ED PSY 824: Advanced Experimental Design and Analysis

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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.
- I may not check and respond to email in the evenings or on weekends. This year I am also required to take some furlough days, during which I may not be responding to email. The furlough dates for Spring 2021 (as far as I know) are Jan. 22, Mar. 26, May 14.
- 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 speak by phone or meet online through Microsoft Teams or Collaborate Ultra.
- 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. Thursdays just before or after class may work for me on most weeks.

Course Objectives: This course will introduce students to data analysis techniques appropriate for specific experimental designs, most of which are variations of the Analysis of Variance (ANOVA). The objectives of the course are to enable students to:

- Identify the most appropriate analysis for research questions involving data typically collected through experiments.
- Use statistical software to appropriately carry out the data analysis and interpret the statistical information.
- 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 analysis procedure most appropriate to address a particular research question with a given data set, carry out the analysis, and properly interpret/communicate the results. The focus will be to expose students to experimental designs and analyses that they may need to use in their own research or encounter in reading research articles.

Pre-requisites: A graduate-level statistics course (e.g., ED PSY 724) that included factorial ANOVA as well as multiple regression and statistical computing (e.g., SAS, SPSS, R).

Textbook: DESIGNING EXPERIMENTS AND ANALYZING DATA, second edition, by Scott E. Maxwell and Harold D. Delaney, published by Lawrence Erlbaum Associates (now Taylor & Francis), 2004.

- There is a third edition of the book out but I will use the second edition for the course.
- We may also discuss journal articles or other readings of relevance throughout the course. If so, these will be posted on Canvas.

Computing: Students will be required to use some statistical software packages (such as SAS, SPSS, or R). 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.

- Students should have remote access to software through UWM's Remote Lab Access. Links to more information and instructions are posted on the course Canvas site under "Computing Links".
- 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 results with that package (the book's web site contains some instructions for SPSS and R).

Course Web Site and Delivery: This course will be delivered online through its **Canvas** site.

- The site can be accessed at <u>UWM Canvas Home</u> and instructions/support for using Canvas are available at <u>Student Canvas support</u>.
- Students are expected to check the site on a regular basis for announcements, notes, assignments, discussions, and any other course information.
  - o You can specify your <u>preferred notification settings</u> in Canvas. I recommend that you enable the notifications for the Announcements, at least.
- I will plan to post the materials, including **notes** (with and without a voice-over recording), no later than Monday 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 attempting the homework assignments (which will be counted towards the course grade).
- Each **Thursday at 3pm** we will meet online through **Collaborate Ultra** on Canvas.
  - o In these meetings students will have a chance to ask questions about the material or assignments, review the learning checks, and discuss any other course information.
  - o Instructions for using this platform are available at <u>Collaborate Ultra instructions for students</u>.
  - o Please plan to mute your microphone to eliminate background noise. You may also wish to use headphones to reduce feedback noise. Use the "Raise Your Hand" or chat feature to ask questions, and unmute when called on.
  - o It would be nice if you can have your camera on or at least a picture of yourself on your Canvas profile so we can all "see" each other.
  - o I will plan to record these class meetings and post them on Canvas. Please note the following statement from the University on <u>Synchronous Online Class Recording</u>:
    > Our class sessions will be audio-visually recorded for students who are unable to attend at the scheduled time. Students who participate with their camera engaged or who utilize a profile image are agreeing to have their audio/video or image recorded. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded.
  - o If there are technical difficulties and you are able to let me know through the chat, please do.
  - o I anticipate that class meetings will usually take about an hour, but some weeks they may be shorter or longer depending on your questions.

Course structure and student evaluation:

- *Homework:*
  - o Homework problem sets will generally be **assigned every week** (based on that week's material) and will be submitted on Canvas every few weeks.
  - o The assignments will be due on Thursdays, 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.)
  - o <u>Late homework assignments</u> 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) 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.
  - o The homework assignments will consist of problems 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**).

- o Each problem (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.

- o 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.
- o Please feel free to post any questions (or helpful information for other students) in the **Discussions** area on Canvas.
- o 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.

- *Course project:*
  - o Overview: The purpose of the project is to provide an opportunity for you to apply the procedures we cover in the course to a data set or application that is (potentially) of interest to you. You will be asked to **obtain a data set**, preferably of interest to you and/or from your field of study, that can be analyzed using the procedures covered in the course.
    - ▪ The data set should contain at least one continuous variable of interest (i.e., the outcome, response, or dependent variable), and at least 2 categorical variables that constitute groups or "levels" that you would want to compare (in terms of the outcome variable).
    - ▪ I will plan to schedule a few progress checks to make sure that you have an appropriate data set and resolve any issues with it.
    - ▪ The data set can consist of data collected for another purpose (e.g., your research), but the projects should be original and should **not** consist of analyses conducted for another class or purpose.
  - o Groups: Given the size of the class, and to encourage interaction with classmates, these will be group projects with 2 students per group. Group members are expected to contribute equally to the project, and students may have an opportunity to evaluate the contributions of their project partner.
    - ▪ Feel free to try and find a partner through the Discussions section in Canvas.
    - ▪ Please let me know early on if, given current circumstances, you do not feel that you will be able to work with another student and wish to work on the project on your own.
    - ▪ There is a **survey** on Canvas (under Quizzes) where you can indicate your partner preference. Partners should be set by about the third week of the semester.
  - o Components: The project will consist of **two parts**. The first part will be due around the middle of the semester and the second will be due at the end of the semester. The same data set should be used for both components.
    - ▪ The first part will serve as a proposal, describing the data set, the research question(s), planned analyses, and possibly some preliminary results.
    - ▪ The second part will be the final report and also include the full analyses, results, and conclusions.
  - o Peer feedback/participation: You will be asked to comment and provide feedback on the first part of **at least two other projects**. The goal of this is to provide friendly, constructive feedback

to your classmates so they can incorporate it into the second part/final report. To encourage this participation, it will constitute a small part of the course grade.
- o The projects will be graded based on the suitability and accuracy of the analyses as well as clarity and level of understanding demonstrated in the written summary.
- o Further details on all components will be posted on Canvas closer to the due dates.

- *Exams*:
  - o There will be a final exam ("take-home") that will be due during finals week.
  - o Students are expected to **complete the exam independently** and with the utmost regard for academic integrity. Students will **not** be allowed to discuss the exam 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%**
Project:	**Component 1**	**10%**
	Peer feedback	**5%**
	Component 2	**25%**
Final exam		**35%**

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 on what is acceptable, or need help, please ask.
- Excerpts from UWM's Academic Integrity Online page:
  - o Ask your instructor if you are unsure about how to complete an assignment or course requirement appropriately.
  - o 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 exam in this course.*)
  - o 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*.

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. 28	Review: One-way Analysis of Variance	Chapters 1-3
2	Feb. 4	Review: One-way ANOVA and group comparisons	Chapters 3-4
3	Feb. 11	Multiple contrasts / group comparisons	Chapter 5
4	Feb. 18	Two-way ANOVA and non-orthogonal designs	Chapter 7
5	Feb. 25	Factorial ANOVA	Chapters 7-8
6	Mar. 4	Factorial ANOVA	Chapter 8
7	Mar. 11	ANCOVA and Blocking	Chapter 9
8	Mar. 18	ANCOVA and Blocking	Chapter 9
9	Mar. 25	*Spring Break*	
10	Apr. 1	Random or Nested Factors ***Project part 1 (proposal) due***	Chapter 10
11	Apr. 8	One-way Within-subjects (repeated measures) ANOVA: Univariate approach	Chapter 11
12	Apr. 15	One-way Within-subjects (repeated measures) ANOVA: Multivariate approach	Chapter 13
13	Apr. 22	Higher-order Within-subjects (repeated measures) ANOVA: Multivariate approach	Chapter 14
14	Apr. 29	Within- and Between-subjects ANOVA designs: Multivariate approach	Chapter 14
15	May 6	Within- and Between-subjects ANOVA designs: Multivariate approach (continued)	Chapter 14
16	May 13	Catch-up and/or review ***Project part 2 (final report) due***	TBD
Finals week	May 20	➢ ***Final exam due***	