

Course title: Mathematical Statistics

USOS code: 12S2O-SMAT

ECTS credit allocation (and other scores): 3.5

Semester: autumn

Level of study: ISCED-7 - second-cycle programmes (EQF-7)

Branch of science: Social sciences

Language: English

Number of hours per semester: 45

Course coordinator/ Department and e-mail: Dr Lesław Markowski, Katedra Finansów, Instytut Ekonomii i Finansów

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Type of classes: classes and lectures

Substantive content

CLASSES: Determining and interpreting the parameters of discrete and continuous random variable distributions. Applying standardization and limit theorems. Constructing confidence intervals. Determining the minimum sample size. Testing parametric hypotheses. Assessing the goodness of fit of statistical distributions to a given theoretical distribution. Determining marginal and conditional distributions. Testing the independence of variables using the chi-square test. Testing the independence of variables using the χ^2 independence test. Inference on correlation dependence.

LECTURES: Likelihood function and probability density function, cumulative distribution function, distribution parameters. Theoretical distributions of discrete and continuous random variables (binomial, Poisson, uniform, exponential, normal, Student's t , χ^2 , F). Sample statistic as a random variable. Limiting distributions. Estimators and their properties. Confidence intervals. Minimum sample size. Hypothesis testing. Statistical test. The concept of statistical significance. Critical region. Parametric significance tests. Chi-square goodness-of-fit test. Kolmogorov λ goodness-of-fit test. Tests of distribution normality. Testing the independence of variables using the chi-square test.

Learning purpose: Providing knowledge in the field of mathematical statistics, including probability distributions of discrete and continuous random variables, as well as methods of estimation and statistical inference.

On completion of the study programme the graduate will gain:

Knowledge: Understanding the role of methods of mathematical statistics, particularly estimation and statistical hypothesis testing methods, in the analysis of the structure and interdependence of variables.

Skills: Is able to select and apply appropriate mathematical statistics tools according to the socio-economic processes being analyzed.

Social Competencies: Acquiring awareness of conducting statistical research and of the need to develop one's own research methodology based on methods of mathematical statistics.

Basic literature: R. V. Hogg and E. A. Tanis, (2000). Probability and Statistical Inference. 6th Edition. Pearson Education.

Supplementary literature: Casella G., Berger R.L. (2024). Statistical inference. 2nd ed. p. cm. ISBN 0-534-24312-6.



The allocated number of ECTS points consists of:

Contact hours with an academic teacher: 45

Student's independent work: 55