Psychological and Quantitative Foundations (PSQF) 7375 Spring 2020: Applied Generalized Linear Models

Instructor:	Professor Lesa Hoffman *(she, her, hers)* Educational Measurement and Statistics Program, Department of Psychological and Quantitative Foundations *Department Office: South 361 Lindquist Center* *DEO: Dr. Megan Foley Nicpon*
Instructor Office:	South 356 Lindquist Center
Instructor Email:	Lesa-Hoffman@UIowa.edu
Course Room:	North 166 Lindquist Center (N166 LC)
Course Time:	Tuesdays and Thursdays 2:00–3:15 PM
Office Hours:	Tuesdays and Thursdays 3:15–4:30 PM in N166 LC

Schedule of Topics and Events:

The planned schedule of topics and events may need to be adjusted throughout the course. The online syllabus at the web address below will always have the most current schedule and course materials: https://www.lesahoffman.com/PSQF7375_Generalized/index.html

Course Objectives, Materials, and Pre-Requisites:

This course will illustrate the uses of generalized linear models for predicting univariate and multivariate outcomes. The course is organized to take participants through each of the cumulative steps in a statistical analysis: deciding which type of model is appropriate, creating predictor variables, building models to evaluate unique effects of predictors, and interpreting and presenting empirical findings. Class time will be devoted primarily to lectures and examples. Lecture materials will be available for download at the website above no later than the day prior to class, or else paper copies can be requested. Video recordings of the class lectures will also be available online but are not intended to take the place of class attendance (either in person or via zoom). Readings will be assigned for each specific topic as needed; the initial list of readings below may be updated later. There will be no required sessions held outside the regular class time noted above. However, because the course will have an applied focus requiring the use of statistical software, participants are encouraged to attend group-based office hours, in which multiple participants will have opportunities to work on course assignments simultaneously and receive immediate assistance. Participants should be comfortable with general linear models (e.g., analysis of variance and linear regression) prior to enrolling in this course. Auditors and visitors are always welcome.

Course Requirements:

Participants will have the opportunity to earn **up to 100 total points** in this course. Up to **86 points** can be earned from **homework assignments** (approximately 6 in total)—these will be graded for accuracy. Up to **14 points** may be earned from submitting **outside-of-class formative assessments** (approximately 7 in total); these will be graded on effort only—incorrect answers will not be penalized. Please note there will also be an opportunity to earn up to **3 points of extra credit** (labeled as homework 0; see the online syllabus for more information). There may be other opportunities to earn extra credit at the instructor's discretion.

Policy on Late Homework Assignments, Quizzes, and Grades of Incomplete:

In order to provide participants with prompt feedback, **homework assignments submitted any time after the deadline will incur a 3-point penalty.** However, 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**. **Late or incomplete outside-of-class formative assessments will**

incur a 1-point penalty when submitted. A final grade of "incomplete" will only be given in dire circumstances and entirely at the instructor's discretion.

Final grades will be determined by the *proportion* 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−, 67–69 = D+, 63–66 = D, 60–62 = D−, <60 = F

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. Please consult the instructor if you have questions.

Accommodating Students with Disabilities:

Students with disabilities or who have other special needs are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation.

Respect for Diversity:

It is the instructor's intent that students from ALL backgrounds and perspectives 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 and follow the course content. You may do so during class, in office hours, over email, or in individual appointments with the instructor (available by request).

Respect for The Rest of Your World:

The instructor realizes that this course is not your only obligation in your work or your life. If work or life events (expected or unexpected) may compromise your ability to succeed in this course, PLEASE contact the instructor for a confidential discussion (in person or over email, as you prefer) so that we can work together to make a plan for your success. Please do not wait to do so until you are too far behind to catch up!

Course Software:

Participants will also need to have access to software that can estimate the models presented. Although the course will feature SAS, Stata, and M*plus* primarily, other software programs (e.g., SPSS, R) may potentially also be used to complete homework assignments. All of these are freely available to University of Iowa members through the UIowa Virtual Desktop: https://virtualdesktop.uiowa.edu/Citrix/VirtualDesktopWeb/

Required Course Textbook (must be purchased):

Agresti, A. (2015). *Foundations of linear and generalized linear models* (1st ed.). Hoboken, NJ: Wiley & Sons.

Optional Course Textbook (can be purchased for future Stata-specific reference):

Hardin, J. W. & Hilbe, J. M. (2018). *Generalized linear models and extensions* (4th ed.). College Station, TX: STATA Press.

Other Course Readings (available via "Files" in Icon):

Hsieh, F. Y. (1989). Sample size tables for logistic regression. *Statistics in Medicine, 8*, 795-802.

Hoffman, L. (2015 chapters 2–3). *Longitudinal analysis: Modeling within-person fluctuation and change*. New York, NY: Routledge Academic.

Enders, C. K. (2010; chapters 3–5). *Applied missing data analysis*. New York, NY: Guilford.

Mize, T. (2019). Best practices for estimating, interpreting, and presenting nonlinear interaction effects. *Sociological Science 6*, 81-117.

Williams, R. (2016). Understanding and interpreting generalized ordered logit models. *The Journal of Mathematical Sociology, 40*, 7-20.

Other readings To Be Determined (TBD)…

Planned Schedule of Events (Weeks 1–8):

Week	Date	Topics	Readings
1	1/20	**NO HOMEWORK (HW) OR FORMATIVE ASSESSMENT (FA) DUE**	
	1/21	Lecture 0 and Example 0: Introduction to this Course and to Maximum Likelihood Estimation of General Linear Models	Agresti ch. 1-3 Hoffman ch. 2 Enders ch. 3
	1/23	Lecture 0 and Example 0, continued	
2	1/27	**HW0 DUE ONLINE BY 11:59 PM: 3 POINTS EXTRA CREDIT**	
	1/28	Lecture 0 and Example 0, continued	
	1/30	Lecture 1 and Example 1: Generalized Linear Models for Binary and Categorical Outcomes	Agresti ch. 4-6 Hardin & Hilbe ch. 2, 9, 15, 16 Hsieh (1989) Mize (2019) Williams (2016)
3	2/3	**FA1 DUE VIA ICON BY 11:59 PM**	
	2/4	Lecture 1 and Example 1, continued	
	2/6	Lecture 1 and Example 1, continued	
4	2/11	Lecture 2 and Example 2: Generalized Linear Models for Count and If-and-How-Much Outcomes	Agresti ch. 7 Hardin & Hilbe ch. 12-14
	2/12	**HW1 DUE ONLINE BY 11:59 PM**	
	2/13	Lecture 2 and Example 2, continued	
5	2/17	**FA2 DUE VIA ICON BY 11:59 PM**	
	2/18	Lecture 2 and Example 2, continued	
	2/20	Lecture 2 and Example 2, continued	
6	2/24	**HW2 DUE ONLINE BY 11:59 PM**	
	2/25	Lecture 3 and Example 3: Generalized Linear and Quantile Regression Models for Non-Normal Continuous Outcomes	Agresti ch. 8 Hardin & Hilbe ch. 5, 10
	2/27	Lecture 3 and Example 3, continued	
7	3/2	**FA3 DUE VIA ICON BY 11:59 PM**	
	3/3	Lecture 3 and Example 3, continued	
	3/5	Lecture 3 and Example 3, continued	
8	3/9	**HW3 DUE ONLINE BY 11:59 PM**	
	3/10	Lecture 4 and Example 4: General Linear Models for Multivariate and Repeated Measures Outcomes	Hoffman ch. 3
	3/12	Lecture 4 and Example 4, continued	

Planned Schedule of Events (Weeks 9–17):

Week	Date	Topics	Readings
9	3/16	**NO HW OR FA DUE**	
	3/17	**NO CLASS OR OFFICE HOURS**	
	3/19	**NO CLASS OR OFFICE HOURS**	
10	3/23	**NO HW OR FA DUE**	
	3/24	Lecture 4 and Example 4, continued	
	3/26	Lecture 4 and Example 4, continued	
11	3/30	**FA4 DUE VIA ICON BY 11:59 PM**	
	3/31	Lecture 5 and Example 5: Generalized Linear Models for Multivariate and Repeated Measures Outcomes	Agresti ch. 9 Hardin & Hilbe ch. 18-19
	4/2	Lecture 5 and Example 5, continued	
12	4/6	**HW4 DUE ONLINE BY 11:59 PM**	
	4/7	Lecture 5 and Example 5, continued	
	4/9	Lecture 5 and Example 5, continued	
13	4/13	**FA5 DUE VIA ICON BY 11:59 PM**	
	4/14	Lecture 6 and Example 6: General Linear Models within Path Analysis	Enders ch. 4-5
	4/16	Lecture 6 and Example 6, continued	
14	4/20	**HW5 DUE ONLINE BY 11:59 PM**	
	4/21	Lecture 6 and Example 6, continued	
	4/23	Lecture 6 and Example 6, continued	
15	4/27	**FA6 DUE VIA ICON BY 11:59 PM**	
	4/28	Lecture 7 and Example 7: Generalized Linear Models within Path Analysis	TBD
	4/30	Lecture 7 and Example 7, continued	
16	5/4	**FA7 DUE VIA ICON BY 11:59 PM**	
	5/5	Lecture 7 and Example 7, continued	
	5/7	Lecture 7 and Example 7, continued Time for Course Evaluations	
17	5/15	**HW6 DUE ONLINE BY 11:59 PM** **ALL OUTSTANDING WORK MUST BE COMPLETED BY 11:59 PM**	