

**Psychological and Quantitative Foundations (PSQF) 6243 Section 0003:  
Intermediate Statistical Methods Spring 2022**

Instructor and Home Department Information:	<b>Professor Lesa Hoffman (she/her—you can call me Lesa)</b> Educational Measurement and Statistics Program <i>PSQF Dept Office: South 361 Lindquist Center; DEO: Dr. Megan Foley Nicpon</i>
Instructor Contact Information:	Email: <a href="mailto:Lesahoffman@uiowa.edu">Lesahoffman@uiowa.edu</a> ( <i>preferred mode of contact</i> ) Office: 356 South Lindquist Center ( <i>mostly unattended</i> ) Phone: 319-384-0522 ( <i>mostly unattended</i> )
Zoom Link for Class and Instructor Office Hours:	<a href="https://uiowa.zoom.us/my/lesahoffmaniowa">https://uiowa.zoom.us/my/lesahoffmaniowa</a> Meeting ID: 5044356512; Mobile Access: +13126266799 ( <i>please use your real name as your account name to be admitted</i> )
Course Location and Time:	166 North Lindquist Center or via zoom Tuesdays and Thursdays 2:00–3:15 PM
Instructor Zoom-Only Office Hours:	Tuesdays and Thursdays 3:30–4:30 PM in a group format or individually by appointment
Volunteer Graduate Teaching Assistants' Contact Information and Zoom-Only Office Hours:	<b>Nikki Tennesen</b> (she/her; PhD student in Higher Education and Student Affairs in EPLS and MA student in Educational Measurement and Statistics in PSQF) Email: <a href="mailto:Nicole-Tennesen@uiowa.edu">Nicole-Tennesen@uiowa.edu</a> Mondays 1:00–2:00 PM and Fridays 11:00 AM–12:00 PM in a group format at: <a href="https://uiowa.zoom.us/j/92004226815">https://uiowa.zoom.us/j/92004226815</a>  <b>Lexi Oakley</b> (she/her; MA student in Educational Measurement and Statistics in PSQF); Email: <a href="mailto:Alexis-C-Oakley@uiowa.edu">Alexis-C-Oakley@uiowa.edu</a> Wednesdays 2:00–4:00 PM in a group format at: <a href="https://uiowa.zoom.us/j/94689871927">https://uiowa.zoom.us/j/94689871927</a>
Graduate Teaching Assistant (shared with PSQF 4143) Contact Information and Zoom Office Hours:	<b>Kun Wang</b> (he/him; PhD student in Counseling Psychology, PSQF) Email: <a href="mailto:Kun-Wang-2@uiowa.edu">Kun-Wang-2@uiowa.edu</a> Mondays 8:00–9:30 AM and 12:00–3:00 PM; Tuesdays 8:00–9:30 AM in a group format at: <a href="https://uiowa.zoom.us/j/5273074796?pwd=MkdBTVhEaFVxWGdma2VOTEJ2QnJjUT09">https://uiowa.zoom.us/j/5273074796?pwd=MkdBTVhEaFVxWGdma2VOTEJ2QnJjUT09</a>

**Schedule of Topics and Events:**

**This course will meet synchronously in person and on zoom.** The planned schedule of topics and events given below will likely need to be adjusted throughout the course. The **course website** will always have the **most current schedule of events and due dates**: <http://www.lesahoffman.com/PSQF6243/index.html>

**Course Objectives, Pre-Requisites, and Materials:**

This course will focus on the analysis of univariate outcomes using the **general linear model (GLM)**; i.e., regression, analysis of variance, analysis of covariance). **The course objective is for participants to be able to complete all the necessary steps in a GLM analysis:** describing the variables of interest and their zero-order associations; creating predictor variables and building models to evaluate their unique effects; and interpreting and presenting empirical findings. Prior to enrolling, participants should be comfortable with univariate descriptive statistics, measures of bivariate association, and null hypothesis significance testing.

Class time will be devoted primarily to lectures, examples, and spontaneous review, the materials for which will be available for download at the course website. Readings and other resources have been suggested for each topic and may be updated later. **Synchronous attendance (in person or via zoom) is encouraged but not required**, and you do not need to notify the instructor of a single class absence. Video recordings of each class will be made available on YouTube so that closed captioning will be provided, and supplemental videos for specific topics (e.g., software demos) may be added as well. Auditors and visitors are always welcome to attend class. No required class sessions will be held outside the regular class time given above (i.e., no additional midterm or final exam sessions). However, because the course will have an applied focus requiring the use of statistical software, participants are encouraged to attend group-based office hours (via zoom only), in which multiple participants can receive immediate assistance on homework assignments simultaneously.

### Course Requirements:

Course participants will have the opportunity to earn **up to 100 total points** by completing work outside of class. Up to **88 points** can be earned from submitting **homework assignments** (approximately 6 in total) through a custom online system—these will be graded for accuracy. Up to **12 points** may be earned from submitting **formative assessments** (approximately 6 in total) through ICON; these will be graded for effort only—incorrect answers will not be penalized. Participants may earn up to **2 extra credit points** for completing homework 0; there may be other opportunities to earn extra credit at the instructor's discretion. Finally, revisions to the planned course schedule and/or content may result in fewer homework assignments and formative assessments (and thus fewer total points) at the instructor's discretion.

### Policy on Accepting Late Work and Grades of Incomplete:

Participants may submit work at any point during the semester to be counted towards their course grade. However, in order to provide participants with prompt feedback, **late homework assignments will incur a 1-point penalty, and late formative assessments will incur a 0.5-point penalty**. Extensions will be granted as needed for extenuating circumstances (e.g., conferences, comprehensive exams, family obligations) if requested at least two weeks in advance of the due date. A final grade of "incomplete" will only be given in dire circumstances and entirely at the instructor's discretion. **All work must be submitted by Friday, May 13, 2021 at 5:00 PM to be included in the course grade.**

### Final grades will be determined by the *percentage* earned out of the total possible points:

>96% = A+, 93–96% = A, 90–92% = A–, 87–89% = B+, 83–86% = B, 80–82% = B–, 77–79% = C+, 73–76% = C, 70–72% = C– (**PASS**), 67–69% = D+, 63–66% = D, 60–62% = D–, <60% = F

### Course Software:

Participants will need to have access to statistical software—**SAS, STATA, or R+Rstudio**—that can estimate the models presented. Each of these programs are freely available to course participants in multiple ways:

- You can connect to the [U Iowa Virtual Desktop](#) (connect to the [U Iowa VPN](#) first) for free
- You can connect to the [U Iowa Research Remote Desktop](#) (connect to the [U Iowa VPN](#) first) for free
- You can [install R software](#) for free on your local machine, along with the free [graphical Rstudio interface](#) that makes R easier to use (install second after R software)
- You can connect to the web-based [SAS OnDemand](#) platform for free on your local machine
- You could also pay \$48 to install a [6-month student copy of STATA](#) on your local machine

### Recommended Course Textbook (to be purchased separately):

(D & H below): Darlington, R. B., & Hayes, A. F. (2016). [Regression analysis and linear models: Concepts, applications, and implementation](#). Guilford. Available from [U Iowa library as an e-book](#) (for multiple users at the same time).

**Other Course Readings (all available in [ICON](#) under "Files"):**

- Anderson, S. F. (2020). Misinterpreting  $p$ : The discrepancy between  $p$  values and the probability the null hypothesis is true, the influence of multiple testing, and implications for the replication crisis. *Psychological Methods*, 25(5), 596–609.
- Belzak, W. C. M., & Bauer, D. J. (2019). Interaction effects may actually be nonlinear effects in disguise: A review of the problem and potential solutions. *Addictive Behaviors*, 94, 99–108.
- Cohen, J. (1994). The earth is round ( $p < .05$ ). *American Psychologist*, 49(12), 997–1003.
- Correll, J., Mellinger, C., McClelland, G. H., & Judd, C. M. (2020). Avoid Cohen's 'small', 'medium', and 'large' for power analysis. *Trends in Cognitive Sciences*, 24(3), 200–207.
- Finsaas, M. G., & Goldstein, B. L. (2021). Do simple slopes follow-up tests lead us astray? Advancements in the visualization and reporting of interactions. *Psychological Methods*, 26(1), 38–60.
- Johfre, S. S., & Freese, J. (2021). Reconsidering the reference category. *Sociological Methodology*, 51(2), 235–269.
- Hoffman, L. (2015 chapter 2). *Longitudinal analysis: Modeling within-person fluctuation and change*. Routledge / Taylor & Francis.
- Rodgers, J. L. (2019). Degrees of freedom at the start of the second 100 years: A pedagogical treatise. *Advances in Methods and Practices in Psychological Science*, 2(4), 396–405.
- Westfall, J., & Yarkoni, T. (2016). Statistically controlling for confounding constructs is harder than you think. *PLOS ONE* 11(3), e0152719.
- Williams, M. N., Grajales, C. A. G., & Kurkiewicz, D. (2013). Assumptions of multiple regression: Correcting two misconceptions. *Practical Assessment, Research, and Evaluation*, 18, Article 11.

**Academic Misconduct:**

As a reminder, the University of Iowa College of Education has a [formal policy on academic misconduct](#), which all students in this course are expected to follow. While students can work with each other to understand the course content, all homework assignment must be completed individually using the student-specific datasets provided for each assignment. Please consult the instructor if you have questions.

**Respect for Each Other:**

The instructor wants ALL students to feel welcome and encouraged to participate in this course. **There is no such thing as a “stupid” question (or answer)**. All course participants—enrolled students and auditing visitors—should always feel welcome to ask whatever questions will be helpful in helping them understand the course content. **Questions or comments are welcome at any point** during class (aloud or using the zoom chat window), in office hours, over email, or in individual appointments with the instructor (available by request). Students with disabilities or who have any special needs are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation.

**All participants are welcome to attend class via zoom instead of in person for any reason at any time.**

If you do attend class in person, the University of Iowa strongly encourages everyone to be vaccinated against COVID-19 and to wear a face mask in all classroom settings and during in-person office hours. **If it possible that you have been exposed to COVID-19 or any other illness, please DO NOT attend class in person!** Similarly, if the instructor has been exposed to illness or the weather prohibits safe travel to class, the course will move to a temporary zoom-only format to protect all course participants. **When using zoom, please provide the name you wish for us to call you inside your zoom account** (i.e., so that it appears on your window while in use). Student use of cameras and microphones while on zoom is also encouraged but not required (out of respect for your privacy and/or limited bandwidth). Please note that class video recordings streamed to YouTube will NOT include any video from course participants (only the class audio and screen share from the instructor will be captured). Participants who do not wish for their audio to be captured can use the zoom chat window (which also allows for private direct messages to the instructor).

The University of Iowa is committed to **making the class environment (in person or online) a respectful and inclusive space** for people of all gender, sexual, racial, religious, and other identities. Toward this goal, students are invited to optionally share the names and pronouns they would like their instructors to use to address them. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories. For more information, contact the [Office of Institutional Equity](#). Additional university guidelines about classroom behavior and other student resources [are provided here](#), and the university acknowledgement of land and sovereignty is [here](#).

**Respect for The Rest of Your World:**

The instructor realizes that this course is not your only obligation in your work or your life. While class attendance in real time is not mandatory, it is strongly encouraged because frequent review of the material will be your best strategy for success in this course. However, if work or life events may compromise your ability to succeed, please contact the instructor for a confidential discussion so that we can work together to make a plan for your success. **Please do not wait until you are too far behind to try to catch up!**

**Schedule of Events for Weeks 1–4:**

Week Number	Weekday and Date	Topics	Readings and Resources for Each Topic
1	M 1/17	<b>NO HOMEWORK (HW) OR FORMATIVE ASSESSMENT (FA) DUE</b>	
	T 1/18	<b>MEET ON ZOOM ONLY</b> Lecture 0: Introduction to this Course	
	R 1/20	<b>MEET ON ZOOM ONLY</b> Lecture 0, continued Lecture 1 and Example 1: Univariate Data Description	D & H ch. 1
2	M 1/24	<b>FA1 DUE IN ICON BY 11:59 PM</b>	
	T 1/25	Lecture 1, continued	
	R 1/27	<b>MEET ON ZOOM ONLY</b> Lecture 2 and Example 2: GLMs with Single-Slope Predictors	D & H ch. 2, ch. 5.1 Effect Size Conversions Power Tables Cohen (1994) Correll et al. (2020)
3	M 1/31	<b>HW0 (for 2 points extra credit) DUE ONLINE BY 11:59 PM</b>	Video: Intro to Homework
	T 2/1	Lecture 2 and Example 2, continued	
	R 2/3	<b>MEET ON ZOOM ONLY</b> Lecture 2 and Example 2, continued	
4	M 2/7	<b>HW1 (based on Example 1) DUE ONLINE BY 11:59 PM</b>	Video: Intro to Virtual Desktop Videos: Intro to SAS, Stata, and R
	T 2/8	Lecture 2 and Example 2, continued	
	R 2/10	Lecture 2 and Example 2, continued	

**Schedule of Events for Weeks 5–13:**

<b>Week Number</b>	<b>Weekday and Date</b>	<b>Topics</b>	<b>Readings and Resources for Each Topic</b>
5	M 2/14	<b>FA2 DUE IN ICON BY 11:59 PM</b>	
	T 2/15	Lecture 2 and Example 2, continued	
	R 2/17	Lecture 2 and Example 2, continued	
6	M 2/21	<b>NO HW OR FA DUE</b>	
	T 2/22	Lecture 2 and Example 2, continued Lecture 3 and Example 3: GLMs with Multiple-Slope Predictors	D & H ch. 4, ch. 9–12 Johfref & Freese (2021) Rodgers (2019)
	R 2/24	Lecture 3 and Example 3, continued	
7	M 2/28	<b>HW2 (based on Example 2) DUE ONLINE BY 11:59 PM</b>	
	T 3/1	Lecture 3 and Example 3, continued	
	R 3/3	Lecture 3 and Example 3, continued	
8	M 3/7	<b>FA3 DUE IN ICON BY 11:59 PM</b>	
	T 3/8	Lecture 3 and Example 3, continued	
	R 3/10	Lecture 3 and Example 3, continued	
9	M 3/14	<b>NO HW OR FA DUE</b>	
	T 3/15	<b>NO CLASS OR OFFICE HOURS</b>	
	R 3/17	<b>NO CLASS OR OFFICE HOURS</b>	
10	M 3/21	<b>NO HW OR FA DUE</b>	
	T 3/22	Lecture 3 and Example 3, continued	
	R 3/24	<b>MEET ON ZOOM ONLY</b> Lecture 3 and Example 3, continued	
11	M 3/28	<b>HW3 (based on Example 3 first two models) DUE ONLINE BY 11:59 PM</b>	
	T 3/29	Lecture 4 and Example 4a: GLMs with Multiple Predictors	D & H ch. 3, ch. 5.3, ch. 8 Williams et al. (2013)
	R 3/31	Lecture 4 and Example 4a, continued	
12	M 4/4	<b>FA4 DUE IN ICON BY 11:59 PM</b>	
	T 4/5	Review: Discussion of HW4 and FA4	
	R 4/7	Lecture 4 and Example 4a, continued	
13	M 4/11	<b>HW4 (based on Example 3 last two models) DUE ONLINE !!! WED 4/13 !!! BY 11:59 PM</b>	
	T 4/12	Lecture 4 and Example 4a, continued	
	R 4/14	Lecture 4, continued Example 4b: Review and Multiple-Predictor GLM	

**Schedule of Events for Weeks 14–17:**

<b>Week Number</b>	<b>Weekday and Date</b>	<b>Topics</b>	<b>Readings and Resources for Each Topic</b>
14	M 4/18	<b>FA5 DUE IN ICON BY 11:59 PM</b>	
	T 4/19	Example 4b, continued	
	R 4/21	Lecture 5 and Example 5: GLMs with Single-Slope Interactions	D & H ch. 13–14 Finsaas & Goldstein (2021) Hoffman (2015 ch. 2)
15	M 4/25	<b>HW5 (based on Example 4a or 4b) DUE ONLINE !!! WED 4/27 !!! BY 11:59 PM</b>	
	T 4/26	Lecture 5 and Example 5, continued	
	R 4/28	Lecture 5 and Example 5, continued	
16	M 5/2	<b>FA6 DUE IN ICON BY 11:59 PM</b>	
	T 5/3	Lecture 5 and Example 5, continued	
	R 5/5	Lecture 6: Caveats and Next Steps	D & H ch. 16–17 Anderson (2020) Westfall & Yarkoni (2016)
		(planned Lecture 7 and Example 7 for GLMs with multiple-slope interactions not presented)	Belzak & Bauer (2019)
17	M 5/9	<b>Nikki's office hours from 1:00-2:00 PM</b>	
	T 5/10	<b>NO CLASS, but Lesa's office hours from 12:30-4:30 PM</b>	
	W	<b>Lexi's office hours from 2:00-4:00 PM</b>	
	R 5/12	<b>NO CLASS, but Lesa's office hours from 12:30-4:30 PM</b>	
	F 5/13	<b>Nikki's office hours from 11:00-12:00 PM HW6 (based on Example 5) DUE ONLINE BY 5:00 PM ALL OUTSTANDING WORK MUST BE COMPLETED BY 5:00 PM</b>	