

Course Syllabus

I. General Information

Course name in English	Biostatistics
Course name in polish	Biostatystyka
Programme	Bioanalytical technologies
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	MSc
Form of studies (full-time, part-time)	Full-time
Discipline	Biological sciences
Language of instruction	English

Course coordinator/person responsible	Asst. Prof. Emin Tahirovic, PhD/ dr Małgorzata Kępczyk-Nowak
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Type of class (<i>use only the types mentioned below</i>)	Number of teaching hours	Semester	ECTS Points
lecture	30	II	6
tutorial	30	II	

Course pre-requisites	Intro to Probability and Statistics
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II. Course Objectives

C1 - have a deeper appreciation for how to interpret and visualize data
C2 - understand how statistics and probability apply to real-world problems
C3 - be able to critically evaluate the statistics in medical studies

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	understands overall goal and the role of statistical analysis in bio-medical research, recognizes when and why it is necessary to apply statistical concepts in their research	K_W04 , K_W05
W_02	understands how type of the data determines applicability of different statistical methods	K_W05
W_03	understands different types of association measures between variables and different types of study design	K_W04
W_04	knows about and is able to define common data visualization techniques	K_W04
W_05	understands and can interpret confidence intervals and p-value in the context of statistical hypothesis testing	K_W04

SKILLS		
U_01	proficiently uses statistical notation and statistical language to the level that allows consummation of biomedical literature and critical appraisal of it	K_U02, K_U03
U_02	can determine which study design is appropriate for which research question	K_U04, K_U14, K_U18
U_03	can interpret statistical graphs and can decide which visualization technique to use to represent which data	K_U04
U_04	Correctly interprets results section and understands to a certain extent statistical methods section in articles published in renown biomedical journals	K_U04, K_U14, K_U16
SOCIAL COMPETENCIES		
K_01	understands the importance of data privacy in the collection and subsequent phases of data analysis	K_K04, K_K01

IV. Course Content

<p>Lectures</p> <p>1. Course introduction; Introduction to statistics; Data presentation and visualization techniques; Population and Sample; 2 Measures of central tendency of the data; Shape of the distribution; Variability in the data; 3. Measures of variability (range, IQR, variance, SD); Normal distribution; 4. Standard normal distribution and Z-scores; Reading standard normal table; 5. Sampling distribution; Sampling distribution of the sample mean; Standard error of the mean; 6 Study designs; 7. Measures of disease risk and association; 8. Statistical inference (confidence intervals and hypothesis testing); 9. Statistical hypothesis testing; 10. P-value, 11. P-value pitfalls; 12. Type I and type II error; 13. Statistical power; 14. Overview of statistical tests, 15. Overview of statistical tests.</p> <p>Tutorials</p> <p>Accompany the weekly lectures by introducing practical application of the concepts introduced in the lectures.</p>
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V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods <i>(choose from the list)</i>	Forms of assessment <i>(choose from the list)</i>	Documentation type <i>(choose from the list)</i>
KNOWLEDGE			
W_01	Conventional lecture	exam	Evaluated test
W_02	Conventional lecture	exam	Evaluated test
W_03	Problem lecture	exam	Evaluated test
W_04	Problem lecture	exam	Evaluated test
W_05	Problem lecture	exam	Evaluated test
SKILLS			
U_01	Tutorial	Test	Evaluated test
U_02	Tutorial	Test	Evaluated test
U_03	Tutorial	Test	Evaluated test
U_04	Tutorial	Test	Evaluated test
SOCIAL COMPETENCIES			
K_01	Discussion	Test	Evaluated test

VI Grading criteria, weighting factors

Midterm Exam - 25 %

Final Exam- 35 %

Final project / Presentation - 40%

Degree	Degree criteria	
Very good (5)	the student realizes the assumed learning outcomes to a very good degree	Student demonstrates knowledge of the content of education at the level of 95-100 %
More than good (4,5)	the student realizes the assumed learning outcomes to a more than good degree	Student demonstrates knowledge of the content of education at the level of 85-94 %
good (4)	the student realizes the assumed learning outcomes to a good degree	Student demonstrates knowledge of the content of education at the level of 75-84%
Good enough (3,5)	the student realizes the assumed learning outcomes to a good enough degree	Student demonstrates knowledge of the content of education at the level of 65-74%
sufficient (3)	the student realizes the assumed learning outcomes to a sufficient degree	Student demonstrates knowledge of the content of education at the level of 55-64%
insufficient (2)	the student realizes the assumed learning outcomes to an insufficient degree	Student demonstrates knowledge of the content of education at the level below 55%

VII Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	69 (60 + 9 individual consultation)
Number of hours of individual student work	81

VIII Literature

Basic literature
Introductory Statistics with R, Peter Dalgaard, Springer-Verlag New York, 2008
Additional literature
What is the P-value anyway? - 34 stories to help you actually understand statistics, Andrew Vickers, Pearson, 2009