Business PF
Business School
Fakultät für Wirtschaft und Recht
Hochschule Pforzheim

HS PF

Syllabus
AQM2101E Inferential Statistics
Dr. Andrea Eberhart
Winter Semester 2023/2024

Level	Bachelor	
Credits	3	
Student Contact Hours	2	
Workload	90 hours, thereof 30 for lectures, 12 hours for exercises and 48 hours for preparation and review	
Prerequisites	AQM1043E Analysis and Linear Algebra AQM1141E Descriptive Statistics	
Time	Mondays, 13:45 – 17:00	
Room	W2.3.01	
Start Date	16.10.2023	
Lecturer	**Name**	Dr. Andrea Eberhart
	Office	(external lecturer)
	Virtual Office	
	Office Hours	
	Phone	
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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 "Inferential Statistics" covers basic methods for making valid and reliable statements from the drawn sample to the underlying population. The lecture places heavy emphasis on understanding the ideas of statistical testing and its application to real empirical problems. With the latter, the students will be able to quantify uncertainty in professional data analysis by using tools of mathematical statistics. The methods are applied by performing calculations by hand and interpreting output from the statistical software R.

Outline of the Course

1: Introduction & random variables
2: Distribution parameters & discrete distribution models
3: Continuous distribution models
4: Samples & sample functions
5: Sample functions
6: Estimation & confidence intervals
7: Forecast- and tolerance intervals
8: Principles of statistical testing
9: One-sample problem
10: Two-sample problem
11: Independence & homogeneity

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 the common distribution models of random variables and to use them on practical examples to support decision-making under uncertainty. In addition, they are able to carry out statistical hypothesis tests with suitable parametric and non-parametric tests and to interpret the results appropriately.	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 inference statistics with common statistical software. The focus is also on an extended use of a 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 assisting in decision-making.	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 inferential statistical methods, 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 inferential statistics in English.	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. "Inferential 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 lectures "Analysis and Linear Algebra" and "Descriptive Statistics".
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.