University of Gdańsk

Subject card

Subject name and code	Medical Statistics and Probability, PG_00182145		
Field of study	Medical Physics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	5.0
Learning profile	academic	Assessment form	exam
Conducting unit	Faculty of Mathematics, Physics and Informatics -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Anita Dąbrowska	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	45.0	0.0	0.0	75

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	75	0.0	75.0	150

Subject objectives

The goal is to familiarize students with the basics of probability calculus and statistical methods used in medicine to the extent that they can select a statistical test, formulate a research hypothesis, and apply appropriate procedures available in the Python package.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[FIZMEDL3_U05] Can program and use specialised software for calculations and data analysis, including in the field of imaging diagnostics, radiotherapy and biomedical signal analysis.	The student is able to: use the tools available in the Python environment for data cleaning and preparation for analysis, data processing, creating charts and data visualizations, as well as performing calculations related to probability, descriptive statistics, and statistical hypothesis testing.	[SU4] test/exam - oral or written
[FIZMEDL3_W05] Knows and understands the most important computational and programming techniques used to solve physical and medical problems, present results, and analyse data.	The student knows: the basic tools of Python packages used for statistical computations and data visualization.	[SW4] test/exam - oral or written
[FIZMEDL3_W03] Knows and understands at an advanced level the most important topics of higher mathematics, including statistics, to the extent necessary for the quantitative description, understanding and modelling of physical and medical processes.	The student knows: the basic concepts and theorems of probability theory, methods of descriptive statistics, the foundations of estimation theory and statistical inference, including the principles of formulating and testing statistical hypotheses, as well as methods of analyzing relationships between variables.	[SW4] test/exam - oral or written

Subject contents	1. Probabilistic foundations of statistics: probability space, independent events, conditional probability. 2. Discrete and continuous random variables. The concept of cumulative distribution functions. Important probability distributions in statistics. 3. Descriptive statistics: frequency distributions, graphical presentation of empirical data, measures of central tendency and dispersion, measures of skewness and kurtosis. 4. The concept of a population. Random sample and sampling distributions of statistics. 5. Point and interval estimation. Confidence intervals for the mean, proportion, and variance. The problem of minimum sample size. 6. Statistical inference. Type I and II errors. Critical value. Statistical significance. 7. Selected parametric tests. Testing for normality of distributions. 8. Selected nonparametric tests. 9. Statistical inference in correlation and regression analysis. 10. Using basic statistical software available in Python.
Prerequisites and co-requisites	The student has basic knowledge of programming in Python.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
tests	51.0%	50.0%
exam	51.0%	50.0%

Recommended reading

Basic literature	J. Podgórski, Statystyka dla studiów licencjackich, Wydawnictwo PWE, Warszawa 2019 A. Baranowska, Elementy statystyki dla studentów uczelni medycznych, Oficyna Wydawnicza GiS, Wrocław 2022 A. Plucińska, E. Pluciński, Rachunek prawdopodobieństwa. Statystyka matematyczna. Procesy stochastyczne, Wydawnictwo Naukowe PWN, Warszawa 2017
Supplementary literature	1. A. Petrie, C. Sabin, Statystyka medyczna w zarysie, PZWL, Warszawa 2006 2. A. Stanisz, Przystępny kurs statystyki z zastosowaniem STATISTICA PL na przykładach z medycyny. Tom 1. Statystyki podstawowe. StatSoft, Polska, Kraków 2006 3. M. Gągolewski, M. Bartoszuk, A. Cena, Przetwarzanie i analiza danych w języku Python, Wydawnictwo Naukowe PWN, Warszawa 2016 4. J. Grus, Analiza danych w Pythonie, Helion S.A., 2020 5. W. McKinney, Python w analizie danych, Helion S.A., 2018
eResources addresses	

Example issues/ example questions/ tasks being completed	not applicable
Work placement	Not applicable

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