

ED PSY 825: Multivariate Methods

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- I do my very best to respond to email within 24 hours during regular business hours. If you do not get a response from me within a couple of work days, please feel free to follow up with a reminder. Note that I may not check and respond to email in the evenings or on weekends.
- Please do check the Canvas course page before emailing to see if the information is posted there. For example, if I already received some questions about a homework problem, I may have posted clarifications on Canvas. If you cannot find the information, do feel free to send me an email.

Office Hours: Please **contact me by e-mail to set up a time** to meet, as necessary.

- We can meet in person, online, or speak by phone.
- Please let me know at least a day or two in advance of when you would like to meet so we can set up a mutually convenient time and modality.

Course Objectives: This course will focus on the "classical" multivariate analysis procedures. The course will be taught from an applied perspective, and the objectives are to enable students to:

- Identify the most appropriate analysis for research questions pertaining to multivariate data.
- Use statistical software to carry out the data analysis and interpret the statistical information appropriately.
- Clearly communicate the results of the statistical analyses to address the research questions of interest.

By the end of the course, students should be able to identify the multivariate analysis most appropriate for a given research question and data set, perform the analysis correctly, and interpret the results properly. Students will be exposed to multivariate methods and analyses that they may need to use in their own research or encounter in reading research articles.

Pre-requisites: ED PSY 724 or equivalent (i.e., proficiency with regression and ANOVA models as well as statistical computing). A course on Multiple Regression models (such as ED PSY 820) is strongly recommended prior to taking this course, as is a course on ANOVA models (such as ED PSY 824).

Textbook: Tabachnick & Fidell (2019). [Using Multivariate Statistics, 7th edition](#). Pearson. ISBN: 9780134790541.

- Other readings and possible books of interest (optional) will be posted on the course web site.

Computing: Students will be required to use some statistical software packages (such as SAS or SPSS). Students are expected to be **already proficient** in at least one software package. The demonstrations and examples provided will focus on the use of SAS. Students who wish to use other software are welcome to do so *on their own*.

- Please be aware that I will be able to help you most with SAS. If you want to use another software package, you will need to figure out how to obtain the correct results with that package.
- Students have remote access to software through UWM's [Remote Lab Access](#). Further computing information and instructions are posted on the course Canvas site under "Computing Resources".

Course Web Site and Delivery: This course will make extensive use of its **Canvas** site.

- The Canvas site can be accessed at [UWM Canvas Home](#) and instructions/support for using Canvas are available at [Student Canvas support](#).
- Students are expected to check the site on a regular basis for announcements, course content, assignments, discussions, and any other course information.
 - You can specify your [preferred notification settings](#) in Canvas. I recommend that you enable the notifications for the Announcements, at least.

- I will plan to post the materials, including course **notes** (with and without a voice-over recording), no later than **Friday** of each week. I will also plan to include some **learning checks** (not counted towards the course grade) that you are encouraged to do to check your understanding prior to the class meetings and before starting the homework assignments (which will count towards the course grade).
 - Students are expected to review the notes (and attempt the learning checks) each week **prior** to the class meeting where the material will be discussed.
- We will meet on **Wednesdays at 3:30 pm**. The first class meeting (Jan. 26, 2022) will be online and should be accessed through the Zoom link on Canvas. After that we will adapt as necessary and/or preferred; the plan is to (eventually) hold class meetings in person with remote participation as an option.
 - The class meetings will consist of providing **clarifications** and answering student questions about the material or assignments, the learning checks, or any other course information.

Course structure and student evaluation:

- **Homework:**
 - Homework problem sets will generally be **assigned every week** (based on that week's material) and will be submitted on Canvas every few weeks.
 - The assignments will likely be **due on Wednesdays**, approximately every 2-3 weeks. Specific due dates will be posted on Canvas. (Note that assignment points may show up as 0 on Canvas but this will be updated once assignments are posted/graded.)
 - Late homework assignments will be accepted with a **10% point deduction** for each day they are late (in other words, you will lose 10% of the total number of points for the assignment for each day it is late, including weekend days). **Please communicate with me (the instructor) prior to the due date if there are extenuating circumstances and/or your homework will be late.** It is preferable that you submit an assignment that reflects **your best work** and is a bit late than one that does not reflect your best work but is on time.
 - The homework assignments will consist of questions that are intended to give you some hands-on practice with the material. You will need to make sure that you are clearly communicating your understanding in your answers (see separate document posted on Canvas for **general homework guidelines**).
 - Each question (or major component) will be graded on a three-point scale to indicate the level of accuracy and understanding reflected in it:

Points	Description
3	Complete, clear and correct.
2	Some mistakes and/or misconceptions, somewhat unclear or incomplete.
1	Many mistakes and/or misconceptions, very unclear or incomplete.
0	Not done or barely attempted.
 - Homework grades and comments are designed to provide you with feedback on the level of understanding conveyed in your assignment. If you find the feedback insufficient, it is **your responsibility** to make sure that you ask and understand it. Do not put off getting help if you don't know how to do a problem or do not understand the feedback you received. Better yet, if you don't understand how to do a problem, ask before the assignment is submitted. (Note that I will not "pre-grade" your answers but will be happy to clarify anything that is unclear to you.)
 - A note on working with others: The goal of the homework assignments is to make sure you are learning and understanding the material, so it would defeat the purpose if you get the right answer without really understanding why. Therefore, while you are allowed to discuss the concepts on homework assignments, it is recommended that you complete the assignments on your own. In addition, **the work you submit must be your own**, and it is considered academic misconduct to submit anyone else's work (or words) as your own.

- Please feel free to post any questions (or helpful information for other students) in the **Discussions** area on Canvas.
- **Exams:**
 - There will be one **midterm** exam as well as a **final** exam. These will be “take-home” exams.
 - The midterm exam will be due around the middle of the course (date will be clearly posted on Canvas) and the final exam will be due during finals week.
 - Students must **complete the exams independently** and with the utmost regard for **academic integrity** (i.e., they should be treated as if they are in-class). Students will **not** be allowed to collaborate on or discuss the exams with anyone (other than the instructor), and violations of this will be considered academic misconduct.

The weights assigned to each of these components will be:

Homework	25%
Mid-term exam	35%
Final exam	40%

➤ *There will be NO extra credit option in this course.*

Using these weights, final scores (out of 100) will be computed and these will be converted to letter grades as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
90-100	85-89	80-84	75-79	70-74	67-69	63-66	60-62	57-59	53-56	50-52	below 50

Academic Integrity:

- It is better to receive an honest grade on your own work than to risk committing plagiarism or academic misconduct. If you are unsure what is acceptable, or need help, please ask.
- Excerpts from [UWM's Academic Integrity Online page](#):
 - Ask your instructor if you are unsure about how to complete an assignment or course requirement appropriately.
 - When collaborating with other students, collaborate for a better understanding of the material, not for answers. (*Note: No collaboration of any kind is allowed on the exams in this course.*)
 - If you are unable to complete assignments, the instructor may be flexible with the deadlines, and receiving a late penalty is far better than academic dishonesty.
- There is additional information and resources for avoiding plagiarism at [Plagiarism.org](#)

University Policies: Policies regarding participation of students with disabilities, accommodations for religious observances, academic misconduct, student complaints, grade appeals, sexual harassment, attendance, assignment of a grade of "incomplete", etc., are available at this [Syllabus Links document](#). *Students should review these policies at the start of the course.*

Panther Community Health and Safety Standards: UWM has implemented reasonable health and safety protocols, taking into account recommendations by local, state and national public health authorities, in response to the COVID-19 pandemic. As a member of our campus community, you are expected to abide by the Panther [Interim COVID-Related Health & Safety Rules](#), which were developed in accordance with public health guidelines. These standards apply to anyone who is physically present on campus, UWM grounds, or participating in a UWM-sponsored activity:

- All individuals visiting UWM facilities must wear face coverings while indoors;
- Unvaccinated students coming to campus are required to test weekly for COVID-19; and,
- You should check daily for COVID-19 symptoms and not come to campus if you are feeling sick.

Additional details about student and staff expectations can be found on the [UWM COVID-19 webpage](#).

Time Investment: This will vary by student and by week, but my expectation is that students will spend a total of about 150 hours on the course (as would be the case for an in-person 3-credit course). This [document](#) provides a more detailed breakdown. This is an estimated workload and students will be assessed on their performance (as indicated in the syllabus), not on the time put into the course.

TENTATIVE SCHEDULE:

Week	Date	Topic	Reading
1	Jan. 26	Introduction and overview	Chapters 1-3
2	Feb. 2	Introduction to Matrix Algebra	Appendix A
3	Feb. 9	General matrix concepts	Appendix A
4	Feb. 16	Data screening (checking basic assumptions)	Chapter 4
5	Feb. 23	Multivariate Analysis of Variance and Covariance	Chapter 7
6	Mar. 2	MANOVA and MANCOVA, continued	Chapter 7
7	Mar. 9	Multivariate Repeated Measures ANOVA	Chapter 8
8	Mar. 16	Review session Midterm Exam available*	
9	Mar. 23	<i>Spring break</i>	
10	Mar. 30	Discriminant Analysis (descriptive)	Chapter 9
11	Apr. 6	Discriminant Analysis (predictive)	Chapter 9
12	Apr. 13	Principal Components Analysis	Chapter 13
13	Apr. 20	Exploratory Factor Analysis	Chapter 13
14	Apr. 27	Exploratory Factor Analysis, continued	Chapter 13
15	May 4	Introduction to confirmatory factor analysis Final Exam available*	Chapter 14
16	May 11	Review session	

**Note: The due date for each exam is anticipated to be two weeks from the day it is made available. Exact due dates will be posted on the course web page.*