**Requirements for the winter term (first)**

**Mathematics**

**Any undergraduate mathematical textbook**

Set operations

Real functions, sequences

(Natural) logarithm, exponential function

Convergence (sequence, function)

Integral calculus, derivatives (+partial derivatives, Fubini theorem), area under the curve

Matrix algebra (calculations with vectors and matrices) norm of a vector, normalized vector, orthogonal vectors, inverse matrix, transposed matrix, positive definite/semidefinite matrix etc.)

Linear form, quadratic form, rank of a matrix, trace of a matrix, eigenvalues and eigenvectors

Linear equations systems

**Descriptive statistics**

**Any undergraduate textbook on probability and statistics**

**Neil A. Weiss Elementary Statistics chapters 2, 3**

Types of variables, frequency table, frequency table with class intervals,

mean, variance and its decomposition, quantile, sample skewness and kurtosis,

basic graphs, histogram,

sample covariance, sample correlation

**Probability**

**Any undergraduate textbook on probability and statistics**

**Sheldon Ross A first course in probability chapter 1, 2**

**Neil A. Weiss Elementary Statistics chapter 5.1-5.3**

**https://www.probabilitycourse.com/ 1.0-1.3, 2**

set theory, basic terms in probability, combinatorics

**Informatics**

**Excel**  user knowledge

**R** basic knowledge  

R is an open source "statistical" programming language for statistical and graphical analysis, automatized report creation etc.

**Installation:**

R: Installation file can be found at https://cran.r-project.org/mirrors.html

RStudio : You will work with RStudio. Installation file and other information can be found at http://www.rstudio.com/.

**Books:**

Book series from Springer Use R!

 Book series from CRC The R Series

 Adler, J. R in a nutshell

 Dalgaard, P. Introductory Statistics with R. Springer

**Internet sources:**

Aggregator of the R blogs: http://www.r-bloggers.com/

Blog by Rob J. Hyndman: http://robjhyndman.com/hyndsight/r/

Electronic manual (introduction): https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf

Electronic manual (advanced): <https://cran.r-project.org/doc/manuals/r-release/R-lang.pdf>

**Statistical methods in R:**

<https://www.statmethods.net/>

descriptive statistics <https://www.statmethods.net/stats/descriptives.html>,

 https://www.statmethods.net/stats/frequencies.html

 matrix operations https://www.statmethods.net/advstats/matrix.html