



## JSGS (803) QUANTITATIVE METHODS AND RESEARCH DESIGN

	UNIVERSITY OF REGINA CAMPUS	UNIVERSITY OF SASKATCHEWAN CAMPUS
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<b>OFFICE HOURS:</b>		By appointment
<b>OFFICE LOCATION:</b>		DIEF 158
<b>TERM:</b>		Fall 2020
<b>ROOM:</b>		Online
<b>DATE AND TIME:</b>		Tuesday, 2-5pm (Sept. 8 – Dec. 1)

### CALENDAR DESCRIPTION

Provides students with the statistical concepts and techniques required for conducting research and critically evaluating empirical studies. Topics include statistical inference, sampling theory, and data and regression analysis as applied to problems in public policy.

### COURSE CONTENT AND APPROACH

This course is designed to introduce you to the basic principles of bivariate and multivariate regression analysis, and to apply the regression model to problems in public policy research. Various modifications to the regression model will be examined, as will several problems that often plague regression models. Finally, you will become familiar with the regression routines of STATA. This software will be used in completing class assignments.

This course emphasizes the application of statistical procedures more than the theoretical or mathematical principles behind them. While you will learn the basic theoretical principles of regression analysis, the overall objective of the course is to learn how to apply this method to diverse empirical problems in public policy.

The course has a lecture format. However, discussion is encouraged. This course outline is subject to changes made during the term.

### ATTRIBUTES OF JSGS GRADUATES

Through the development of the following competencies, JSGS MPA graduates will be prepared to meet the policy challenges of a rapidly changing world:

- **Analysis and Use of Evidence** – how to use evidence and develop the necessary analytical skills to succeed in a public administration career;
- **Politics and Democracy** – ensuring that students have a deep understanding of the role of politics and democracy in public policy development including the roles of the various institutions and policy actors; and
- **Policy Delivery** – the importance of effective service delivery and the ongoing management and evaluation of public policy.

## REQUIRED READINGS

Leo H. Kahane, *Regression Basics* 2nd edition (Thousands Oaks: Sage, 2008). ISBN: 9781412951265.

## EVALUATION (subject to changes)

Class participation		10%
Assignment 1 Bivariate Regression	Due at 12pm on Sept. 22	20%
Assignment 2 Policy project	Due at 12pm on Oct. 6	20%
Assignment 3 Multiple Regression	Due at 12pm on Oct. 27	20%
Assignment 4 Research Project	Due at 12pm on Dec. 1	30%

In this course, I assume that most of you have no experience in using STATA. I will be explaining how to use STATA for particular problems. Should you desire more exhaustive resources, there are many manuals available online (e.g. at <http://www.stata.com/links/resources1.html>).

While the STATA software is expensive you can get access to STATA for free by following the instructions on the website of "ITS Service and Support", at <http://www.usask.ca/ict/hardware-software/statistical-software/stata.php>. If you need help, ask the ITS support staff.

## LATE ASSIGNMENTS

Without compelling reasons, late assignments will not be accepted and will result in a mark of zero.

## COURSE OUTLINE AND ASSIGNMENTS (SUBJECT TO CHANGES)

### Session 1 – Introduction, correlation and linear regression (September 8, distribute A1 and A2)

#### REQUIRED READINGS

- > Kahane, *Regression Basics*, Chapter 1; Chapter 2, pp. 19-29.
- > Michael S. Lewis-Beck, *Applied Regression: An Introduction*, Chapter 1, pp. 9-26.  
(<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412983440.n1>)

#### SUPPLEMENTARY READING

- > Levin, Jack and James Alan Fox, *Elementary Statistics in Social Research* (New York: Harper & Row, 2004) Chapters 7-9 "From Description to Decision Making", pp. 128-192. For a review of basic statistical concepts, see Chapter 3-6.
- > John Richard, Jennifer Hove, and Kemi Afolabi, "Understanding the Aboriginal/Non-Aboriginal Gap in Student Performance" C.D. Howe Institute Commentary, No. 276 (December 2008), available online at [http://www.cdhowe.org/pdf/commentary\\_276.pdf](http://www.cdhowe.org/pdf/commentary_276.pdf).

### Session 2 – Hypothesis testing and model performance (September 15)

#### REQUIRED READINGS

- > Kahane, Chapter 3
- > Michael S. Lewis-Beck, *Applied Regression: An Introduction*, Chapter 2, pp. 26-43.  
(<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412983440>)

- > Edward Tufte, *Data Analysis for Politics and Policy* (Englewood Cliffs, N.J.: Prentice-Hall, 1974), Chapter 3, “Example 5: Comparing the Slope and the Correlation Coefficient”, pp. 101-107.
- > Christopher H. Achen, *Interpreting and Using Regression*, Chapter 4, “Comparing Substantive and Statistical Significance”, pp. 46-51. (<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412984560.n4>)

#### SUPPLEMENTARY READING

- > Joseph P. Newhouse, “Medical-Care Expenditure: A Cross-National Survey,” *Journal of Human Resources*, 12:1 (Winter, 1977), pp.115-125.

### **Session 3 – Regression model assumptions and the analysis of residuals (September 22, A1 is due)**

#### REQUIRED READINGS

- > Kahane, Chapter 2, pp. 30-34; Chapter 7.

### **Session 4 – The multiple regression model: partial slopes (September 29, distribute A3 and A4)**

#### REQUIRED READINGS

- > Kahane, Chapter 4.
- > Michael S. Lewis-Beck, *Applied Regression: An Introduction*, Chapter 3, pp. 47-54.  
<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412983440.n3>

#### SUPPLEMENTARY READINGS

- > Stuart Landon, Melville L. McMillan, Vijay Muralidharan and Mark Parsons, “Does Health-Care Spending Crowd Out Other Provincial Expenditures?” *Canadian Public Policy* 32:2 (June, 2006), pp. 121-142.  
<http://library.usask.ca/scripts/remote?URL=http://www.jstor.org/stable/4128724>

### **Session 5 – Presentation of Assignment 2 (October 6, A2 is due)**

### **Session 6 – The multiple regression model: dummy variables and interaction effects (October 13)**

#### REQUIRED READINGS

- > Kahane, Chapter 5, pp. 86-101.
- > Achen, Chapter 2, pp. 12-29.  
<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412984560.n2>

#### SUPPLEMENTARY READINGS

- > Mohammed H.I. Dore and Surendra Kulshreshtha, “The Labor Market and Rural-Urban Differences among First Nations: The Case of Saskatchewan,” *Journal of Socio-Economics*, 32:2 (May, 2003), pp. 147-159.
- > Card, David, and Alan B. Krueger. “Minimum wages and employment: a case study of the fast-food industry in New Jersey and Pennsylvania: reply.” *American Economic Review* 90, no. 5 (2000): 1397-1420.

### **Session 7 – The multiple regression model: choosing a specification – including Outliers and data transformations (October 20)**

#### REQUIRED READINGS

- > Kahane, Chapter 5, pp. 79-83; Chapter 7.
- > Edward Tufte, *Data Analysis for Politics and Policy* (Englewood Cliffs, N.J.: Prentice-Hall, 1974), Chapter 3, “Example 6: Interpretation of Regression Coefficients when the Variables are Re-expressed as Logarithms (with Five Examples)”, pp. 108-134.

- > Achen, Chapter 5, "Choosing a Specification", pp. 51-77.  
<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412984560.n5>

#### SUPPLEMENTARY READINGS

- > Robert W. Jackman, "The Politics of Economic Growth in the Industrial Democracies, 1974-80: Leftist Strength or North Sea Oil?," *The Journal of Politics*, 49: 1 (Feb., 1987), pp. 242-256.  
<http://library.usask.ca/scripts/remote?URL=http://www.jstor.org/stable/2131143>
- > John Fox, *Regression Diagnostics* (Newbury Park, CA: Sage, 1991), Chapter 4 "Outlying and Influential Data", pp. 21-40. <http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412985604.n4>
- > Schroeder et al., *Understanding Regression Analysis: An Introductory Guide*, Chapter 5, "Problems and Issues of Linear Regression", pp. 65-80.  
<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412986410.n5>

#### **Session 8 – logistic regression and time series data (October 27, A3 is due)**

##### REQUIRED READINGS

- > Logistic: Kahane, Chapter 5, pp.83-86.
- > Time series data: Kahane, Chapter 6; Chapter 7, pp. 132-138.
- > Fred C. Pampel, *Logistic Regression: A Primer* (Newbury Park, CA: Sage, 2000), Chapter 1 "The Logic of Logistic Regression" (<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/10.4135/9781412984805.n1>) and Chapter 2 "Interpreting Logistic Regression Coefficients", pp. 1-30.  
(<http://library.usask.ca/scripts/remote?URL=http://dx.doi.org/DOI:10.4135/9781412984805>)

##### SUPPLEMENTARY READING

- > Anna Ya Ni and Stuart Bretschneider, "The Decision to Contract Out: A Study of Contracting for E-Government Services in State Governments," *Public Administration Review*, 67:3 (May, 2007), pp. 531-544.
- > Haizhen Mou, Michael M. Atkinson, and Ata-Ul Munim, "The Cost of Government: Decomposing Provincial Expenditures, 1981 – 2007," *Canadian Public Policy* 40:1 (March, 2014), pp. 84-97.

#### **Session 9 – Hierarchical Linear Modelling (November 3)**

##### REQUIRED READINGS

- > Raudenbush, Stephen, and Anthony S. Bryk. "A Hierarchical Model for Studying School Effects." *Sociology of Education* 59, no. 1 (1986): 1-17. doi:10.2307/2112482.
- > Gelman, Andrew. "Multilevel (Hierarchical) Modeling: What It Can and Cannot Do." *Technometrics* 48, no. 3 (2006): 432-35. <http://www.jstor.org/stable/25471214>.

##### SUPPLEMENTARY READING

- > Haizhen Mou and Michael M. Atkinson. 2020. "Want to Improve Math Scores? An Empirical Assessment of Recent Policy Interventions in Canada" *Canadian Public Policy* 46(1):107–124.

#### **November 10: reading week – no class**

#### **Session 10 – Introduction to Causal Modelling (November 17, to be confirmed)**

##### REQUIRED READINGS

- > Lechner, Michael. The estimation of causal effects by difference-in-difference methods. 2011. [https://michael-lechner.eu/ml\\_pdf/journals/2011\\_Lechner\\_DiD\\_2011\\_ECO%200403%20Lechner\\_darf%20aufs%20Netz.pdf](https://michael-lechner.eu/ml_pdf/journals/2011_Lechner_DiD_2011_ECO%200403%20Lechner_darf%20aufs%20Netz.pdf)
- > Luellen, Jason K., William R. Shadish, and M. H. Clark. "Propensity scores: An introduction and experimental test." *Evaluation Review* 29, no. 6 (2005): 530-558. [https://www.researchgate.net/publication/7522646\\_Propensity\\_Scores\\_An\\_Introduction\\_and\\_Experimental\\_Test](https://www.researchgate.net/publication/7522646_Propensity_Scores_An_Introduction_and_Experimental_Test)
- > Hahn, Jinyong, Petra Todd, and Wilbert Van der Klaauw. "Identification and estimation of treatment effects with a regression-discontinuity design." *Econometrica* 69, no. 1 (2001): 201-209. <http://www.jstor.org/stable/2692190>

#### SUPPLEMENTARY READING

- > Howe, Katherine B., Christian Suharlim, Peter Ueda, Daniel Howe, Ichiro Kawachi, and Eric B. Rimm. "Gotta catch'em all! Pokémon GO and physical activity among young adults: difference in differences study." *bmj* 355 (2016). <https://www.bmj.com/content/355/bmj.i6270.full>
- > Mendola, Mariapia. "Agricultural technology adoption and poverty reduction: A propensity-score matching analysis for rural Bangladesh." *Food policy* 32, no. 3 (2007): 372-393. [https://www.researchgate.net/publication/222434303\\_Agricultural\\_technology\\_adoption\\_and\\_poverty\\_reduction\\_A\\_propensity-score\\_matching\\_analysis\\_for\\_rural\\_Bangladesh](https://www.researchgate.net/publication/222434303_Agricultural_technology_adoption_and_poverty_reduction_A_propensity-score_matching_analysis_for_rural_Bangladesh)
- > Pellegrini, Guido, Flavia Terribile, Ornella Tarola, Teo Muccigrosso, and Federica Busillo. "Measuring the effects of European Regional Policy on economic growth: A regression discontinuity approach." *Papers in Regional Science* 92, no. 1 (2013): 217-233. <https://rsaiconnect.onlinelibrary.wiley.com/doi/full/10.1111/j.1435-5957.2012.00459.x>

#### **Session 11 – Introduction to Machine Learning Methods (November 24, to be confirmed)**

##### REQUIRED READINGS

- > Sutton, Oliver. "Introduction to k nearest neighbour classification and condensed nearest neighbour data reduction." *University lectures, University of Leicester* (2012): 1-10. <https://staff.fmi.uvt.ro/~daniela.zaharie/dm2018/ro/TemeProiecte/Biblio/kNN/CondensedNearestNeighbor.pdf>
- > Imandoust, Sadegh Bafandeh, and Mohammad Bolandraftar. "Application of k-nearest neighbor (knn) approach for predicting economic events: Theoretical background." *International Journal of Engineering Research and Applications* 3, no. 5 (2013): 605-610. [https://www.ijera.com/papers/Vol3\\_issue5/DI35605610.pdf](https://www.ijera.com/papers/Vol3_issue5/DI35605610.pdf)

##### SUPPLEMENTARY READING

- > Ringsquandl, Martin, and Dusan Petkovic. "Analyzing political sentiment on Twitter." In *2013 AAAI Spring Symposium Series*. 2013. <https://www.semanticscholar.org/paper/Analyzing-Political-Sentiment-on-Twitter-Ringsquandl-Petkovic/5735ccb48deb5acb6e22fc2b4d1a721c380552b2>
- > Huq, Mohammad Rezwanul, Ahmad Ali, and Anika Rahman. "Sentiment analysis on Twitter data using KNN and SVM." *IJACSA) International Journal of Advanced Computer Science and Applications* 8, no. 6 (2017): 19-25. <https://pdfs.semanticscholar.org/05a8/78000170abcd0c6f8208080470858422e17c.pdf>

#### **Session 12 – Term project presentation (December 1, A4 is due)**

## STUDENTS WITH SPECIAL NEEDS

University of Regina (U of R): Students in this course who, because of a disability, may have a need for accommodations are encouraged to discuss this need with the instructor and to contact the Centre for Student Accessibility (<https://www.uregina.ca/student/accessibility/>).

University of Saskatchewan (USask): Students in this course who, because of a disability, may have a need for accommodations are encouraged to discuss this need with the instructor and to contact Access and Equity Services (AES) at 966-7273 or [aes@usask.ca](mailto:aes@usask.ca) (<https://students.usask.ca/health/centres/access-equity-services.php>).

## STUDENTS EXPERIENCING STRESS

University of Regina (U of R): Students in this course who are experiencing stress can seek assistance from the University of Regina Counselling Services. For more information, visit this website: <http://www.uregina.ca/student/counselling/contact.html>, or call (306) 585-4491 between 8:30 a.m. to 4:30 p.m. Monday to Friday.

University of Saskatchewan (USask): Students in this course who are experiencing stress can seek assistance from the University of Saskatchewan Student Wellness Centre. For more information, please visit this website: <https://students.usask.ca/health/centres/counselling-services.php>, or call (306) 966-4920 between 8:30 a.m. to 4:30 p.m. Monday to Friday.

## ACADEMIC INTEGRITY AND CONDUCT

University of Regina (U of R): Ensuring that you understand and follow the principles of academic integrity and conduct as laid out by the University of Regina (available at <https://www.uregina.ca/president/executive-team/ed-governance-univ-secretary/student-appeals/student-behaviour.html>) is vital to your success in graduate school. Ensuring that your work is your own and reflects both your own ideas and those of others incorporated in your work is important: ensuring that you acknowledge the ideas, words, and phrases of others that you use is a vital part of the scholarly endeavour. If you have any questions at all about academic integrity in general or about specific issues, contact your course instructor to discuss your questions.

University of Saskatchewan (USask): Understanding and following the principles of academic integrity and conduct as laid out in the University of Saskatchewan's Guidelines for Academic Conduct is vital to your success in graduate school (available at <http://www.usask.ca/secretariat/student-conduct-appeals/academic-misconduct.php>). Ensuring that your work is your own and reflects both your own ideas and those of others incorporated in your work is important: ensuring that you acknowledge the ideas, words, and phrases of others that you use is a vital part of the scholarly endeavour. If you have any questions at all about academic integrity in general or about specific issues, contact any faculty member and we can discuss your questions.

## STUDENT SUPPORTS

There are additional personal and academic support services and programs available for students and the university community. For more information and a comprehensive guide, please go to: <https://students.usask.ca/>.