Study programme(s): Applied Mathematics (MAP)

Course title: APPLIED STATISTICS PROJECT (P116)

Lecturer(s): Sanja Rapajić

Course status: elective

ECTS points: 5

Requirements: Probability

Learning Objectives

Acquiring experience and skills in an independently performed complete statistical analysis of a given experiment from a wide range of real problems. Encouraging students' ability for teamwork and communication.

Learning Outcomes

Acquiring solid knowledge of methods for appropriate choice of statistical tests, experiment design models, performing simulations and sampling, and reaching statistical conclusions in a wide range of application domains. Students will gain necessary skills for a complete statistical analysis, experience in the implementation of tests in various statistical software, as well as effective communication of the obtained results both in oral and written form.

Syllabus

Theoretical instructions

Students will learn how to perform a complete statistical analysis from data collection through testing (parametric and non-parametric tests of differences, comparisons, data fitting and regression analysis, analysis of variance, survival analysis, prognostic factors, as well as implantation in a statistical software) to interpretation of statistical test results, power analysis of the tests, analysis of its sensitivity and specificity.

The selected topics will be illustrated through specific examples from the following domains:

- statistics in medicine and pharmacology, clinical research, biostatistics
- statistics in economy, financial markets, statistics for insurance companies
- statistics in the gaming industry, Monte Carlo methods and simulations
- statistics in psychology and sports
- statistics in sociology, ecology, politics, migration analysis, other social phenomena

Practical instructions

Students will gain the ability and experience in simulating natural and social phenomena, analyzing experiments, implementing statistical tests in various software packages, and drawing conclusions about the research results. Writing of a statistical report.

Literature

1. Petrie, C. Sabin, **Medical Statistics at a Glance**, 4th ed., Blackwell Science, 2019.
2. W. H. Greene: **Econometric analysis**, 5th ed., Prentice Hall, 2003.
3. Arthur Aron, Elaine N. Aron, Elliot Coups, **Statistics for the Behavioral and Social Sciences: A Brief course,** 5th Ed., Pearson Prentice Hall, 2011.
4. R. W. Shonkwiler, F. Mendivil, **Explorations in Monte Carlo Methods**, Springer; 2009.

Number of active classes	**Lectures: 2**	**Exercises: 2**	
Teaching methods Plenary lectures on a given topic followed by independent research work by students with interactive guidance of the teacher; workshop form (problem-solving sessions, student teamwork) on the selected real problem. Presentation of the project works and discussion.			
Grading (maximum number of points 100)			
Pre-exam obligations	Points	**Final exam**	Points
independent research work	**70**	project presentation	**30**