

Subject card

Subject name and code	Medical Statistics and Probability, PG_00182145						
Field of study	Medical Physics						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
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 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_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		
	[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_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		

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
	exam	51.0%	50.0%
	tests	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. Stanis, Przystępny kurs statystyki z zastosowaniem STATISTICA PL na przykładach z medycyny. Tom 1. Statystyki podstawowe. StatSoft, Polska, Kraków 2006 3. M. Gagolewski, M. Bartoszek, 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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