DESCRIPTION OF THE COURSE OF STUDY

Course code		0912.4.LEK.B.BI
Name of the course in	Polish	**Biostatystyka z elementami informatyki**
	English	**Biostatistics with elements of informatics**

1. LOCATION OF THE COURSE OF STUDY WITHIN THE SYSTEM OF STUDIES

1.1. Field of study	Medicine
1.2. Mode of study	Full-time
1.3. Level of study	Uniform Master's study
1.4. Profile of study*	General academic
1.5. Person/s preparing the course description	dr Artur Michalik
1.6. Contact	artur.michalik@ujk.edu.pl

2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

2.1. Language of instruction	English
2.2. Prerequisites*	--------------

3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

3.1. Form of classes		semester 1: lectures (25 h including 5 h e-learning), classes (25 h)
		semester 2: lectures(15 h including 5 h e-learning), classes (10 h)
3.2. Place of classes		Courses held in the classrooms of the UJK, e-learning courses
3.3. Form of assessment		semester 1: Credit with grade (lectures, classes), credit (e-learning lecture)
		semester 2: Exam (lectures), credit with grade (classes), credit (e-learning lecture)
3.4. Teaching methods		Lecture: informative lecture method; use of multimedia presentations. Classes: problem-based learning; practical exercises using scientific databases; use of statistical software (Statistica®) and spreadsheet tools (Microsoft Excel) – both provided by the university
3.5. Bibliography	**Required reading**	1. Aviva Petrie, Caroline Sabin "Medical Statistics at a Glance", Blackwell Science, 2016 2. Cruz Vargas-De-León "Recent Advances in Medical Statistics", IntechOpen, 2022 3. Jekel, James F." Jekel's epidemiology, biostatistics, preventive medicine, and public health " Saunders/Elsevier, 2014.
	Further reading	1. Hirsch Robert P. "Introduction to Biostatistical Applications in Health Research with Microsoft Office Excel", Wiley, 2016 2. Hirsch Robert P. "Workbook to accompany introduction to biostatistical applications in health research with Microsoft Office Excel", Wiley, 2016

4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED TEACHING OUTCOMES

4.1. Course objectives *(including form of classes)*

Lectures

C1 – Presentation of planning principles and research in medicine as well as basic methods of description and statistical inference in medical research.

Classes

C2 – Developing skills to find information in medical databases.

C3 – Developing skills to use selected statistical methods with the usage of program supporting statistical calculations.

C4 – Developing skills to cooperate in a group on the project.

4.2. Detailed syllabus *(including form of classes)*

Lectures

Winter semester: Introduction to biostatistics. Population and sample. Statistical variables. Types of statistical data. The distribution of statistical data. Descriptive statistics and data visualization. Elementary concepts of probability. Types of statistical inference. Point and interval estimation of population parameters.

Study designs in medical research. Experimental and observational studies. Randomized controlled trials. Case reports. Cohort studies. Case-control studies. Cross-sectional studies. The hierarchy of research designs.

Statistical hypotheses. Process of statistical hypothesis testing. Type I and type II errors. studies. The statistical power of a test. Hypothesis testing: one, two and multiple sample inference.

Summer semester: Statistical methods in population Parametric and nonparametric methods. Test of independence. Statistical evaluation of diagnostic tests. Receiver operating characteristic curve. Survival analysis. Examples of complex medical data analysis

e-learning:

Winter semester (5 h.):

1) Basic regression and correlation methods.
2) Analysis of variance.

Summer semester (5 h):

1) Advanced regression and correlation methods.
2) Meta-analyses.
3) Analytical and graphic presentation and interpretation of meta-analysis results.

Classes

Winter semester: Searching for information in medical bibliographic databases. Using Excel for statistical data analysis. Statistics graphs with Excel. Pivot tables in Excel. Creating a simple medical database in Excel. Excel data management (merging, sorting, filtering of data). Statistical description – choosing, stating and interpreting statistical measures, graphic presentation of data adequate to its type and the measuring scale used. Elementary concepts of probability. Point and interval estimation – computing and interpretation. Hypothesis testing: one- and two-sample inference. Nonparametric methods. Regression and correlation methods. Analysis of variance.

Summer semester:. Goodness-of-fit tests. Test of independence Complex analysis of medical data. Statistical methods in population and diagnostic studies. Receiver operating characteristic curve – obtaining and interpretation (ROC). Application of logistic regression model. Estimation and interpretation

of logistic regression equation's parameters. Estimation and interpretation of odds ratio. Creation of survival curve. Survival analysis in Cox proportional hazard model.

Note: for implementation of the above content, to support calculation and visualization of data, the program Statistica is used (licensed commercial program, license is provided for every student), as well as MS Excel program (Office 365 license is provided for every student).

4.3. Education outcomes in the discipline

Code	A student, who passed the course	Relation to teaching outcomes
	Within the scope of **KNOWLEDGE**:	
W01	The basic computer and biostatistical tools used in medicine	B.W23.
W02	The basic methods of statistical analysis used in population and diagnostic studies;	B.W24.
W03	The possibilities of modern telemedicine as a tool to support the work of a physician;	B. W25.
	within the scope of **ABILITIES:**	
U01	Use medical databases and properly interpret the information contained therein necessary to solve problems in the field of basic and clinical sciences;	B.U8.
U02	Select appropriate statistical tests, performs basic statistical analyses, use suitable methods of presentation of results;	B.U9.
U03	Classify the methodology of scientific research, including distinguishing between experimental and observational studies, along with their subtypes, rank them according to the reliability of the provided results and correctly assess the quality of scientific evidence;	B U10.
U04	Plan and perform basic scientific research, interpret the results and draw conclusions.	B.U11.
U01	Use medical databases and properly interpret the information contained therein necessary to solve problems in the field of basic and clinical sciences;	B.U8.
	within the scope of **SOCIAL COMPETENCE**:	
K01	recognize his/her own limitations and self-evaluate educational deficiencies and needs;	K.S5.
K02	use reliable information sources;	K.S7.
K03	conclude on the basis of own surveys and observations;	K.S8.
K04	introduce rules of social conduct and teamwork to the group of specialists, including specialists form other medical professions also in the multicultural and multinational environment;	K.S9.
K05	give opinions concerning various aspects of professional activity;	K.S10.
K06	take responsibility for own decisions made during professional activities including own safety and safety of other people;	K.S11.

4.4. Methods of assessment of the intended teaching outcomes

Teaching outcomes (code)	Method of assessment (+/-)														
	Exam written			Test*			Project*			Group work			Observation		
	Form of classes			Form of classes			Form of classes			Form of classes			Form of classes		
	L	C	Ls	L	C	Ls	L	C	...	L	C	...	L	C	...
W01	+			+	+			+							
W02	+			+	+			+							
W03								+							
U01					+			+							
U02					+			+							
U03	+														
U04								+							
K.01-K.06								+		+	+		+	+	

4.5. Criteria of assessment of the intended teaching outcomes

Form of classes	Grade	Criterion of assessment
lecture (L)	3	at least 61% and not more than 68% of the total number of available points
	3,5	more than 69% and not more than 76% of the total number of available points
	4	more than 77% and not more than 84% of the total number of available points
	4,5	more than 85% and not more than 92% of the total number of available points
	5	more than 93% of the total number of available points
classes (C)	3	at least 61% and not more than 68% of the total number of available points
	3,5	more than 69% and not more than 76% of the total number of available points
	4	more than 77% and not more than 84% of the total number of available points
	4,5	more than 85% and not more than 92% of the total number of available points
	5	more than 93% of the total number of available points

5. BALANCE OF ECTS CREDITS – STUDENT'S WORK INPUT

Category	Student's workload
	Full-time studies
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/	**75**
Participation in lectures	30
Participation in classes, seminars, laboratories	35
e-learning	10
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	**75**
Preparation for the lecture	10
Preparation for the classes	20
Preparation for the exam/test	10
Gathering materials and preparing the project	35
TOTAL NUMBER OF HOURS	**150**
ECTS credits for the course of study	6

Accepted for execution *(date and signatures of the teachers running the course in the given academic year)*

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[1] e-learning