Syllabus
AQM1141E Descriptive Statistics
Prof. Dr. Thilo Klein
Summer Semester 2024

Level	Bachelor
Credits	3
Student Contact Hours	2
Workload	90 hours, thereof 22,5 for lectures, 6 hours for exercises and 61,5 hours for preparation and review
Prerequisites	AQM1043E Analysis and Linear Algebra
Time	Thursdays, 08:00 – 09:30
Room	AUDIMAX
Start Date	21.03.2024

Lecturer		
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Summary

The necessity to understand statistical methods, to be able to see through them and to apply them has become inevitable in a world in which we are surrounded by data, numbers, trends and studies every day. Statistical methods have become an important tool, not only in business decision-making. The students get an insight into methods of presenting practical information about relationships with the help of appropriate methods and statistical indicators. They learn to recognize sources of error and manipulation attempts and to avoid them.

The course content in the subject of statistics consists of the two courses "Descriptive Statistics" (AQM1141) in the second semester and "Inferential Statistics" (AQM2101) in the third semester. Both lectures each comprise two hours per week and are each concluded with a 60-minute written exam. The course "Descriptive Statistics" covers the basic methods of the univariate and bivariate data analysis as well as probability theory. The methods are applied by performing calculations by hand and interpreting output from statistical software. The contents include the collection and scaling of empirical data, their appropriate presentation, the analysis of univariate and bivariate data sets as well as the handling of events and their quantification within the framework of probability theory and combinatorics.

Outline of the Course

- Introduction and survey types

- Introduction to R

- The sigma sign

- Univariate data analysis

  o Presentation of univariate data sets

  o Description of univariate data sets

- Bivariate data analysis

  o Contigency analysis

  o Correlation analysis

- Linear Regression

  o Method of least squares

  o Goodness of fit

  o Extensions

- Probability theory

  o Random processes and events

  o Combinatorics

  o Applications and extensions

Course Intended Learning Outcomes and their Contribution to Program Intended Learning Outcomes / Program Goals

Program Intended Learning Outcomes		Course Intended Learning Outcomes	Assessment Method
	After completion of the program the students will be able…	After completion of the course the students will be able…	Written Exam
			100%
			Individual
1	**Expert Knowledge**		
1.4	...to solve business problems based on profound data research skills and by applying quantitative methods.	… to understand simple and advanced descriptive evaluation and analysis methods (univariate and bivariate) as well as probability calculations in an economic context and to use them confidently to support decision-making in practical examples. In addition, they are able to carry out an appropriate evaluation and to clearly communicate results with textual and graphic representations and interpretations.	X
2	**Digital Skills**		
2.1	...to know and understand relevant IT software tools used in business and their features and have a solid understanding of digital technologies.	… to apply, understand and interpret basic methods of descriptive statistics with common statistical software. The focus is also on learning a basic syntax.	X
3	**Critical Thinking and Analytical Competence**		
3.1	...to implement adequate methods in a competent manner and to apply them to complex problems.	… to accompany quantitative decisions in companies and to participate in decision support.	X
3.2	...to critically reflect and interpret findings and to develop comprehensive solutions for complex problems.	… to reflect on the possibilities and limits of the statistical procedures, to recognize statistical sources of error and manipulation attempts and to develop an awareness of problems in the application and interpretation of the methods and the results.	X
4	**Ethical Awareness**		
5	**Communication and Collaboration Skills**		
5.1	...to express complex issues effectively in writing.	… to describe the statistical problems and exact mathematical notation and verbalize them in the exam depending on the context.	X
6	**Internationalization**		
6.1	...to understand and explain business challenges in an international context.	… to understand the relevant technical terms of descriptive statistics in the English language.	X

Teaching and Learning Approach

The lecture is given to students from different study programs. To prepare for the exam and to get familiar with the provided content, exercise sheets will be additionally provided during the semester. Details will be provided in the lecture. "Descriptive Statistics" is a classical lecture with the idea of the methods, the methods itself and applications of the methods. The content of the lecture is built upon the previous lecture "Analysis and Linear Algebra".

Due to the quantity and details of the topics discussed in the lecture, it is strongly recommended to keep track of the lecture by working through the hand-outs / slides and the corresponding chapters in the books during the term. The primary approach to the course will be analytical/logical. It is important to understand why and how the methods are used rather than just being able to get the correct answer.

Some mathematics, however, will be necessary to understand course content. Students are expected to attend all classes, arriving on time and staying until dismissed. You are also expected to participate actively in all class discussions and activities. It is very important that students ask and answer questions during the class. This will greatly help to understand the material better. The spoken word of the lecturer prevails.

Literature and Course Materials

Handl, A. and Kuhlenkasper, T. (2018): Einführung in die Statistik – Theorie und Praxis mit R, Springer, Heidelberg.

Lecture slides and exercise sheets for the tutorials are provided in Moodle.

Assessment

For the course, participants have to pass a written exam (60 minutes). For the exam, the following scheme of grades will be applied: 'very good' corresponds to an outstanding performance which is clearly above the average. 'good' corresponds to good performance being above the average. 'satisfactory' corresponds to an average performance with some deficits. 'sufficient' corresponds to a performance below the average with clearly deficits. 'insufficient' corresponds to performance clearly below the average with deficits being not acceptable.

Additional Information

A total of five exercises are offered in this course. The dates for the exercises will be visible in the LSF. Participation in the exercises is voluntary and cannot replace attending the lecture or a detailed study of the literature, but it does facilitate efficient self-study. Sample solutions to the exercise sheets are not provided. The students are advised to work through all the tasks on the exercise sheets before the exercise in order to be able to ask specific questions.

For regular, successful completion of the exercise sheets, students receive a bonus of 3 points for the exam. You can secure the bonus by entering your answers to the exercises before the end of the lecture period on the Moodle e-learning platform. In addition, you must achieve at least 30 points (= 30%) in all task sheets. Important: Even without this bonus, the maximum number of points of 60 points can be achieved in the exam.