

# Syllabus

## Quantitative Methods

Instructors: Oliver Westerwinter & Dirk Lehmkuhl  
Teaching Assistant: Massimo Mannino  
Spring Semester 2015

### **Time & Room**

*Class:* Wednesday 12:15-2 in 09-114  
*Exercise Group 1:* Wednesday March 25,  
April 22, May 20 10:15-12 in 36-108  
*Exercise Group 2:* Wednesday March 25,  
April 22, May 20 12:15-2 in 01-U102

### **Office**

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*Office hours:* Tuesday 1:30-2:30,  
starting February 24

This syllabus may be subject to adjustments.

### **Overview and Goals**

This course provides a systematic introduction in the techniques and instruments of basic quantitative methods in the social sciences. The course is divided into three main parts. The first part deals with questions related to quantitative research design, measurement, and descriptive statistics. Part two covers basic topics of univariate statistics, such as point estimation, interval estimation, and hypothesis testing. The final part is concerned with regression models. The primary goal of the course is to provide students of the social sciences with the skills needed to understand and critically discuss social science research that uses statistical methods.

At the end of the course, you will have acquired solid training in the basics of descriptive and inferential statistical research methods. This includes knowledge of the elementary mathematical and probability theory related foundations of statistical methods. Furthermore, you will also be familiar with basic techniques of preparing, managing, visualizing, and analyzing statistical data using the computer software STATA.

### **Prerequisites**

A willingness to work through possibly unfamiliar material. A basic understanding of calculus, linear algebra, and probability is helpful but not required.

## Class Requirements

Final grades will be based on:

- Final exam (70% of final grade)
- Homework assignments (30% of final grade)
- Participation in lectures and exercises

There will be three homework assignments each of which will contribute 10% to your final grade for this class. The homework assignments will consist of analytical problems, computer simulations, and data analysis. They have to be submitted at the beginning of the exercise sessions and will be assigned at least one week prior to the next exercise session. No late homework submissions will be accepted. All submitted homework will be graded. Solutions will be discussed by the teaching assistant in the exercise sessions on the day the assignments are due.

The homework assignments are solo exams. Thus, you always need to write and submit your own solutions. Please always make sure that you write your name on every page of your submission. Please note that the homework assignments are designed to support and deepen your understanding of the material discussed in class. They will help you to self-assess your level of accomplishment and plan your preparations for the final exam.

The final exam will be 60 minutes, central in-class exam and held in English. The exam will be closed book but you will be allowed to use a calculator of the Texas Instruments TI-30 series. No other calculators will be allowed for the exam. You are also allowed to use a bilingual dictionary without notes.

## Exercise Sessions

Two exercise groups will complement the lectures. Each group will meet three times during the course of the semester. Group 1 will meet on Wednesday March 25, April 22, and May 20 at 10:15-12 in room 36-108. Group 2 will meet on Wednesday March 25, April 22, and May 20 at 12:15-2 in room 01-U102.

The exercise sessions will consist of a review of the theoretical material presented in the lectures and a discussion of the homework assignments. All exercise sessions will be held in computer labs and will be run by the teaching assistant.

The exercise sessions are an integral part of this class. The solutions to the homework assignments will only be discussed in the exercise sessions.

## Course Website

We use StudyNet as communication platform for the class. The course site at StudyNet can be accessed here: <https://loginpages.unisg.ch/studynet>.

The course website at StudyNet will provide readings, homework assignments, datasets, sample STATA code, and supplementary materials.

## Computation

We teach the course in STATA, though there will be an occasional use of R. STATA is available in all computer labs on campus (rooms: 01-U102, 01-U179, 01-206, 36-108). Student licenses can also be purchased from the IT support service of the university.

The book *A Gentle Introduction to Stata* (for full reference, see below) provides you with an accessible introduction to STATA. In addition, the web also provides a number of tutorials and resources to learn STATA. A list of these can be found at <http://www.stata.com/links/resources-for-learning-stata>.

If you want to make yourself familiar with R in addition to STATA, you are free to do so. R is an open-source computing language that is widely used in statistics. You can download it for free from [www.r-project.org](http://www.r-project.org). Tutorials and other resources to learn R are available at <http://wiki.math.yorku.ca/index.php/R:Gettingstarted>.

## Reading

The assigned required readings are listed on the syllabus for each topic. You should read this material closely! In addition, it is recommended to consult the optional readings.

The required as well as the optional books will be provided in the university library in a special section for this class. We recommend to buy the Agresti and Finlay book. Complementary reading materials will be provided at the course website at StudyNet.

## Required Books

The following required textbook is available at the university library and will be used in the course.

Agresti, Alan and Barbara Finlay. 2014. *Statistical Methods for the Social Sciences*. Fourth edition.

## Optional Books

The following books are optional but may prove useful to students looking for additional coverage of some of the course topics.

*Alternative textbooks:*

Diez, David M., Christopher D. Barr and Mine Cetinkaya-Rundel. 2014. *OpenIntro Statistics*. Second edition. The book and the complementary materials are available at <https://www.openintro.org/stat/textbook.php>.

Wooldridge, Jeffrey. 2013. *Introductory Econometrics. A Modern Approach*. Fifth edition. New York: South-Western.

*For research design:*

King, Gary, Robert O. Keohane and Sidney Verba. 1994 *Designing Social Inquiry: Scientific Inference in Qualitative Research*. Princeton: Princeton University Press.

*For an introduction to STATA:*

Acock, Alan C. 2014. *A Gentle Introduction to Stata*. Fourth edition.

*For probability:*

Bertsekas, Dimitri and Tsitsiklis, John. 2002. *Introduction to Probability*. Second edition.

*For math background:*

Gill, Jeff. 2006. *Essential Mathematics for Political and Social Research*. New York: Cambridge University Press.

Moore, Wil H. and David A. Siegel. 2013. *A Mathematical Course for Political and Social Science*. Princeton: Princeton University Press.

Simon, Carl and Blume, Lawrence. 2010. *Mathematics for Economists*. New York: Norton.

## **Preliminary Schedule**

The weekly coverage might change as it depends on the progress of the class. The readings should be completed prior to the lecture for which they are listed. This schedule is subject to change.

Please note: There will be no class and exercise group sessions on April 1 & 8.

In what follows, we refer to the Agresti and Finlay book as AF with chapter and section numbers following (e.g. AF3.2-3.5 means chapter 3, sections 2-5 of Agresti and Finlay).

Individual numbers refer to optional texts which may be helpful for understanding the material presented in the lecture they are associated with. You can find the detailed references for these materials below in the section “Optional Literature”. References to other literature listed in the class schedule that are not numbers refer to additional required readings. For example, while the “1” in the “reading” column of February 18 refers to an optional text, the reference to Wooldridge Appendix B.1., B.3, and B.5 in the “reading” column of March 11 refers to an additional required text.

## **Optional Literature**

1. Mahoney, James and Gary Goertz. 2006. “A Tale of Two Cultures: Contrasting Quantitative and Qualitative Research.” *Political Analysis* 14: 227-249.

<b>Date</b>	<b>Topic</b>	<b>Reading/Assignment</b>
Feb. 18	Introduction: quantitative research design, basic concepts	AF1, 1
Feb. 25	Sampling and measurement	AF2
March 04	Descriptive statistics	AF3
March 11	Probability distributions	AF4.1-4.3, Wooldridge Appendix B.1, B.3 & B.5 (normal distribution)
March 18	Univariate statistical inference I: Sampling distributions, point estimation, interval estimation	AF4.4-4.6 & 5.1-5.3, Wooldridge Appendix C.1-3 & C.5
March 25	Exercise groups 1 & 2, session 1	Assignment 1
April 15	Univariate statistical inference II: Hypothesis testing	AF6.1-6.6
April 22	Exercise groups 1 & 2, session 2	Assignment 2
29. April	Group comparisons & contingency tables	AF 7.1-7.4 & 8.1-8.4
6. Mai	Regression & correlation I	AF 9.1-9.3
13. Mai	Regression & correlation II, questions final exam	AF 9.4-9.6
May 20	Exercise groups 1 & 2, session 3	Assignment 3