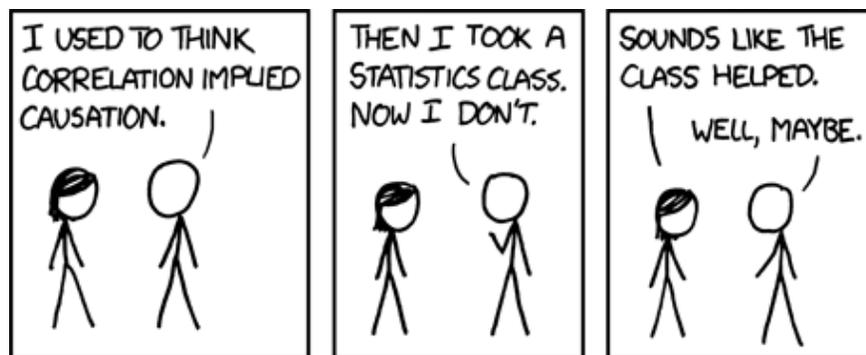Political Science 4781 Online
Data Analysis in Political Science I
Summer 2015

Syllabus Version: 1.0

Instructor: Agnar F. Helgason

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Office Hours: One-on-One on Skype 10-11am Tue and Fri (appointment required), and by appointment.

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Course Description

This course introduces students to ways in which social scientists leverage **quantitative data** to answer questions about human behavior and society. We will cover a range of topics, including how to **describe data**, how to **draw inferences** from samples to populations, how to formally **test hypotheses** using data, and how to **evaluate data-based claims** in experimental and observational research. In the course, students will get **hands-on experience in analyzing data**, which will involve learning how to apply the techniques we discuss in class using a popular (and free!) statistical software program, R. While many of the examples used in the class will be related to political science, we will also use examples from other fields of study, such as sociology, psychology, sports, and the health sciences.

At the successful completion of the course, you should be able to **critically evaluate social scientific research** you come across, both in other courses and in your daily live; and **seek out and analyze data** to address research questions that interest you. Moreover, familiarity with statistical methods and statistical software is increasingly **valued by employers**. If you do well, you can add completion of the course to your CV and, in particular, that you have experience in using R.

A Note on the Mode of Instruction

The course will be **delivered entirely online**, with all lectures, assignments, exams, and feedback provided through Carmen. This provides you with considerable flexibility in managing how you progress through the course, but **with great flexibility comes great responsibility**. While I will do my best to facilitate learning over the entire span of the course, it is eventually **your responsibility to keep up** with lectures and assignments and to actively seek out help from the instructor if help is needed.

Research suggests that one of the most important predictors of success in online classes is the willingness (and motivation) to independently master the material of the class over the course of the term. Thus, while the online format suits the learning needs of many students, it is by no means the ideal format for everyone.

Prerequisites

Formally: Math 1151 and one course in Political Science at the 3000 level or above.

Informally: While much of this course is devoted to learning methods of statistical analysis, it is not necessary for you to have an extensive mathematical background in order to gain a thorough understanding of the material. However, there are a couple of factors you should keep in mind when deciding if this course is the right fit for you:

- Although this is an online class, the work load is the same as in the face-to-face section of the class. To be successful in the course, you should expect to devote considerable (though not unreasonable) time to study the material each week.

- Learning how to use R can be a frustrating process. You should be willing to put in the time and effort to use it, since using R is an intergral part of the course. That said, I am here to help you learn and will, of course, provide extensive information on how to perform data analysis in R.

- This course is conducted entirely online, meaning that all assistance will be provided through online communication. Importantly, I will not be holding any face-to-face office hours. All office hours will be conducted on Skype, either using IM or video conferencing.

Course Objectives

This course satisfies the GE data analysis requirement, described by the University as follows:

Goals: Students develop skills in drawing conclusions and critically evaluating results based on data.

Expected Learning Outcomes: Students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

Texts and Material

Required Texts

The following (free!) textbook is required:

- David M. Diez, Christopher D. Barr, and Mine Cetinkaya-Rundel. *OpenIntro Statistics.* CreateSpace, 2nd edition, 2011. ISBN 978-1478217206

  A PDF of the book (henceforth OI) is available for free at http://www.openintro.org/stat/textbook.php. A paperback version can also be purchased from Amazon for under $10.

Other required material will be provided on Carmen.

Computer Software

Quantitative social science research requires the use of computers. Throughout the course, I will assume that you have a personal (or family) computer that you can use to complete all assignments. **If you do not have access to a personal computer, please email Agnar ASAP.**

While there are many different statistical software packages available, we will be using a program called R, which is a free, open source programming language and environment for statistical computing. It can be downloaded at http://www.r-project.org/. To assist you in using R, I also recommend that you install RStudio, which is a free, open source interface to R that makes working with R significantly easier, particularly on Windows. It can be download it for various platforms at http://www.rstudio.org/. Instructions on how to install both programs will be provided in week 1.

Assignments and Grading

Assessment for this course will be based on (almost) weekly quizzes, four homework assignments, a midterm exam, and a final exam. The final course grade will be determined based on the following breakdown:

Weekly quizzes: Best 8 out of 10 @ 2.5% each = 20%
Homework assignments: 1 @ 5% and 3 @ 10% each = 35%
Midterm exam: 1 @ 20% = 20%
Final exam: 1 @ 25% = 25%

You will also have the opportunity to complete 2 extra credit assignments, with each contributing up to 3% to your grade. A cumulative average grade of over 90% is guaranteed at least an A-, over 80% is guaranteed at least a B-, and over 70% at least a C-. These thresholds may be lowered, but will never be raised.

Week 1 Chores

In the first week of the course, you are required to complete a couple of "chores". You will not receive credit for any quizzes or homeworks until these tasks have been completed. **Please complete them by the end of the first week:**

1. You should add the instructor (username: `agnar.f.helgason`) as a contact on Skype. If you do not have Skype on your computer, you can download it for free at `http://www.skype.com/`. If you cannot install Skype, please email Agnar ASAP.

2. Install R and RStudio on your computer using the guidelines provided in the first week material. If you cannot install either program, please email Agnar ASAP.

3. Complete the "Statement of Understanding", which can be found under the "Activities-Quizzes" tab on Carmen. The quiz will ask you to note that you understand some of the basic requirements and logistics of the course, discussed in the syllabus. The quiz is untimed. Please complete this chore last, since it will ask you to confirm that you have completed the first two chores.

Quizzes

The quizzes are meant to test your working knowledge of the materials covered in lectures and assigned readings. The quizzes will consist of ten questions, **which you will have to answer in a maximum of 30 minutes.** Each quiz is graded out of 8 points, meaning you can answer two questions incorrectly and still receive the highest grade. If you answer more than 8 questions correctly, the extra points will be carried over, such that they can improve your quiz grade in another week (e.g. if you score 9 in one week and 7 in another, you'd get 8 points in each week, and thus, an A). Most weeks, each quiz will consist of two sections: 1) A section which involves completing exercises from the textbook. The exercises will be provided in each week's study guide, which means that you can complete them prior to the quiz and, thus, only have to fill in the appropriate answers during the quiz. 2) A section which involves answering multiple choice questions on the material covered during the week. The questions in this section may be randomly chosen from a larger pool of questions, which means that you and your classmates will not necessarily be asked exactly the same questions. The quizzes are open book, i.e. you are free to check the book, videos, R etc. for answers, but are not allowed to consult with your classmates during the quiz. Quizzes are due by 11.59 PM (EST) on Tuesday. **After the deadline has passed, you will not be able to take that week's quiz and will receive a score of 0**. (Protip: Plan for contingencies and do not wait until the last minute to take the quiz — no extensions will be granted due to technical difficulties). Quiz answers will be available on Carmen the morning after a quiz is due. **The lowest score will be dropped**.

Homework Assignments

Homework assignments are meant to assist you in developing the problem-solving, analytic, and computer skills necessary to perform modern social scientific research. Assignments will give you the opportunity to engage deeply with the course material and provide you with hands-on experience in working with real-world data in R. The schedule below contains information on when assignments are due — like the quizzes, they should be handed in by 11.59 PM (EST) on Tuesdays. **You**

can hand in the homework up to three days late, but will incur a 20% late penalty. Homework assignments will not be accepted after the three days have passed.

Midterm and Final Exam

The midterm exam will cover all materials presented or assigned in the first five weeks of the course. It will take place in week 6, from 8 AM on June 22 to 11.59 PM on June 23.

The final exam will cover all materials presented or assigned after the midterm exam. The exam will take place from 8 AM on August 3 to 11.59 PM on August 4.

You can choose when during each two day period you take the respective exam, although **once you have begun taking an exam, you only have 80 minutes to complete it.** As with the quizzes, do not wait until the last minute to complete the exams. Extensions based on technical problems that occur at the last minute will not be granted.

No make-up exams will be given for the final exam. If you can't take the final exam on the dates specified above, you should email Agnar ASAP (and at the latest, four weeks before the final is to take place).

Extra Credit

Two extra credit assignments will be available over the semester, with each contributing up to 3% to your grade. Additionally, **in an effort to encourage you to provide constructive feedback on the course there will be a group-wise extra credit granted if more than 75% of the students completing the course complete both their SEI and an end-of-class-survey.** Since both surveys are anonymous, everyone in the class will receive the extra credit if the threshold is passed.

Policies and Procedures

Academic Honesty

I expect all of the work you do in the course to be your own. Academic misconduct of any sort will not be tolerated and will be reported to the university committee on academic misconduct and handled according to university policy. **The quizzes, assignments, and exams are to be taken during the allotted time period without the aid of other students and/or people.**

Communication

The primary method of communication will be through Carmen. Please be sure that you have access to Carmen and that you check it regularly.

The class site on Carmen includes a discussion board where you can ask questions about the course. **Any non-personal question related to the course material, quizzes, homeworks, etc. should be posted to the discussion board.** Please adhere to the (fairly reasonable) code of conduct when you post on the discussion board. Also, make sure to check whether your question has already been asked (and answered!).

Agnar will have online office hours slots two times a week (see first page of syllabus for times). Please book an appointment at https://calendly.com/agnarhelgason/officehrs/. Office hours will be conducted through Skype. **Using webcams for office hours is not required. If you prefer, you can talk using just audio, or exchange messages using the IM interface on Skype**. Skype also allows for the possibility of sharing screens, which is a really useful feature when discussing questions relating to R.

I aim to answer all questions sent by email or posted on the discussion board promptly. If I have not answered your question within 48 hours, please resend/repost your question – in all likelihood I have missed it.

Disability Services

Students with disabilities that have been certified by the Office for Disability Services (http://www.ods.ohio-state.edu/) will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901.

Weekly Schedule

Every week, I will post a short study guide for the week on Carmen. The guide will include the learning objectives for the readings, exercises to complete for the weekly quiz, and anything else that might be important to that week's subject. Please begin each week by reading the guide.

Tips for Success

1. Use the study guide to navigate the material for each week.

2. Complete the exercises in the study guide prior to taking the weekly quiz.

3. Get an early start on homework assignments. Using R will involve some trial-and-error and having ample time to seek help from the instructor is crucial.

4. Don't suffer alone! Research on online education shows that participation on discussion boards and other interaction with your classmates is important to solidify your understanding of the material. If you do not understand something, you are most likely not the only one. Post a question on the discussion board or reach out in another way to your classmates or the instructor.

5. Don't be a stranger! I am here to help and happy to answer your questions. Meeting on Skype for office hours doesn't have to be a big thing – we can IM or only use audio if you prefer.

Class Schedule

The class schedule below is tentative, and is subject to change depending on how fast we get through the material. If the schedule does change, an updated syllabus will be posted to Carmen. Readings from the textbook are denoted with a # sign - for example, OI#1.1-1.5 means that you should read sections 1 through 5 of Chapter 1 in Diez et al. (2011).

Unit	Due Date	Topics and Readings	Assignments
1	5/19	**Introduction** Social SCIENCE, Data, Installing R and RStudio Read: This syllabus, OI#1.1-1.5	Q1 & W1 Chores Due
2	5/26	**Exploratory Data Analysis** Describing Data, Using RStudio Read: OI#1.6-1.8	Q2 & HW1 Due
3	6/2	**Probability Distributions** Normal Distribution, Binomial Distribution Read: OI#3.1, 3.2, 3.4 Recommended: OI#2.1, 2.2	Q3 Due
4	6/9	**Statistical Inference** Sampling Distribution, CLT, Confidence Intervals Read: OI#4.1-4.2	Q4 Due
5	6/16	**Statistical Inference II** Hypothesis Testing, Decision Errors, Significance Read: OI#4.3-4.5	Q5 & HW2 Due
6	6/23	**Midterm**	Midterm Due
7	6/30	**Research Design in the Social Sciences** Causation, Experiments, Observational Studies Read: Kellstedt and Whitten (2013#3-4)	Q6 Due
8	7/7	**Inference for Numerical Variables** Difference of Means, t-test, ANOVA Read: OI#5	Q7 Due
9	7/14	**Inference for Categorical Variables** Proportions, Chi-Squared Read: OI#6.1-6.4	Q8 & HW3 Due
10	7/21	**Simple Linear Regression and Correlation** Linear Regression, Correlation, Prediction, Outliers Read: OI#7	Q9 Due
11	7/28	**Multiple Linear Regression** OLS, Model Selection, Multicollinearity Read: OI#8.1-8.3	Q10 & HW4 Due

Unit	Due Date	Topics and Readings	Assignments
12	8/4	**Final Exam**	Final Due

Required Readings

David M. Diez, Christopher D. Barr, and Mine Cetinkaya-Rundel. *OpenIntro Statistics.* CreateSpace, 2nd edition, 2011. ISBN 978-1478217206. [3, 6, 7]

Paul M Kellstedt and Guy D Whitten. *The Fundamentals of Political Science Research.* Cambridge University Press, New York, NY, 2nd edition, 2013. ISBN 978-1107621664. [7]