GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	MATHEMATICAL STATISTICS, PG_00070890		
Field of study	Economic Analytics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Statistics and Econometrics -> Faculty of Management and Economics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Jarosław Krajewski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	18.0	0.0	18.0	0.0	0.0	36

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	36	3.0	86.0	125

Subject objectives

preparation of students to apply methods of mathematical statistics for data analysis and to support decision-making processes, based on knowledge of random variable distributions, estimation, and hypothesis testing in the context of economic data analysis and business decision-making.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W05] possesses advanced knowledge in integrating data from various sources and in methods that enable a comprehensive analysis of economic problems.	has knowledge and understanding of methods of mathematical statistics in the context of analyzing economic data from various sources.	[SW1] Assessment of factual knowledge
[K6_K03] is prepared to critically assess the knowledge they possess, which is necessary for solving cognitive and practical problems, and to supplement any gaps with opinions from external experts.	is ready to critically reflect on the results of statistical analyses and applied methods, recognize the limits of their knowledge, and seek expert opinions and specialized sources to complement it.	[SK5] Assessment of ability to solve problems that arise in practice
[K6_U07] uses advanced information technologies to enhance data analysis and decision-making processes.	is able to use statistical software to process and analyze data, applying statistical methods to support decision-making.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>Course content – lecture
1. Population and sample.
2. Basic rules of probability. Bayes' theorem.
3. Random variables, expected value, variance.
4. Distributions of discrete and continuous random variables.
5. Sample distributions. Point and interval estimation.
6. Testing statistical hypotheses. Significance level and test power.
7. Statistical tests and confidence intervals for one mean/proportion.
8. Statistical tests for two means/proportions.
9. Chi-square test.
10. Analysis of variance.
11. Tests of normality of distribution.
12. Non-parametric tests.
13. Tests in linear regression models
Course content – laboratory
1. Population and sample.
2. Basic rules of probability. Bayes' theorem.
3. Random variables, expected value, variance.
4. Distributions of discrete and continuous random variables.
5. Sample distributions. Point and interval estimation.
6. Testing statistical hypotheses. Significance level and test power.
7. Statistical tests and confidence intervals for one mean/proportion.
8. Statistical tests for two means/proportions.
9. Chi-square test.
10. Analysis of variance.
11. Tests of normality of distribution.
12. Non-parametric tests.
13. Tests in linear regression models</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>probability theory, descriptive statistics</td></tr>
<tr><td>Assessment methods and criteria</td><td><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Final Exam</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>Calculation and decision-making tasks (test 1).</td><td>60.0%</td><td>25.0%</td></tr>
<tr><td>Calculation and decision-making tasks (test 2).</td><td>60.0%</td><td>25.0%</td></tr>
</table></td></tr>
<tr><td>Recommended reading</td><td><table>
<tr><td>Basic literature</td><td>1. Wickham, H., Grolemund, G. (2017). R for Data Science. Import, Tidy, Transform, Visualize, and Model Data, O'Reilly.
2. Ramachandran, K., Tsokos, C. P. (2020). Mathematical Statistics with Applications in R, Elsevier LTD.</td></tr>
<tr><td>Supplementary literature</td><td>1. Field, Z., Miles, J. (2022). Discovering Statistics Using R. SAGE Publications Ltd.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>• A calculus task in probability and central limit theorems.
• A calculus task in point and interval estimation.
• Testing of parametric hypotheses.
• Testing of non-parametric hypotheses.
• Examination - theoretical issues.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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