Syllabus
Social Science Methodology: Intermediate Statistics
Instructor: Oliver Westerwinter
Spring semester 2018

Time & room

Office
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This syllabus may be subject to adjustments.

Overview and goals
This course focuses on intermediate statistical methods in the social sciences. The course is divided into three main parts. The first part deals with regression models and ordinary least squares estimation (OLS). Part two covers binary outcome models, nominal and ordered outcome models, and count outcome models. The final part is concerned with panel data models. Throughout the class, we will focus on both the theoretical foundations as well as the practical application of the statistical methods discussed.

The primary goal of the course is to help students to become increasingly skilled users and critical consumers of research employing statistical methods. A special emphasis will lie on the substantive interpretation of the results of statistical models. At the end of the course, students will have acquired solid training in a broad range of statistical models and how they can be used in a practical social science research context. This includes knowledge of the elementary mathematical and probability theory related foundations of statistical methods. Furthermore, students will also be familiar with techniques of preparing, managing, visualizing, and analyzing statistical data using the computer software R.

Prerequisites
A basic understanding of statistical methods (e.g. descriptive statistics, hypotheses tests, confidence intervals) will be helpful to follow the class. Familiarity with calculus, linear algebra, and probability is helpful, but not required.

Class requirements
Final grades will be based on:

• Term paper (55% of final grade)
• Three homework assignments (45% of final grade)
• Participation in lectures
There will be three homework assignments, each of which will contribute 15% to your final grade. The homework assignments will consist of analytical problems and data analysis. The solutions of the assignments have to be submitted either in handwritten or printed form at the beginning of each class at which they are due. You may also submit your solutions via email to oliver.westerwinter@unisg.ch. The assignments will be available one week prior to the class at which they are due. No late homework submissions will be accepted. All submitted homework will be graded. Solutions will be available electronically in due course after the submission of the assignments.

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 term paper project.

The term paper will contribute 55% to your final grade. It has to be submitted either as hard copy or electronically (PDF file per email to: oliver.westerwinter@unisg.ch) by June 1. Late submissions will not be accepted. The term paper is expected to present a short research project that uses statistical methods. The maximum length of the paper is 5,000 words (including footnotes, references, etc.). The term paper is a solo exam. You are therefore expected to work on and submit your term paper project individually.

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](https://loginpages.unisg.ch/studynet).

The course website at StudyNet will provide lecture slides, readings, homework assignments, R scripts, and other supplementary materials.

Computation using R
The course will be taught in R. 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) and it is recommended that you install R on your private computer prior to the start of class. For those of you who are not yet familiar with R, the course will include an introduction into the basics of R in the first sessions. Furthermore, I will provide detailed example code as well as other resources to learn programming in R including an introductory manual on the StudyNet website of the course. Additional tutorials and other resources to learn about the basics of R are available here: [http://wiki.math.yorku.ca/index.php/R:Gettingstarted](http://wiki.math.yorku.ca/index.php/R:Gettingstarted).

The books Introductory Statistics with R, Political Analysis Using R, and Quantitative Social Science. An Introduction (for full references, see below) provide an accessible introduction to R.

Writing using \LaTeX
\LaTeX is a document processing environment that is also free and open-source. Working in \LaTeX is a lot like working with html code for webpages. You write \LaTeX documents using a text editor. You add formatting features to the document using various codes that are...
available in the base \LaTeX{} system or in various packages that you load as part of the document. You then ask the text editor to use the functions available in \LaTeX{} to compile your document. The result is a PDF (or other) file that looks clean and professionally produced. The value of \LaTeX{} over word processors like MS Word is that you have complete control over how your final document looks. This is often trivial for memos or letters, but can be quite helpful when doing scientific writing. \LaTeX{} makes it much easier to write mathematical formulas, include figures, construct tables, and build your references. There are a number of features that make it particularly compatible with using R to conduct your statistical analysis.

\LaTeX{} is available from several sources online. \TeX{} Live works for all common platforms. A version called Mac\TeX{} is a version of \TeX{} Live specially designed for installation on a Mac. MiK\TeX{} and its newer version, pro\TeX{}t, are distributions for Windows machines. You can read more about this online here: \url{http://latex-project.org/ftp.html}, \url{http://www.ctan.org/}, and \url{http://www.tug.org}.

I encourage you to consider using \LaTeX{} for your work in this class. I will provide support and direction with \LaTeX{}, but if you are interested in using \LaTeX{} for this class, you need to take the responsibility yourself to learn the tools you need to do your work. In addition to the sources provided in this course, you can consult the broad range of online sources. Working in groups with other students to work through the challenges of getting started with \LaTeX{} may also be helpful.

**Textbooks**

The required readings in combination with the slides will be the primary teaching materials. The main textbook for the course is:


Students who are interested in consulting additional textbooks can choose from a broad variety of statistics and econometrics texts with different strengths and weaknesses including:


**Schedule**
The weekly coverage might change as it depends on the progress of the class. The assigned required and optional readings are listed in the class schedule for each session. The required readings should be completed prior to the session for which they are listed and studied carefully. In addition, it is recommended to consult the optional readings. The optional readings may prove useful to students looking for additional coverage of some of the course topics as well as for developing the topic of your term paper project. This schedule is subject to adjustments.

**February 19 – Introduction & regression and OLS I**

*Required readings:*


*Optional readings:*


**February 26 – Regression and OLS II**

*Required readings:*


*Optional readings:*


**March 05 – Regression and OLS III**

*Required readings:*


*Optional readings:*


**March 12 – Regression and OLS IV (problem set 1 available)**

*Required readings:*


*Optional readings:*


**March 19 – Binary outcome models I (problem set 1 due)**

*Required readings:*


Optional readings:


March 26 – Binary outcome models II

Required readings:


Optional readings:


April 16 – Nominal and ordered outcome models I (problem set 2 available)

Required readings:


Optional readings:


April 23 – Nominal and ordered outcome models II (problem set 2 due)
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Required readings:


Optional readings:


April 30 – Count models

Required readings:


Optional readings:


May 07 – Panel data models I (problem set 3 available)

Required readings:


Optional readings:

May 14 – Panel data models II (problem set 3 due)

Required readings:


Optional readings:


Further optional readings

The following texts may turn out helpful for students who want to deepen some of the materials covered in class and review the basics of calculus, probability theory, research design, and programming in R.

Research design:


Probability theory:


Mathematics:


Introduction to R:
