

IR 151 - ANALYTICAL TECHNIQUES FOR SOCIAL SCIENCES

Spring 2022-2023

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Email:	ayse.senol@bilgi.edu.tr	Office Hours:	Friday, 16:15-17:15 (or appointment by e-mail)
Lectures	IR 151.1 Friday 09:00-12:00		IR 151.2 Friday 13:00-16:00

Course Description and Objectives:

The value and impact of quantitative data in social science started to increase in the last couple of decades. Survey data on voter behavior to predict election outcomes, event data to predict civil/interstate conflict, or data on democratic values to track and understand the reasons for autocratization are only some of the examples of current debates in both academic and policy-making circles on how quantitative data acts as very crucial assets to analyze key social and political events. Data analysis techniques, thus, are necessary skills for every social scientist which will enable them to understand and use the produced data in social science. The purpose of this course, thus, is to introduce the main analytical tools and techniques used in quantitative methods which are crucial in social sciences.

Throughout the semester, we will examine different analytical techniques that are necessary to understand research methods in social sciences. The course will offer a refresher on calculus and algebra which can be considered as the common language in quantitative analysis. The course will also introduce logic, probability theory, statistics, and game theory at an introductory level. Yet students will familiarize themselves with the basic concepts of these major topics.

By the end of the semester, the students will be able to read and understand mathematical notations and get familiar with the functions and algebra. Students will be able to formulate good questions and hypotheses by learning the essentials of logic. Students will understand how to treat uncertainty in political science by learning probability theories. Students will become familiar with important concepts of statistics. Last but not least students will be able to think formally with the introduction of the essentials of game theory. Therefore, the students will be prepared for advanced methodological courses in social sciences and political sciences (such as IR 213 and IR 342).

Grading Policy and Course Requirements

To receive a passing grade from the course you should complete the following requirements of the course. Grades will be given on a 100-points scale. Cumulative final grades will then be converted to letter grades at the end of the semester as follows:

85-100=A, 80-84=A-, 75-79=B+, 70-74=B, 65-69=B-,
60-64=C+, 55-59=C, 50-54=C-, 45-49=D+, 40-44=D,
0-39=F.

- In-class Exercises: There will be 6 pre-announced in-class exercises which will be done as a group or individually. The assignments aim to facilitate students' understanding of the topics covered during the lecture. The best five in-class exercises will be counted and each of these exercises will be worth 4% of the total course grade so you will get 20% of your course grade from these in-class exercises.¹
- Attendance: Attendance is mandatory and is 5% of your course grade.²
- Midterm: The midterm will be 15% and you will be responsible for the first 6 weeks. The details on the midterm exam will be announced during the semester.
- Final Exam: The midterm will be 60% and you will be responsible for the whole semester. The details on the final exam will be announced during the semester.

Course Outline and Important Dates

■	Why Do We Need Analytical Tools in Political Science?	March, 3
■	Mathematical Notations and Algebra Review	March, 10
■	Causality and Functions	March, 17
■	In-class exercise	
■	Causality and Calculus in One Dimension	March, 24
■	In-class exercise	
■	Logic and Introduction to Probability Theory	March, 31
■	Probability Theory	April, 7
■	In-class exercise	
■	Midterm	April, 14
■	**No Class**	April, 21
■	Introduction to Statistics	April, 28
■	Introduction to Statistics (cont.)	May, 5
■	In-class exercise	
■	Game Theory I	May, 12
■	**No Class**	May, 19
■	Game Theory II	May, 26
■	In-class exercise	
■	Social Science and Machine Learning	June, 2
■	In-class exercise	

¹Originally this component was designed as an in-class activity however with the current changes these exercises will be done over Zoom and the details will be announced in the first lecture.

²According to the YÖK regulations you can participate over Zoom. The Zoom link will be provided before the first lecture.

Textbooks:

We will follow some of the chapters of the following books throughout the semester. The assigned book chapters will be available on BilgiLearn platform.

Howard, Christopher. *Thinking Like a Political Scientist: A Practical Guide to Research Methods*. University of Chicago Press, 2017.

Moore, Will H., and David A. Siegel. *Mathematics Course for Political and Social Research*. Princeton University Press, 2013.

Agresti, Alan, and Barbara, Finlay. *Statistical Methods for the Social Sciences*. No. 300.72 A3. 2009.

Copi, Irving, Carl Cohen, and Victor Rodych. *Introduction to Logic*. Routledge, 2016

Required Readings:

These assigned texts are for you to follow the lectures easily. The lectures will be based on these readings and we will cover most of the materials from these texts. So it is very important you to read these texts before and /or after the lecture.

- **Week 1 (03.03) Why do we need Analytical Tools in Political Science?**
 - Howard, [Introduction](#), pp.1-10.
- **Week 2 (10.03) Mathematical Notations and Algebra Review**
 - Moore and Siegel, [Chapter 2](#)
- **Week 3 (17.03) Causality and Functions**
 - Moore and Siegel, [Chapter 3](#)
- **Week 4 (24.03) Causality and Calculus in One Dimension**
 - Moore and Siegel, [Chapter 5](#)
- **Week 5 (31.03) Logic and Introduction to Probability Theory**
 - Copi et al., [Chapter 12](#)
- **Week 6 (07.04) Probability Theory**
 - TBA

- **Week 7 (14.04) Midterm**
- **Week 9 (21.04) **No Classes****
- **Week 7 (28.04) Introduction to Statistics**
 - Agresti and Finlay [Chapter 1](#) and [Chapter 2](#)
- **Week 10 (05.05) Introduction to Statistics (cont.)**
 - Agresti and Finlay [Chapter 3](#)
- **Week 11 (12.05) Game Theory I**
 - Osborne, Introduction, pp.1-9
- **Week 12 (19.05) ***No Classes*****
- **Week 13 (26.05) Game Theory II**
 - Debs, Alexandre. “The Empirical Promise of Game Theory.” In *Oxford Research Encyclopedia of Politics*. 2017.
- **Week 14 (02.06) Social Sciences meets Machine Learning**
 - Grimmer, Justin, Margaret E. Roberts, and Brandon M. Stewart. “Machine learning for social science: An Agnostic Approach.” *Annual Review of Political Science* 24 (2021): 395-419.