

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

**Instructor:** Meng-Jia Wu, Associate Professor

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

**Class time:** Wednesday, 7 - 9:30pm

**Office hour:** By appointment

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**School of Education conceptual framework**

Our School's conceptual framework is "social action through education". 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 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 (in the matrix format), MANOVA, MANCOVA, repeated MANOVA, discriminant analysis, canonical correlation, and logistic regression. 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.

**Required texts**

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed., International ed.). Boston, [Mass.] ; London: Pearson.

Field, A. (2013). *Discovering statistics using IBM SPSS* (4<sup>th</sup> ed.) Thousand Oaks, CA: SAGE Publications. ISBN-10: 1446249182; ISBN-13: 978-1446249185.

**Assignments**

Seven 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 other scores (see below) to obtain a final

overall grade. You are encouraged to work with another student in this class to discuss the questions and analyses in the HWs. You are also allowed and encouraged to discuss with other groups. However, each group should write up the answers independently and turn in just one copy of the group work by the due date. **DO NOT CIRCULATE YOUR WRITTEN HOMEWORK** between groups nor among individuals outside of the group through e-mail in order to avoid the possible plagiarism.

Late work is not acceptable unless prior arrangements have been made with the instructor. Late assignments will automatically be worth only half of their original point value.

### Final exam

The final exam is open-book and open-note, and you may use calculators during the exam. However, books, notes, and calculators may **NOT** be shared during exams, so be sure to bring your own materials.

### 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 is provided in the end of this syllabus.

[!] Please note that the presentation is part of the class. You are expected to present and stay for other students' presentations.

### Participation

Class participation includes but is not limited to, attending class on time, actively participating in class activities and discussions, asking and answering questions, listening to and respecting the views, thoughts, and opinions of your classmates. **If you must be absent from class because of illness or emergency, notify the instructor as early as possible.**

### Evaluation

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

Assignments	50%	Presentation	10%
Final exam	30%	Participation	10%

The grade ranges in terms of percentage are:

100.0-90.0 = A	84.9-80.0 = B+	69.9-65.0 = C+	54.9 and below = F
89.9-85.0 = A-	79.9-75.0 = B	64.9-60.0 = C	
	74.9-70.0 = B-	59.9-55.0 = C-	

**Dispositions**

Each course in the School of Education focuses on one or more professional dispositions. Students are offered opportunities to receive feedback on their dispositional growth in the areas of professionalism, Inquiry and/or social justice. The evaluation of SOE student's disposition will be recorded in LiveText. The expected behaviors for specific dispositions for this class and the evaluation rubrics are listed in the end of this syllabus.

**IDEA Objectives**

IDEA is an evaluation system that our School uses to assess whether a class reaches the major goals in the end of the semester. The essential objectives for this course are:

- Gaining a basic understanding of the subject (e.g., factual knowledge, methods, principles, generalizations, theories)
- Learning to apply course material (to improve thinking, problem solving, and decisions)
- Learning appropriate methods for collecting, analyzing, and interpreting numerical information

Please see Syllabus Addendum below for more information.

**Loyola University Chicago  
School of Education  
Syllabus Addendum**

**IDEA Course Evaluation Link for Students**

Each course you take in the School of Education is evaluated through the IDEA Campus Labs system. We ask that when you receive an email alerting you that the evaluation is available that you promptly complete it. To learn more about IDEA or to access the website directly to complete your course evaluation go to: <http://luc.edu/idea/> and click on **STUDENT IDEA LOGIN** on the left hand side of the page.

**Dispositions**

All students are assessed on one or more dispositional areas of growth across our programs: **Professionalism, Inquiry, and Social Justice**. The instructor in your course will identify the dispositions assessed in this course and you can find the rubrics related to these dispositions in LiveText. *For those students in non-degree programs, the rubric for dispositions may be available through Sakai, TaskStream or another platform.*

Disposition data is reviewed by program faculty on a regular basis. This allows faculty to work with students to develop throughout their program and address any issues as they arise.

**LiveText**

All students, *except those who are non-degree*, must have access to LiveText to complete the benchmark assessments aligned to the Conceptual Framework Standards

and all other accreditation, school-wide and/or program-wide related assessments. You can access more information on LiveText here: [LiveText](#).

**Syllabus Addendum Link**

- [www.luc.edu/education/syllabus-addendum/](http://www.luc.edu/education/syllabus-addendum/)

This link directs students to statements on essential policies regarding *academic honesty, accessibility, ethics line reporting* and *electronic communication policies and guidelines*. We ask that you read each policy carefully.

This link will also bring you to the full text of our conceptual framework that guides

**Tentative schedule:**

T: Tabachnick &amp; Fidell (2013) ; F: Field (2013)

<b>Week</b>	<b>Date</b>	<b>Topics</b>	<b>Readings</b>	<b>HW Due</b>
1	1/18	Introduction	T: Ch. 1	
2	1/25	Matrix algebra & SPSS syntax	T: Appendix A	
3	2/1	Multiple regression using matrix I	T: Ch. 5 F: Ch. 8	HW1: Matrix Operation
4	2/8	Multiple regression using matrix II		
5	2/15	MANOVA – Part I	T: Chs. 3 (pp.37-55) & 7 F: Chs. 11 & 16	HW2: MR
6	2/22	MANOVA – Part II MANCOVA – Part I	T: Chs. 6 & 7 F: Ch. 12	HW3: MANOVA
7	2/29	MANCOVA – Part II		
8	3/7	<b>Spring Break – No Class</b>		
9	3/14	Repeated MANOVA - Profile analysis	T: Ch. 8 F: Ch. 14	HW4: MANCOVA
10	3/21	Discriminant Analysis	T: Ch. 9	HW5: PA
11	3/28	Canonical Correlation	T: Ch. 12	HW6: DA
12	4/4	Logistic Regression I	T: Ch. 10 F: Ch. 19	HW7: CC
13	4/11	Logistic Regression II		HW8:LR
14	4/18	Structure equation modeling	T: Ch. 14	
15	4/25	<i>Presentation</i>		
16		<b>Final Exam</b>		

## Research Methodology PhD Program - Disposition Assessment

Course: RMTD 483 – Multivariate Statistics

	Exceeds Standard	Meets Standard	Partially Meets Standard	Does Not Meet Standard
<b>Professionalism (management domain)</b>	Candidate manages time and responsibilities to meet deadlines and expectations, making adjustments as appropriate and assist others to meet the standard.	Candidate manages time and responsibilities to meet deadlines and expectations, making adjustments as appropriate.	More than 2/3 of the time throughout the course candidate manages time and responsibilities to meet deadlines and expectations, making adjustments as appropriate.	Candidate does not manage time and responsibilities to meet deadlines and expectations, making adjustments as appropriate.
<b>Professionalism (management domain)</b>	Candidate always communicates effectively and appropriately with faculty and peers.	Candidate usually communicates effectively and appropriately with faculty and peers.	Candidate sometimes communicates effectively and appropriately with faculty and peers.	Candidate does not communicate effectively and appropriately with faculty and peers.
<b>Inquiry (methodology domain)</b>	Candidate is able to carry out an inquiry process, including asking questions, designing studies, sampling, collecting and analyzing data, interpreting results, and reporting findings outside of the classroom setting.	Candidate is able to carry out an inquiry process, including asking questions, designing studies, sampling, collecting and analyzing data, interpreting results, and reporting findings.	Candidate sometimes is able to carry out an inquiry process, including asking questions, designing studies, sampling, collecting and analyzing data, interpreting results, and reporting findings.	Candidate is not able to carry out an inquiry process, including asking questions, designing studies, sampling, collecting and analyzing data, interpreting results, and reporting findings.

## REQUIREMENTS FOR THE FINAL PRESENTATION

Turn in the study of your choice for presentation by **March 21st** to get approval by **March 28th**  
Presentation date: **April 25th**

This activity is designed for you to practice searching the literature with specific goals (which will be described below) as well as to practice presenting a study using multivariate statistics. You will present a paper of your choice as if you were one of the researchers.

You can pair up with another student in the class and work on this presentation as a group, or you can choose to present individually.

Below are the specific requirements for the final presentation:

### Search of the study

1. The study should focus on the topic in your field or relate to the field of your current research interest.
2. The study should adopt at least one of the following analytical methods to answer the major research question(s): MANOVA, MANCOVA, profile analysis, discriminant analysis, and/or canonical correlation.
3. Search on-line databases through our school library website at <http://libraries.luc.edu/databases>, or search any databases you can access. You can also conduct a manual search and browse through the journals.
4. The study should be no less than 7 pages and no longer than 35 pages. Published papers are preferred.
5. The conceptual framework of the study should make sense and the methodology section of the paper should be clear (so you would have enough information for your presentation). **Be sure you have enough statistics in the paper for you to discuss in your presentation.**
6. After you select the study, e-mail the downloaded file to the instructor. Once the study is approved for presentation, it will be posted in Sakai for everybody to view. Make sure you select the right study for you (e.g., you are interested in it, and the conceptual framework, method and the statistics make sense to you) to avoid the last minute change.
7. Submit the study of your interest as soon as possible. You do not have to wait until the due date to get the approval.

### Presentation requirements

1. You will need to use either Power Point slides or handouts while presenting the study of your choice. If you decide to use handouts, you will need to bring enough copies to the class.
2. Each person/group will have 12 to 15 minutes to present the paper, followed by questions from the audience.

The suggested distribution of the time spent during the presentation:

*Conceptual framework & research question: 4 to 5 minutes*

*Methodology: 2 to 3 minutes*

*Analysis (statistics): 4 to 5 minutes*

*Conclusion: 2 minutes*

3. The “conclusion” in the presentation could be the summary made by the original researchers, which can be found in the last section of a study, or it can be from your observation on the things that should be addressed in the study.

#### Participation requirement

Each student is responsible to ask at least one question to the student's presentation whose First name is next to her/him alphabetically (A to Z).