

SOC 910 Advanced Statistics

Spring 2021, Class# 58034

M 2:30-5:15, Fraser 106

Zoom link: <https://kansas.zoom.us/j/95092788799>

Instructor:

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Office Hours W 2:00–3:00 or by Appointment

Course Objectives: This course surveys advanced statistical techniques that sociologists and other social scientists use to investigate the mechanisms and/or causalities of social phenomenon. The topics include ordinary least square method and its limitations, two- and three-way interaction effects, weighting, regression decomposition, discrete variable analyses (e.g., logit and probit), panel models, quantile regression, and several causality-finding techniques. Class discussion will focus on the application and interpretation rather than theoretical and/or mathematical backgrounds. This course necessitates knowledge of basic mathematical operations. SOC 812 or an equivalent course is prerequisite.

Textbook: There are a required textbook, a supplementary textbook, and additional readings.

- Textbook 1:
Agresti, Alan and Barbara Finlay. 2008. *Statistical Methods for the Social Science*, 4th Edition. Prentice Hall. (3rd edition is fine)
- Textbook 2:
Wooldridge, Jeffrey M. 2016. *Introductory Econometrics: A Modern Approach*, Sixth Edition. Thomson.
- Textbook 3:
Xie, Yu and Daniel Powers. 2008. *Statistical Methods for Categorical Data Analysis*, 2nd Edition. Emerald.
- Textbook 4:
Angrist, Joshua and Jörn-Steffen Pischke. 2015. *Mastering Metrics: The Path from Cause to Effect*. Princeton University Press.

Course Website: <http://people.ku.edu/~chkim/soc910/>

(An ID and a password [they are different from your KU-ID] are required to open the restricted materials on the course website. Contact the instructor to acquire them.)

Class Discussion Format: This is an in-person course in principal. However, if you have any reasons that prevent or make you feel uncomfortable from coming to class, you can join the class discussion thru Zoom (<https://kansas.zoom.us/j/95092788799>). No classes will be recorded.

Other Requirements:

(1) Calculator with a square root, natural log, and exponential function keys.
 (2) Access to a computer equipped Stata. If you are already familiar with other statistical packages and want to use the other program, that is perfectly fine. In class, I will discuss only Stata (but can discuss R as well if needed). There are several ways to access to Stata: ① a computer in Fraser 754 is equipped with Stata; or ② computers in the Fraser Computer Lab have Stata installed; or ③ you can order your own perpetual/annual/six-month licensed Stata program at <http://www.stata.com/order/new/edu/gradplans/student-pricing/>.

Homeworks: There will be 8 homework assignments and each homework assignment is worth 50 points. Homeworks are about analyzing data using the techniques learned in class. Assignments must be submitted in class or by email no later than the dates indicated. Late assignments will lower the grade by 3 points for each day late. The maximum allowed late submission is one week (with a 15 point penalty). Students who miss assignments will not be able to make up the work.

Term Paper: Students should submit a 10-15 page term paper. It is worth 100 points. The term paper should have (1) introduction including very brief literature review (2-3 pages), (2) hypothesis, (3) data, (4) statistical methods, (5) empirical findings, and (6) discussion/conclusion. The term paper must be emailed to the instructor in the pdf format by May 10th. Students who submit the proposal for the term paper by April 5th will receive my feedback. The plan should include a very brief introduction on the topic; hypotheses to test; and data. The proposal is optional but I strongly encourage you to develop it.

Evaluation: A total of 500 points is possible for the course. Final course grades will be determined according to the following scale:

Item	Points	Total	Grade
Homework	400	450+	A
Term Paper	100	400 - 449	B
		350 - 399	C
		≤ 349	F
Total	500		

Class Attendance: Those who miss classes three or more times without documented justifications will get F. If you expect to be absent from the classes three or more times, drop this course.

Course Policies

Religious Holidays: While I have attempted to construct the course schedule around religious holidays, I may have overlooked some. If you are unable to attend a class due to a religious holiday, please let me know in advance, and we can make other arrangements.

Accommodations: I am available to discuss appropriate academic accommodations that you may require as a student with a disability. I will need documentation from the appropriate college office before making any changes. You will need to let me know as soon as possible, so that I can make arrangements.

Academic Dishonesty: I would like to believe that all students are in graduate school because of a passion for learning and that they take courses - even general education requirements - for their own enlightenment. While this may describe many students in the class, I also understand that sometimes students may be tempted to engage in plagiarism, cheating, etc. Academic dishonesty will not be tolerated. It is okay to discuss with your colleagues to do homeworks, but the mid-term take-home exam should be done independently.

Copy Rights: Lectures, class handouts, and web materials are belong to the lecturer. Any commercial use, dissemination, or publication without authorization is strictly prohibited.

Other Policies: Please note that the University of Kansas has many policies regarding how classes will be conducted and expected behaviors of students. Even though these may not be explicitly listed here, this class will be run in accordance with KU policies.

Tentative Course Schedule

- Week 1 (Feb 1): OLS Multiple Regression - Review
 - Handouts
 - Agresti and Finlay Chapters 9 and 11.
 - Wooldridge Chapters 2, 3, 4 and 5.
- Week 2 (Feb 8): Dummy Variable and Interaction Effects in OLS
 - Handouts
 - Agresti and Finlay Chapter 13.
 - Wooldridge Chapter 7.
- Week 3 (Feb 15): Functional Forms and Comparison across Models in OLS, Weighting: Principles and Applications
 - Handouts
 - Wooldridge Chapters 6, 8, and 9.
- Week 4 (Feb 22): Regression Decomposition
 - Kim, ChangHwan. 2010. “Decomposing the Change in the Wage Gap Between White and Black Men over Time, 1980-2005: An Extension of the Blinder-Oaxaca Decomposition Method.” *Sociological Methods & Research* 38:619-51.
 - Kim, ChangHwan. “Detailed Wage Decompositions: Revisiting the Identification Problem.” *Sociological Methodology* 43:346-63.
 - Fortin, Lemieux, and Firpo. 2011. “Decomposition Methods in Economics.” in D. Card and O. Ashenfelter, eds., *Handbook of Labor Economics*, 4 th Edition, Elsevier North Holland, 2011, pp. 1-102.
- Week 5 (Mar 1): Generalized Linear Models 1: Logit and Probit
 - Xie and Powers Chapter 3.
 - Agresti and Finlay Chapter 15.

- Week 6 (Mar 8): Generalized Linear Models 2: Scale variance of Logit & Other Link Functions
 - Allison, Paul. 1999. “Comparing Logit and Probit Coefficients Across Groups.” *Sociological Methods & Research* 28(2):186-208.
 - Breen, Richard, Kristian Bernt Karlson, and Anders Holm. 2018. “Interpreting and Understanding Logits, Probits, and Other Nonlinear Probability Models.” *Annual Review of Sociology* 44: 39-54.
- Week 7 (Mar 15): Panel Models 1: Fixed Effects Model vs. Random Effects Model
 - Halaby, Charles N. 2004. “Panel Models in Sociological Research: Theory into Practice.” *Annual Review of Sociology* 30: 507-544.
 - Wooldridge Chapters 13 and 14.
- Week 8 (Mar 22): Panel Models 2: Random Coefficients Model
 - Halaby, Charles N. 2004. “Panel Models in Sociological Research: Theory into Practice.” *Annual Review of Sociology* 30: 507-544.
 - Stata Manual on “Mixed”
- Week 9 (Mar 29): Quantile Regression 1: Conditional Quantile Regression
 - Hao, Lingxin and Daniel Q. Naiman. 2007. *Quantile Regression* (Quantitative Applications in the Social Sciences Vol 149). Sage Publications.
- Week 10 (Apr 5): Quantile Regression 2: Unconditional Quantile Regression
 - Firpo, Fortin and Lemieux. 2009. “Unconditional Quantile Regressions.” *Econometrica* 77(3): 953-973.
 - Killewald and Bearak. 2014. “Is the Motherhood Penalty Larger for Low-Wage Women?” *ASR* 79(2): 350-357.
 - Borah and Basu. 2013. “Highlighting differences between conditional and unconditional quantile regression approaches through an application to assess medication adherence.” *Health Economics* 22(9): 1052-1070.
- Week 11 (Apr 12): Causality 1: Concepts
 - Gangle, Markus. 2010. “Causal Inference in Sociological Research.” *Annual Review of Sociology* 36:21-47.
 - Hedström and Petri Ylikoski. 2010. “Causal Mechanisms in the Social Sciences.” *Annual Review of Sociology* 36:49-67.
- Week 12 (Apr 19): Causality 2: Regression discontinuity
 - Angrist, Joshua and Jörn-Steffen Pischke. Chapter 4.
- Week 13 (Apr 26): Causality 3: Difference-in-difference
 - Angrist, Joshua and Jörn-Steffen Pischke. Chapter 5.
- Week 14 (May 3): No class – Reading Weeks
- Term Paper due by May 10th (Monday)
- Week Extra 1: Propensity Score Matching

- Week Extra 2: Log-linear Models
 - Xie and Powers Chapter 4.