

Quantitative Methods

Lecturer: Dr. Florian Kauffeldt: mail@florian-kauffeldt.com

1. Course Overview

This course imparts foundational statistical knowledge. Descriptive statistics as well as inferential statistics are covered.

2. Course Objectives and Learning Outcomes

The course objectives are the following:

CO 1: Gain foundational knowledge of descriptive statistics and inferential statistics

CO 2: Understand the concepts behind the different statistical approaches

These course objectives relate to the following expected learning outcomes:

LO 1: Students will be able to calculate parameters/statistics, test hypotheses, draw inferences, and describe the relationship between variables.

LO 2: Students will be able to critically reflect on parameters/statistics and inferences presented in academic literature, using their acquired theoretical knowledge.

3. Preliminary Time Schedule (The right to make amendments is reserved)

<u>Date</u>	<u>Issue</u>
04.10.2018	Introduction
11.10.2018	Descriptive Statistics
18.10.2018	Descriptive Statistics
01.11.2018	Holiday
08.11.2018	Written Assignment #1 Descriptive Statistics
15.11.2018	Business simulation (no lecture)
22.11.2018	Random Variables and Probability Distributions
29.11.2018	Written Assignment #2 Discrete Probability Distributions

<u>Date</u>	<u>Issue</u>
06.12.2018	Continuous Probability Distributions
13.12.2018	Written Assignment #3 Sampling Distributions
20.12.2018	Large-Sample Estimation
10.01.2018	Large-Sample Tests of Hypotheses
17.01.2018	Inferences from Small Samples

4. Contents

00 Introduction

01 Issue 1 – Descriptive Statistics

Statistical Units and Characteristics
Samples and Statistical Distribution
Measures of Central Tendency
Measures of Variability

Reading: Mendenhall et al., 1993, Ch. 1 & 2

02 Issue 2 – Random Variables and Probability Distributions

Random Variables
Discrete and continuous Random Variables
Probability Distribution

Reading: Mendenhall et al., 1993, Ch. 3 & 4

03 Issue 3 – Discrete Probability Distributions

Binomial Experiment
Binomial Probability Distribution
Poisson Probability Distribution
Hypergeometric Distribution

Reading: Mendenhall et al., 1993, Ch. 5

04 Issue 4 – Continuous Probability Distributions

Uniform Distribution
Normal Distribution
Normal Approximation to the Binomial Distribution

Reading: Mendenhall et al., 1993, Ch. 6

05 Issue 5 – Sampling Distributions

Sampling Distributions
Central Limit Theorem

Reading: Mendenhall et al., 1993, Ch. 7

06 Issue 6 – Large-Sample Estimation

Point Estimators and Confidence Intervals
Goodness of Estimators
Choosing the Sample Size

Reading: Mendenhall et al., 1993, Ch. 8

07 Issue 7 – Large-Sample Tests of Hypotheses

Relevant Concepts (Null Hypothesis, Alternative Hypothesis)
Alpha and Beta Error
z-Test for μ und p , $(\mu_1 - \mu_2)$ and $(p_1 - p_2)$
 p -Values

Reading: Mendenhall et al., 1993, Ch. 9

08 Issue 8 – Inferences from Small Samples

Student's t Distribution
Independent (unpaired) Samples t-test
Paired Samples t-test
Tests to Compare Variances (χ^2 -Test, F-Test)

Reading: Mendenhall et al., 1993, Ch. 10

5. ILIAS (eLearning-platform): <https://ilias.hs-heilbronn.de>

- **Content:** Slides, othe Material
- **Course:** Quantitative Methods_Kauffeldt_WS1819
- **Password:** cauchy1789

6. Teaching Methods

As a foundational course this course is primarily based on weekly lectures (theory and exercises).

Learning occurs through a combination of

- Face-to-face lectures and class discussion
- Assigned academic readings
- Extended self-study

7. Examination and Assessment Requirements (LKBK)

The examination and grade consists of two key components: class participation/written assignments and a final exam:

- Three individual written assignments during class sessions (40%):
 - **Scheduled dates: see 3. Preliminary Time Schedule**
 - One assignment can be skipped/only the two best results will count
 - Participating in assignments → participating in final exam is obligatory
- Individual final exam (60%): The written exam (90 minutes) is an open book exam. The final exam has to be passed to pass the course.

In accordance with study and exam regulations: **Writing the first assignment requires to register bindingly for the final exam.**

8. Required Reading

The reading for this course is organised by topic (see above).

Mendenhall, W., Reinmuth, J., & Beaver, R. J. (1993). *Statistics for Management and Economics*. 7th Edition. Duxbury Press.

Mendenhall et al. (1993) is provided in PDF format via the ILIAS online learning platform.

9. Recommended Reading

You are expected to read broadly on the issues covered. Find out which statistic book is most suitable for you personally. There is a wide range of statistic books and other literature available in the campus library and online, e.g.

Backhaus, K., Erichson, B., Plinke, W., Weiber, R. (2016). *Multivariate Analysemethoden – Eine anwendungsorientierte Einführung*. Berlin: Springer, 12. Auflage

Field, A. (2017). *Discovering Statistics Using IBM SPSS Statistics*. London: SAGE Publications.

Gujarati, D., N. (2004). *Basic Econometrics*. McGraw-Hill.

Murray, M. P (2006). *Econometrics – A Modern Introduction*. Pearson International Edition.

8. Links to other courses

Research methods and statistical knowledge, as foundational academic knowledge, directly relate to all other courses when it comes to correctly interpret academic work, research results, statistics, etc. and reflect academic and non-academic articles.

Good luck and best wishes!

Florian Kauffeldt