

**RMTD 483**  
**Multivariate Statistics**

**Instructor:** Meng-Jia Wu Bohanon, Assistant Professor

**Classroom:** Corboy Law Center, Room 710

**Class time:** Tuesday, 4:15-6:45pm

**Office hour:** By appointment

**Office:** Lewis Towers, Room 1120

**Email:** mwu2@luc.edu

**School of Education conceptual framework**

Our School's conceptual framework is "professionalism in service of social justice".

This course contributes to this framework by equipping students with knowledge and experience for conducting valid quantitative research. Through conducting, interpreting, and reporting reliable social science studies, researchers can help further the scholarly understanding of the events and practices that influence the field of education. The ultimate outcome of this understanding is to ensure that that all individuals, no matter their ability, race, religion, socioeconomic status, age or gender benefit from effective social science research.

**Course topics & objectives**

Major topics introduced in this class are multiple regression, MANOVA, MANCOVA, repeated MANOVA, discriminant analysis, canonical correlation, and principal components & factor analysis. Students are expected to

1. Get familiar with the terms used in multivariate data analysis.
2. Understand the theoretical basis and assumptions for the techniques introduced in this class.
3. Be able to select and apply appropriate procedures to analyze multivariate data.
4. Be able to interpret the outputs from multivariate analysis.
5. Be able to study further in quantitative methods.

Knowledge of basic algebra and univariate inferential statistical techniques is required; knowledge of calculus is not required.

**Technology**

Students will conduct analyses using the latest version of SPSS-PC.

**Required text**

Tabachnick, B. G. and Fidell, L. S. (2006). Using Multivariate Statistics. 5th Ed, Boston, MA: Allyn and Bacon.

\*Go to [http://wps.ablongman.com/ab\\_tabachnick\\_multistats\\_5](http://wps.ablongman.com/ab_tabachnick_multistats_5) to find the data used in the example in the text.

Field, A. (2009). *Discovering Statistics Using SPSS* (3<sup>rd</sup>. ed.). Sage Publications. ISBN-10: 1847879071; ISBN-13: 978-1847879073

### Homework

Seven homework assignments will make up the points devoted to homework. The assignments are not all equal in length. Total homework points will be converted to a percentage score, then weighted and combined with exam scores to obtain a final overall grade. You are encouraged to work with another student in this class to discuss the questions and the direction of analysis asked in the HWs. You are also allowed and encouraged to discuss with other groups. However, each group should write up the answers separately and turn in a copy of the group work by the due date.

Each group is given a total of **6** late days that can be used throughout the semester without any consequence to the final grade. You may use two late days on each of the assignment 1 to 3, or all 6 days on one assignment. No late date can be used on the last assignment so the answer key, which will be provided for each HW, can be posted in time for the purpose of preparing for the final exam. If more than 6 late days are accumulated, it will affect your final course grade, as described below. Late homework should be turned in during business hours to the faculty mail box on the 11<sup>th</sup> floor at the Lewis Tower campus.

<u>Number of late days</u>	<u>Consequences</u>
0-6	None
6-8	Marginal grades will be graded down
8-10	Downgrade one level on final grade (e.g., A reduced to A-)
10+	Downgrade two levels on final grade (e.g., A reduced to B+)

If you would like to appeal any grade after your HW is graded, you must make the appeal in writing and submit it along with the graded HW to the instructor.

### Presentation

This activity is designed for students to practice searching the literature with specific goals as well as to practice presenting a study with multivariate statistics involved. You will present the paper of your choice as if you were the researcher. A specific guideline will be posted soon.

### Evaluation

Grades will be based on points accumulated on homework, presentation, and examinations. There will be 100 total possible points, distributed as follows:

Homework	45%
Presentation	20%
Midterm exam	15%
Final exam	20%

**Other important issues****▪ Academic Honesty**

Academic honesty is an expression of interpersonal justice, responsibility and care, applicable to Loyola University faculty, students, and staff, which demands that the pursuit of knowledge in the university community be carried out with sincerity and integrity. The School of Education's Policy on Academic Integrity can be found at: [http://www.luc.edu/education/academics\\_policies\\_integrity.shtml](http://www.luc.edu/education/academics_policies_integrity.shtml). For additional academic policies and procedures refer to: [http://www.luc.edu/education/academics\\_policies\\_main.shtml](http://www.luc.edu/education/academics_policies_main.shtml)

**▪ Accessibility**

Students who have disabilities which they believe entitle them to accommodations under the Americans with Disabilities Act should register with the Services for Students with Disabilities (SSWD) office. To request accommodations, students must schedule an appointment with an SSWD coordinator. Students should contact SSWD at least four weeks before their first semester or term at Loyola. Returning students should schedule an appointment within the first two weeks of the semester or term. The University policy on accommodations and participation in courses is available at: <http://www.luc.edu/sswd/>

**▪ Harassment (Bias Reporting)**

It is unacceptable and a violation of university policy to harass, discriminate against or abuse any person because of his or her race, color, national origin, gender, sexual orientation, disability, religion, age or any other characteristic protected by applicable law. Such behavior threatens to destroy the environment of tolerance and mutual respect that must prevail for this university to fulfill its educational and health care mission. For this reason, every incident of harassment, discrimination or abuse undermines the aspirations and attacks the ideals of our community. The university qualifies these incidents as incidents of bias.

In order to uphold our mission of being Chicago's Jesuit Catholic University-- a diverse community seeking God in all things and working to expand knowledge in the service of humanity through learning, justice and faith, any incident(s) of bias must be reported and appropriately addressed. Therefore, the Bias Response (BR) Team was created to assist members of the Loyola University Chicago community in bringing incidents of bias to the attention of the university. If you believe you are subject to such bias, you should notify the Bias Response Team at this link: <http://webapps.luc.edu/biasreporting/>

**▪ Diversity**

School of Education is committed to ensure the learning environment and activities are designed with respect of individual and cultural differences. The examples used in this class are chosen to reflect the diversity.

**Tentative schedule:**

T: Tabachnick &amp; Fidell (2006) ; F: Field (2009)

Week	Date	Topics	Readings	HW Due
1	1/18	Introduction	T: Chs. 1 & 4 F: Ch. 4	
2	1/25	Matrix algebra & SPSS syntax	T: Appendix A	
3	2/1	Multiple regression using matrix I	T: Ch. 5 F: Ch. 7	HW1: Matrix Operation
4	2/8	Multiple regression using matrix II	T: Ch. 5 F: Ch. 7	
5	2/15	ANOVA & MANOVA	T: Chs. 3 & 7 F: Chs. 10 & 16	HW2: MR
6	2/22	ANCOVA & MANCOVA	T: Chs. 6 & 7 F: Chs. 11	HW3: MANOVA
7	3/1	Repeated MANOVA (Profile analysis)	T: Ch. 8 F: Ch. 13	HW4: MANCOVA
8	3/8	~*~*~ <b>Spring break</b> ~*~*~		
9	3/15	Discriminant Analysis	T: Ch. 9	HW5: Repeated MANOVA
10	3/22	<b>Midterm exam</b>		
11	3/29	Canonical Correlation	T: Ch. 12	HW6: Discriminant Analysis
12	4/5	Principal components and factor analysis	T: Ch. 13 F: Ch. 17	HW7: Canonical Correlation
13	4/12	<b>Presentation</b>		
14	4/19	<b>Review</b>		
15	4/26	<b>Final exam</b>		