Requirements for the fall term (first)

Mathematics

Any undergraduate mathematical textbook

Set operations

Real functions, sequences

(Natural) logarithm, exponential function

Convergence (sequence, function)

Norm of a vector, normalized vector, orthogonal vectors

Linear and quadratic equations

Linear equations systems

Descriptive statistics

Any undergraduate textbook on probability and statistics

Neil A. Weiss Elementary Statistics chapter 2, 3

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

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

Basic graphs, box plot, 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

Programming

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/.

Basic features of R:

Understanding objects in R (scalars, vectors, matrices, data frames)

Basic arithmetic operations

Importing data, data management

Installing packages

Recommended study materials:

- Data types, definition/creation of objects, arithmetic, slicing/subsetting
  - https://www.guru99.com/r-data-types-operator.html
  - http://www.r-tutor.com/r-introduction/basic-data-types
  - https://www.tutorialspoint.com/r/r_data_types.htm
  - https://www.dummies.com/article/technology/programming-web-design/r/subsetting-r-objects-142857
- Vectors
  - http://www.r-tutor.com/r-introduction/vector
  - https://www.tutorialspoint.com/r/r_vectors.htm
- Matrices
  - http://www.r-tutor.com/r-introduction/matrix
  - https://www.tutorialspoint.com/r/r_matrices.htm
  - https://www.guru99.com/r-matrix-tutorial.html
- Data frames
  - https://www.guru99.com/r-data-frames.html

- http://www.r-tutor.com/r-introduction/data-frame
- https://www.tutorialspoint.com/r/r_data_frames.htm

Statistical methods in R:

https://www.statmethods.net/

Basics of data visualization

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

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

Many videos about data analysis in R and Python https://www.youtube.com/c/DataProfessor

One video – introduction to data science in R https://www.youtube.com/watch?v=32o0DnuRjfg

Requirements for the summer term (2nd term)

Regression

Fundamentals of linear regression model and correlation

Neil A. Weiss Elementary Statistics chapters 4, 14

Requirements for Econometrics (4th term, course Advanced Econometrics)

Any undergraduate textbook in econometrics
Preferably, use: Wooldridge, Introductory econometrics (ed. 4 or later), good familiarity with topics discussed through chapters 1 to 9 (as a minimum).

https://www.youtube.com/playlist?list=PLwJRxp3blEvZyQBTTOMFRP_TDaSdly3gU
(short videos 1 – 127 provide an outline for most of the necessary topics)

The nature of econometrics and economic data

The simple regression model

Multiple regression analysis: estimation, inference

Ordinary least squares (OLS), asymptotics

Multiple regression analysis with qualitative information: binary variables

OLS: heteroskedasticity and autocorrelation of residuals