Statistical Computing
Ma Data Science
Winter Semester 2019/20

BEUTH HOCHSCHULE FÜR TECHNIK BERLIN
University of Applied Sciences

Prof. Tim Downie

Course Information

Course Aims: To learn the basics of statistical methods, graphics and data analysis. Particular focus is put on using R and RStudio to analyse data by applying these methods.

Course Objectives: On successful completion of this course a student will understand and be able to apply classical descriptive and inferential statistical methods. A student will be able to use the statistical package R to input, edit and manipulate data, produce appropriate graphics and implement statistical methods. In addition, the student will be familiar with some basic principles of programming, and should be able to carry out simple programming in R with application to a variety of computational and numerical techniques.

Course content: Introduction to Rand RStudio. throughDescriptive statistics including measures of location, dispersion, quantiles and covariance. Inferential statistics including confidence intervals and hypothesis tests. Simple regression models. R topics include: expressions, assignments, objects, vectors, arrays and matrices, lists and data frames, functions, control structures, graphics and simulation. The application of R in order to carry out the statistical aspects of the course.

Moodle-Site: All course material and news will be distributed via Moodle:
http://lms.beuth-hochschule.de/moodle/course/view.php?id=17295
Short name: sc-wise1920

Lecturer: Prof. Tim Downie (TD) (FB II, Room A 126)

Email: tim.downie@beuth-hochschule.de

Office Hour: Please email TD to arrange a time.

Texts: It is not necessary to buy any book for this course. Some on-line links are available in Moodle, the following books are for further reference.

J. Maindonald and J. Braun (2003). *Data analysis and graphics using* R*: an example-based approach*. Cambridge University Press.

B.S. Everitt (2002). *A handbook of statistical analyses using S-Plus* (second edition, Chapman and Hall/CRC Press).

S. Selvin (1998). *Modern and Applied Biostatistical Methods Using S-Plus* (Oxford University Press)

W.N. Venables and B.D. Ripley (2002). *Modern Applied Statistics with* S (fourth edition, Springer).

B.S. Baumer,D.T. Kaplan and N.J. Horan (2016) *Modern Data Science with R.* (Chapman and Hall/CRC Press).

Timetable: Officially there are weekly blocks of *Seminarische Unterricht* (lectures) with *Übungsgruppen* (workshops) fortnightly.

In practice each week will start with a lecture, followed most weeks by a computing workshop. The exact time allocation to lecture/workshop will vary from week to week. This gives you more hands-on computing time than if we stick rigidly to the official lecture/workshop allocation.

All lectures and workshops take place in Room A 129L.

On odd calendar weeks we have one teaching block from 12:15 until 13:45.

On even calendar weeks [like the first week] we have two teaching blocks from **12:15** until **15:30**. There will be a fifteen minute break at a convenient time.

Semester Plan:

Week	Date	No. blocks	Topics covered
1	4/10/2019	2	Using R for the first time
2	11/10/2019	1	Population, samples, frequencies
3	18/10/2019	2	Measures of location, quantiles, basic graphics
4	25/10/2019	1	Measures of dispersion, covariance
5	1/11/2019	2	Ecdf, boxplots and exploratory data analysis
6	8/11/2019	1	Regression
7	15/11/2019	2	Regrssion ctd.
8	22/11/2020	1	Control stucture and programming
9	29/11/2020	2	Central Limit theorem and Simulation
10	6/12/2019	1	Confidence Intervals
11	13/12/2019	2	Confidence intervals and hypothesis tests
12	20/12/2019	1	Practical R Test
	27/12/2019	-	Christmas break
	3/1/2020	-	Christmas break
13	10/1/2020	2	Hypothesis tests
14	17/1/2020	1	Revision
15	24/1/2020	-	Written exam

The outline is meant as a guide only. The topics might shift week or change as the semester progresses.

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Assessment for examination grading: There will be one sixty minute practical test using R and RStudio contributing 20% to the final course mark. The planned date for the test is the 20th December. The practical test is not compulsory but absentees without a medical certificate will get 0 points. There will be no "Nachklausur" (second test) for the practical test.

There are two ninety-minute written exams contributing 80% to your final course mark. **You only need to pass one of the two exams**.

The proposed dates for the exam are **24th January 2020** and **26th March 2020**.

A minimum of 50% (practical test + exam) is required to pass the course.

The week before the exam there will a revision class.

Information on all exam timetabling can be found at: https://pruefungen.beuth-hochschule.de/M-DS

The following grading scheme (Notenschema) will be used:

Percentage	<50	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100
Grade (Note)	5.0	4.0	3.7	3.3	3.0	2.7	2.3	2.0	1.7	1.3	1.0