15</td>
<td>Dec 5</td>
<td>Final exam due</td>
<td></td>
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**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. There will be no extra credit opportunities. Incomplete option is not for poor performance in the course. Incomplete for this course will be given on a case-by-case basis. However, unless the student can provide very compelling reasons with proof documents, incomplete will not be given.

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**Course Procedures and Policies**

**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 :**
If you have a registered disability that will require accommodation, please see the instructor so necessary arrangements can be made. If you have a disability and have not yet registered with the University, please contact Disability Support Services in the Shoemaker Building at https://www.counseling.umd.edu/ads/start/eligibility/ or at (301.314.7682) as soon as possible.

**Academic Integrity :**
The University of Maryland, College Park has a student-administered Honor Code and Honor Pledge. For more information on the Code of Academic Integrity or the Student Honor Council, please visit
https://www.president.umd.edu/administration/policies/section-iii-academic-affairs/iii-100a. The code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. It is very important for you to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism. The code prohibits students from cheating, fabrication, facilitating academic dishonesty, and plagiarism. Instances of this include submitting someone else’s work as your own, submitting your own work completed for another class without permission, or failing to properly cite information other than your own (found in journals, books, online, or otherwise). Any form of academic dishonesty will not be tolerated, and any sign of academic dishonesty will be reported to the appropriate University officials.

**Course evaluations:**
As a member of our academic community, students have a number of important responsibilities. One of these responsibilities is to submit course evaluations each term though CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to CourseEvalUM is confidential. Campus will notify you when CourseEvalUM is open for you to complete your evaluations for fall semester courses. Please go directly to the website (www.courseevalum.umd.edu) to complete your evaluations. By completing all of your evaluations each semester, you will have the privilege of accessing online, at Testudo, the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

**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 and 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.