**PA 5032 Spring 2021 (2 credits)**

**APPLIED REGRESSION**

**Welcome to PA 5032: Applied Regression**!

How the global pandemic affects this course. The reason this course is being offered via remote instruction is because there is no way to safely offer a course of this size (or even half this size) in-person during a global pandemic. We have re-designed the course to involve more interaction during the synchronous class and lab sessions and in the assignments. We have also made adjustments to the course to help you keep up or catch up if you have to miss sessions because of sickness or other problems. If someone on the teaching team gets sick, we will cover each other to keep the class on track to the best of our ability, but will ask for some grace as we work through redistributing our workload and supporting our sick colleague.

**If you get/feel sick**, **please contact the Boynton Nurse Line at 612-625-3222 (answered 24/7).**  Let your group know so that they can carry on in your absence. You will be given the opportunity to make up any group work you miss. Email the instructor if you want to arrange any accommodations for class participation while you are feeling ill. We will not share your health status with anyone to protect the confidentiality of your personal health information, as required by federal and state law. We will do everything we can to help you participate in the class and catch up when you feel better.

Inclusion Statement. Statistics is not as objective as it seems. The field has been dominated by a small subset of privileged voices. Statistics has also been used as a tool to oppress. Two groups that have been particularly harmed with statistical weapons in the US, although there are many more, are African-Americans, by biased statistical comparisons that do not account for historical and structural racism, and Native Americans, by not being represented in most statistical analyses. To begin to rectify these past wrongs, we will explicitly put these groups at the forFeb efront of our minds and I provide here brief acknowledgements that ensure that everyone in the course has a basic understanding of the history of these groups.

*The University of Minnesota-Twin Cities respectfully acknowledges that the land we are on today is the traditional and ancestral homeland of the Daḳota people. The University of Minnesota is founded as a land-grant institution and we recognize that our founding came at a dire cost to the Daḳota people. The Daḳota were forced to cede their lands in return for goods and services, but the government did not uphold the terms of these treaties leading to widespread devastation. We recognize this painful past, and we honor Daḳota peoples’ history on this land, their sovereignty, and their continued contributions to our region. Minnesota comes from the Daḳota name for this region, Mni Sota Maḳoce — "the land where the waters reflect the skies." The Daḳota and numerous other Indigenous peoples, whose cultural, spiritual, and economic practices are intrinsically woven to this landscape, hold this land sacred. We recognize them as original stewards of this land and all the relatives within it, who had thriving and vibrant communities prior to disruption by settlers. Today, the State of Minnesota shares geography with eleven Tribal Nations. By offering this land acknowledgement,* ***we affirm tribal sovereignty and hold the University of Minnesota accountable to recognize and counter the historical and contemporary injustices that continue to impact Indigenous people, through mutually beneficial partnerships, research, policies, and practices that respect Indigeneity.*** *(Tribal Nation Relations in the Office of Equity and Diversity, approved by 9 out of 11 tribal nations)*

*Most US-born African-Americans had ancestors who were brought to the US forcibly as slaves. While enslaved, the ancestors of current African-Americans were malnourished, lived in unsanitary conditions, performed excessive physical labor, and were often physically and sexually abused. After slavery was abolished in the US, many Midwestern and southern states enacted codes (referred to as Jim Crow laws) that legally subjugated African-Americans and were in place for about 100 years. Jim Crow laws imposed legal restrictions for non-white persons in education, transportation, hospitals, employment, marriage, voting, and every other institution that affects one’s health and wellbeing. Policies like redlining (i.e., restricting financial services to neighborhoods of color) and racially restrictive covenants on deeds (i.e., that non-white people could not own the property) were common in Minnesota leading Minneapolis to have the widest racial homeownership gap out of the 100 US cities with the largest black populations. The impact of these policies are still present today: because of these policies, African-Americans still live predominately in neighborhoods with limited public investments, poor quality schools, limited green space, and high poverty and crime rates.* ***“We commit and rededicate ourselves to preparing our next generation of legal and public policy practitioners who will challenge racist and dysfunctional systems and devote their professional lives to the pursuit of justice and civil rights for all of society.”*** *(Garry W. Jenkins and Laura Bloomberg, June 1, 2020)*

It is not enough to only make these acknowledgements. We will center these two groups, and to a lesser extent other marginalized populations, in this class. We will also provide a section on Canvas to share resources so that you can do the work of educating yourself if they have been omitted in your prior education.

While we will explicitly center these two groups, it is my intent that students from all backgrounds and perspectives be well-served by this course. I strive to create a learning environment that honors all of your identities (including race, gender, class, sexuality, religion, ability, etc.), and where each class member (including the instructor and TAs) is able to hear and respect each other. Please let me know (anonymously if you prefer) if something is said or done in this course that is troubling or causes offense.

I strongly believe that stress inhibits learning. Thus, we strive to not create stress or anxiety in this course and we are sensitive to the stressors that occur outside of class. If something difficult happens in your life, don’t stay silent. It doesn’t matter what it is (having a baby, getting married/divorced, breakups, family members/friends getting sick, financial troubles, mental health crises, etc.). These are unprecedented times and we need to prioritize supporting each other as humans. **We are your new Humphrey community**. Send someone on the teaching team an email, and reach out to fellow students for support. We may be able to offer you flexibility on assignment due dates or connect you to resources you may not know about. Our goal is to not only foster intellectual nourishment, but also create an environment of social connection and personal accommodation.

**Course Overview**

This course is designed to help you read, understand, interpret, use and evaluate quantitative empirical work in public affairs research and practice. To advance that goal, attention is concentrated on one of the main techniques used by public policy researchers and social scientists: regression analysis. You will learn the assumptions that underlie the appropriate use of regression, how to identify violations of those assumptions, the consequences of not satisfying the assumptions, and how to take the corrective measures necessary to improve your ability to make valid inferences. The course will begin with a refresher on ordinary least squares regression and hypothesis testing. Data problems covered will include specification problems (e.g., omitted variable bias), multicollinearity, heteroscedasticity, and measurement error. We will use Stata for statistical analyses throughout the course.

This course is intended:

* to provide knowledge of the assumptions that underlie the appropriate use of linear regression;
* to criticize regression results by identifying violations of those assumptions and to take corrective measures to address those violations; and
* to enable you to conduct linear regression analyses that results in valid inferences about a population.

**Prerequisites**

This course assumes a background in statistics at the level of PA5031 (Statistics for Public Affairs), PA5054 (Statistics for Public Affairs, Accelerated), or PA5205 (Statistics for Planning).

**Instruction team contact information:**

Professor Angie Fertig, [arfertig@umn.edu](mailto:arfertig@umn.edu), 612-625-4534

Office hours are by appointment here: <https://z.umn.edu/fertigappts>

TA Patrick Alcorn, [alco031@umn.edu](mailto:alco031@umn.edu)

Office hours are Wed 1:30-3:30pm or by appointment

TA Wenchen Wang, [wang6054@umn.edu](mailto:wang6054@umn.edu)

Office hours are Fri 2:00-3:30pm or by appointment

Zoom links for office hours are available on the Canvas course website.

**Course Logistics**

Meeting dates and times:

* Class sessions: Mondays and Wednesdays 9:45 – 11:00am
* Lab sessions: Fridays at 12:45pm – 2:00pm
* Optional online poster presentation party: 3/5 at 12:45-2pm
* Optional in-person poster presentation party (social distancing and masks required):
  + 3/8 at 9:45-11am at Bruinicks rooms 530A and B
* The Zoom link for all sessions is on the Canvas course website.

Zoom/Classroom Practices:

* All Zoom sessions will have live captioning provided.
* Students will be asked to include their gender pronouns in their Zoom name. If gender pronoun announcement and use is new to you or you wish to learn more about gender identity and its movement, there will be additional resources provided on the Canvas course website.
* Recordings of weekly class and lab sessions will be posted to Canvas.
* You do not need to turn on your video. However, please engage in the class to the best of your ability. It is helpful to the instructor and teaching assistants to get live feedback from students whenever possible (e.g., chat questions, confused looks, thumbs up, applause).
* Please mute your audio when you are not speaking.
* In accordance with student privacy protections, no recordings of any of the class or lab zoom sessions that shows students faces or names can be shared outside of this course.
* To prevent “Zoom-bombing”, do not share any class Zoom links on social media or other public places.

Lab Sessions:

Friday labs, led by one or both of the TAs, are where you will review course concepts and learn new commands in Stata in order to do the assignments.

Canvas Course Website:

All assignments will be turned in and graded on the Canvas course website (canvas.umn.edu). Required online discussions will take place on designated discussion boards on Canvas. Extra readings and resources will also be available there. We will also set up an informal discussion board on Canvas for students to share resources, advice, and to chat informally to foster community and connection. Please make sure you set course settings to receive course announcements and course conversations (emails) at least the same day.

Required Readings:

* Studenmund, AH. Using Econometrics: A practical guide. Pearson, 2017. I’m using the 7th edition, but you can use any edition you’d like. Available at the UMN bookstore, but search online as well. Used and rental options bring the price down to $40 or less.
* Additional readings are listed at the end of the syllabus and will be posted on the course website.

Required Hardware and Software:

* *Stata 15 or higher*. You can run Stata remotely from your home computer without purchasing a personal copy of Stata by using AppsToGo, which can be installed following these instructions: <https://it.umn.edu/self-help-guide/appstogo-use-umn-apps-your-personal>. If you want to purchase Stata for your personal computer, you can download it here: <https://www.stata.com/order/new/edu/gradplans/student-pricing/>. Stata/IC for 6 months is $48, or you can purchase the annual or perpetual license if you plan to take more statistics classes.
* *Internet-connected device*. Since we will have synchronous sessions, you will need to have an internet-connected device to do zoom on. We will be also be using a polling platform that will require an internet connection.

**University and School Policies and Resources**

Disability Resource Center (DRC). The University of Minnesota is committed to providing equitable access to learning opportunities for all students. The DRC is the campus office that collaborates with students who have disabilities to provide and/or arrange accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory, or physical), please call 612-626-1333 to arrange a confidential discussion. For more information, please see diversity.umn.edu/disability. If you are registered with the DRC and have a current letter requesting accommodations, please contact your instructor as early in the semester as possible to discuss.

Center for Writing's Student Writing Support. Student Writing Support provides free writing instruction for all University of Minnesota students – graduate and undergraduate - at all stages of the writing process. They help students develop productive writing habits and revision strategies via in-person consultations. See writing.umn.edu.

Academic Policies. For links to University of Minnesota and Humphrey School policies, please click the “U of M Policies” link on our course Canvas site, or see  <https://z.umn.edu/PolicyStatements>. Policies include information on student conduct, scholastic dishonesty, legitimate absences, sexual harassment, equal opportunity, disability accommodations, and more. It is your responsibility to understand these policies; ignorance of the policies is not an acceptable excuse for violating a policy.

**Course Requirements**

Before we get to the actual assignments, please note that students are expected to work cooperatively in groups assigned by the instruction team. This is a required part of the course. Each student will be assigned to one group for the half-semester. Groups will work together on one presentation (worth 20% of your grade)A. In addition, your group partners will provide the instruction team with evaluations that will inform part of your participation grade (worth 13%). So, it is in your interest to do your part to make your group productive. Learning to work in teams is an important skill.

Independent Individual Research Project (55% of course grade). You will use individual-level data from the American Community Survey (ACS), Panel Study of Income Dynamics (PSID) or General Social Survey (GSS) to conduct an independent individual research project. The project will involve three interim graded assignments (see below) that will build up to a final quantitative research poster. You will use Stata for these assignments and will need to turn in a Stata log file with all of your analyses with each report.

**Quantitative Research Project Design, Data and Methods** (15%–Due midnight February 12). Identify a research topic that can be addressed using quantitative methods and one of the allowed data sources.  Write 3 pages in which you: 1) state your research question and your initial hypothesis; 2) provide 4-6 bullet points of background about the topic citing at least 3 sources (1 or more of which should be peer-reviewed publications); 3) describe the data source, your sample, and your variables; 4) provide a table of descriptive statistics and text explaining the table; and 5) write out a regression equation that would test your hypothesis and explain how it tests your hypothesis.

**Specification & Diagnostic Analysis** (20%–Due 9am Mar 1). Conduct a specification analysis and a diagnostic analysis to determine your final regression results.

* The specification analysis involves: 1) providing a table with at least 6 different regression specifications that could test your hypothesis, 2) writing a paragraph interpreting the differences in results across specifications, and 3) identifying your preferred specification and writing a paragraph arguing why that specification is preferred over the others) and a diagnostic analysis.
* The diagnostic analysis involves: 1) testing your preferred specification for multicollinearity and if needed, taking corrective measures; 2) testing your preferred specification for heteroscedasticity and if needed, taking corrective measures; 3) writing a paragraph interpreting your diagnostic tests; and 4) presenting and interpreting your final regression results after any changes have been made due to the diagnostic tests.

**Final Quantitative Research Poster** (20%--Due midnight March 8). This assignment is the culmination of your half-semester-long research project. It is an integration and refinement of the two interim reports. You will create a research poster that must clearly present the topic you analyzed, provide background on the topic, describe your quantitative data and methods, and present your results, interpretations, limitations, and conclusions.  If you would like to receive feedback on your poster before you turn it in, you can present your poster at the online Poster Presentation Party on March 5 during your lab session time, or at the in-person Poster Presentation Party on March 8 at 9:45am, but presenting your poster is optional.

Group Journal Article Project (20% of course grade). Each group will be assigned to make a class presentation of a journal article (see list on last page of the syllabus). In the presentation, each group must provide the research question, the hypothesis, the regression equation used to test the hypothesis, a description of the sample and measures used, the regression results, an interpretation of the results, and some limitations of the study. The article may have numerous regressions – the group only needs to present on one major regression. No live questions will be asked during or after the class presentation. Instead, each group will post their slides on a discussion board, and their fellow students will submit questions. Each group will choose 3 questions to respond to and post their responses.

Four Quizzes (12% of course grade). The quizzes will be posted on Canvas and will be due before Monday class in the early weeks of class. Each quiz is worth 4% of your course grade, but the lowest quiz score will be dropped. These quizzes are intended to incentivize you to keep up with the readings, lectures, and materials. Working through problems will also help you better understand new concepts.

Participation (13% of course grade). The participation grade will be primarily assessed based on the following 2 activities:

1. **Active participation in your group.** At the end of the half-semester, members of your group will provide the instruction team with an evaluation of your participation and effort on the group assignment.
2. **Questions posted on discussion board about group presentations.** Each student is expected to submit on an online discussion board a substantive question about the regression analysis in three of the journal articles presented in class. It is your choice which 3 journal articles to ask questions about. You must submit your question within 3 days after the presentation. Only substantive questions about the article will count towards the participation grade.

**Detailed Course Schedule with Deadlines** (Subject to change with notice.)

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| --- | --- | --- | --- |
| **(Due) Date** | **Type** | **Description** | **Reading** |
| **WEEK 1** | | | |
| Wed, Jan 20 | Class | Introduction |  |
| Fri, Jan 22 | Lab | Software & Data |  |
| **WEEK 2** | | | |
| Mon, Jan 25 | Class | OLS Basics | S Chs. 1-3 |
| Wed, Jan 27 | Class | Hypothesis Testing | S Ch. 5 |
| Fri, Jan 29 | Lab | Software & Data |  |
| **Mon, Feb 1** | **Quiz** | Quiz 1 due by 9am |  |
| **WEEK 3** | | | |
| Mon, Feb 1 | Class | OLS Assumptions | S Ch. 4 |
| Wed, Feb 3 | Class | Choosing Independent Variables | S Ch. 6 |
| Fri, Feb 5 | Lab | Software & Data |  |
| **Mon, Feb 8** | **Quiz** | Quiz 2 due by 9am |  |
| **WEEK 4** | | | |
| **Mon, Feb 8** | **Group Presentation** | Groups 1 & 2 Present |  |
| Mon, Feb 8 | Class | Choosing Independent Variables | S Ch. 6 |
| **Wed, Feb 10** | **Group Presentation** | Groups 3 & 4 Present |  |
| Wed, Feb 10 | Class | Fixed Effects | S Ch. 16.3 |
| Fri, Feb 12 | Lab | Help with Report 1 |  |
| **Fri, Feb 12** | **Report** | Report 1 due by midnight |  |
| **Mon, Feb 15** | **Quiz** | Quiz 3 due by 9am |  |
| **WEEK 5** | | | |
| **Mon, Feb 15** | **Group Presentation** | Groups 5 & 6 Present |  |
| Mon, Feb 15 | Class | Functional Form | S Ch. 7 |
| **Wed, Feb 17** | **Group Presentation** | Groups 7 & 8 Present |  |
| Wed, Feb 17 | Class | Functional Form | S Ch. 7 |
| Fri, Feb 19 | Lab | Specification Analysis |  |
| **Mon, Feb 22** | **Quiz** | Quiz 4 due by 9am |  |
| **WEEK 6** | | | |
| **Mon, Feb 22** | **Group Presentation** | Group 9 & 10 Present |  |
| Mon, Feb 22 | Class | Multicollinearity | S Ch. 8 |
| Wed, Feb 24 | Class | Heteroskedasticity | S Ch. 10 |
| Fri, Feb 26 | Lab | Diagnostic Tests |  |
| **WEEK 7** | | | |
| **Mon, Mar 1** | **Report** | Report 2 due by 9am |  |
| Mon, Mar 1 | Class | Other Data Problems | S Ch. 11 & 14.6 |
| Wed, Mar 3 | Class | Binary Dependent Variables | S Ch. 13 |
| Fri, Mar 5 | **Poster Presentation** | Online Poster presentation party (optional) |  |
| Mon, Mar 8 | **Poster Presentation** | In-person poster presentation party (optional) |  |
| **Mon, Mar 8** | **Poster** | Poster due by midnight |  |

**Journal Article Presentation Schedule**

Each group will present on one of the following readings and each student will ask a question online about 3 of the articles over the half-semester.

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| --- | --- | --- |
|  | **Presentation, Questions, Responses Due Dates** | **Journal Article** |
| 1 | Feb 8, 11, & 15 | Dossi G, Figlio DN, Giuliano P, Sapienza P “The Family Origin of the Math Gender Gap is a White Affluent Phenomenon” NBER Working Paper Series 2021. |
| 2 | Feb 8, 11, & 15 | Fish J, Livingston JA, VanZile-Tamsen, Patterson Silver Wolf DA “Victimization and Substance Use Among Native American College Students*” Journal of College Student Development* 2017. |
| 3 | Feb 10, 13, & 17 | Haltiwanger JC, Kutzbach MJ, Palloni GE, Pollakowski H, Staiger M, Weinberg D “The Children of HOPE VI Demolitions: National Evidence on Labor Market Outcomes” NBER Working Paper Series 2020. |
| 4 | Feb 10, 13, & 17 | Hollingsworth A, Huang M, Rudik IJ, Sanders NJ “Lead Exposure Reduces Academic Performance: Intensity, Duration and Nutrition Matter” NBER Working Paper Series 2020. |
| 5 | Feb 15, 18, & 22 | Black SE, Cortes KE, Lincove JA “Apply Yourself: Racial and Ethnic Differences in College Application” Education Finance and Policy 2018. |
| 6 | Feb 15, 18, & 22 | Button P, Dils E, Harrell B, Fumarco L, Schwegman D “Gender Identity, Race, and Ethnicity Discrimination in Access to Mental Health Care: Preliminary Evidence from a Multi-wave Audit Field Experiment” NBER Working Paper Series 2020. |
| 7 | Feb 17, 20, & 24 | Cabral M, Kim B, Rossin-Slater M, Schnell M, Schwandt H “Trauma at School: The impacts of schootings on students’ human capital and economic outcomes” NBER Working Paper Series 2020. |
| 8 | Feb 17, 20, & 24 | Bryan C, Hansen B, McNichols D, Sabia JJ “Do State Tobacco 21 laws work?” NBER Working Paper Series 2020. |
| 9 | Feb 22, 25, & Mar 1 | Myers SL, Lee WF “Racial Disparities, Homeownership, and Mortgage Lending in the Post-Great Recession Period: the Case of the Minneapolis-St. Paul Metropolitan Area” *Journal of Economics, Race, and Policy* 2018. |
| 10 | Feb 22, 25, & Mar 1 | Bentley MJ, Bogan VL “Boomerang bias: Examining the effect of parental coresidence on Millennial financial behavior” *Financial Planning Review* 2019. |