University of Gdańsk

Subject card

Subject name and code	Statistics and probability theory for teachers, PG_00155425						
Field of study	Mathematics						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		5.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Institute of Mathematics -> Faculty of Mathematics, Physics and Informatics -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Agnieszka Demby				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	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	60		5.0		60.0	125
Subject objectives	Deepening and broadening the knowledge of students - future teachers of mathematics - both about the basic concepts of descriptive statistics, combinatorics and probability calculus used in school mathematics, as well as the ability to solve tasks related to these concepts, including the use of an Excel spreadsheet.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[MATL3_U08] is able to formulate definitions and theorems in an understandable way, both orally and in writing, and present correct mathematical reasoning regarding the acquired issues	Is able to formulate definitions and theorems in an understandable way, both orally and in writing, and present correct mathematical reasoning concerning elements of combinatorics, probability theory and descriptive statistics in the field of school mathematics and its extension presented during the lecture.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU4] test/exam - oral or written
[MATL3_W05] knows and understands the basic concepts, methods and theorems of probability and statistics, as well as basic examples illustrating specific concepts in these fields and enabling the refutation erroneous hypotheses or unauthorized reasoning	Knows and understands the basic concepts and theorems of combinatorics and probability calculus, as well as the basic concepts and tools of descriptive statistics; knows basic examples both illustrating specific concepts from these fields and allowing to refute erroneous hypotheses or illegitimate reasoning, including examples of manipulation and erroneous reasoning that occur when applying statistics and probability calculus to interpretations from everyday life.	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion
[MATL3_K02] is ready to precisely formulate questions to deepen his/ her own understanding of a given topic or to find missing elements of reasoning	Is ready to formulate precise questions that serve to deepen one’s understanding of a given topic or to find missing elements of reasoning.	[SK8] observation of student's independent or team work
[MATL3_U09] is able to plan how to solve a specific problem and prepare a correct record of this solution, providing strict and precise justification for the correctness of his reasoning	Is able to plan a way to solve a specific problem and prepare a correct record of this solution, providing precise and precise justifications for the correctness of his/her reasoning in terms of the objectives and content of the subject, with particular attention to accessibility for students.	[SU1] oral statement/conversation/ discussion [SU4] test/exam - oral or written
[MATL3_K06] is ready to formulate opinions on basic mathematical issues	Is ready to form opinions on basic mathematical issues.	[SK8] observation of student's independent or team work
[MATL3_U14] knows how to use computer programmes in the field of data analysis	Can use Excel and GeoGebra computer programs for data analysis	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report
[MATL3_W08] knows and understands the structure of mathematical theories, is able to use mathematical formalism to build and analyze simple mathematical models in other fields of science	Knows and understands the structure of mathematical theories, is able to use mathematical formalism to build and analyze simple mathematical models in other fields of science - is aware of the existence of different definitions of probability (in a historical approach), knows about the possibilities of building different probabilistic models to describe the same random experiment	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion

Course outcome	Subject outcome	Method of verification
[MATL3_U05] is able to correctly use the known concepts of probability and statistics, is able - at a simple and medium level of difficulty - to apply the known theorems and methods in these fields and is able to interpret the obtained results	Is able to correctly use the concepts of combinatorics, probability and statistics learned during this lecture, is able - at an easy and medium level of difficulty - to apply the theorems and methods learned in these fields and is able to interpret the obtained results, in particular when solving more difficult tasks in combinatorics and probability calculus from school mathematics, as well as when developing, presenting and interpreting statistical data.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU4] test/exam - oral or written
[MATL3_U16] can speak about mathematical problems in understandable colloquial language	Is able to talk about mathematical issues that are covered by the scope of the objectives and content of the subject in understandable, everyday language.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report
[MATL3_W10] knows and understands the basics of computational and programming techniques supporting the work of a mathematician and understands their limitations	Knows and understands the basics of computational and programming techniques that support the work of a mathematician in developing statistical data and understands their limitations (Excel, GeoGebra)	[SW2] presentation/project/paper/ report
[MATL3_K04] is ready to understand and appreciate the importance of intellectual honesty in one's own and other people's actions; is willing to act ethically	Jest gotów do rozumienia i docenienia znaczenia uczciwości intelektualnej w działaniach własnych i innych osób; etycznego postępowania.	[SK8] observation of student's independent or team work
[MATL3_K01] is ready to accept the limitations of his/her own knowledge and understands the need for further education	s willing to acknowledge the limitations of his own knowledge and to pursue further education.	[SK8] observation of student's independent or team work

Subject contents

1. Basic types of statistical series. Analysis of statistical data - measures of central tendency, location, dispersion. Frequency distribution. Gaussian curve.
2. Graphical representation of data series and dependencies between two data series. Correlation, regression.
3. Examples of descriptive statistics exercises using a spreadsheet.
4. Orderly counting of element systems, including the use of basic combinatorial schemes, trees and other graphs.
5. Probability and statistics. Various definitions of probability.
6. Modeling random experiments, including multi-stage ones.
7. Bernoulli's scheme - various aspects and applications.
8. Games of chance and lotteries. Expected value of winning.
9. Solving more difficult combinatorics and probability problems from school mathematics.
10. Relationships between statistics and probability theory with everyday life, including decision-making problems, examples of manipulation and fallacies. Examples of popularization of issues in statistics, combinatorics and probability theory.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	51.0%	25.0%
exam	51.0%	30.0%
Activity	51.0%	20.0%
Project	51.0%	25.0%
Student Attitude Assessment	51.0%	0.0%

Recommended reading	Basic literature	1. M.Zakrzewski, T.Żak, Kombinatoryka, prawdopodobieństwo i zdrowy rozsądek, Quadrivium, Wrocław 1998. 2. M.Kałuszka, Rachunek prawdopodobieństwa i statystyka dla uczniów szkół średnich, Wydawnictwa Naukowo-Techniczne, Warszawa 1997. 3. Preparatory materials for the European Statistics Competition: https://eks.stat.gov.pl/materialy.html 4. T.Michalski, Statystyka, WSiP, Warszawa 2012. 5. A.Engel, T.Varga, W.Walser, Strategia czy przypadek? Gry kombinatoryczne i probabilistyczne, Wydawnictwa Szkolne i Pedagogiczne, Warszawa 1979.
	Supplementary literature	1. Popular science books, e.g. from the series: Świat jest mathematical, RBA Collectables, S.A.. 2. Articles from popular science magazines and portals (e.g. deltami.edu.pl) and portals and magazines for teachers (np."Matematyka w Szkole", "Matematyka"). 3. A.Obecny, Statystyka opisowa w Excelu dla szkół. Ćwiczenia praktyczne, Helion, Gliwice 2002. 4. W.J.Gmurman, Zbiór zadań z rachunku prawdopodobieństwa i statystyki matematycznej, Wydawnictwo Naukow-Techniczne, Warszawa 1976 5. T.Gerstenkorn, T.Śródka, Kombinatoryka i rachunek prawdopodobieństwa, Państwowe Wydawnictwo Naukowe,Warszawa 1983.
	eResources addresses	
Example issues/ example questions/ tasks being completed	For the data set from the task below, determine two measures that make sense for the given study: (i) central tendency - other than the arithmetic mean and the weighted mean, (ii) dispersion. Provide the names of the measures determined. Task (from a school textbook): Andrzej asked 20 adults he met by chance how many children they had. He received the following answers: 2, 2, 3, 0, 1, 1, 0, 2, 3, 4, 0, 2, 1, 1 0, 4 5 0, 1, 0.	
Work placement	Not applicable	

Document generated electronically. Does not require a seal or signature.