

## DESCRIPTION OF THE COURSE OF STUDY

<b>Course code</b>	<b>0912-7LEK-B2.7-BEI</b>	
<b>Name of the course in</b>	Polish	<b>Biostatystyka z elementami informatyki</b>
	English	<b>Biostatistic with elements of informatics</b>

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

<b>1.1. Field of study</b>	Medicine
<b>1.2. Mode of study</b>	Full-time
<b>1.3. Level of study</b>	Uniform Master's study
<b>1.4. Profile of study*</b>	practical
<b>1.5. Specialization*</b>	lack
<b>1.6. Unit running the course of study</b>	<i>The Faculty of Mathematics and Natural Sciences</i>
<b>1.7. Person/s preparing the course description</b>	<i>dr Magdalena Chrapek</i>
<b>1.8. Person responsible for the course of study</b>	Dr Aldona Kubala-Kukus
<b>1.9. Contact</b>	a.kubala-kukus@ujk.edu.pl

### 2. GENERAL CHARACTERISTICS OF THE COURSE OF STUDY

<b>2.1. Affiliation with the module</b>	Scientific basis for medicine
<b>2.2. Language of instruction</b>	English
<b>2.3. Semesters in which the course of study is offered</b>	1 <sup>st</sup> and 2 <sup>nd</sup> semester
<b>2.4. Prerequisites*</b>	—————

### 3. DETAILED CHARACTERISTICS OF THE COURSE OF STUDY

<b>3.1. Form of classes</b>	semester 1: lectures (15 h), classes (35 h) semester 2: lectures(15 h), classes (15 h)	
<b>3.2. Place of classes</b>	Courses in the teaching rooms of UJK faculty of Mathematics and Natural Science	
<b>3.3. Form of assessment</b>	Exam (lectures), credit with grade (classes)	
<b>3.4. Teaching methods</b>	lectures– informative lectures classes – problem methods, laboratory method (practical classes using Statistica and/or R package as well as MS Excel).	
<b>3.5. Bibliography</b>	<b>Required reading</b>	1] Aviva Petrie, Caroline Sabin “Medical Statistics at a Glance”, Blackwell Science, 2009 [2] Betty R. Kirkwood, Jonathan A.C. Sterne “Essential Medical Statistics”, Blackwell Science, 2003 – or newer
	<b>Further reading</b>	[3] Introduction to Biostatistical Applications in Health Research with Microsoft Office Excel, Robert P. Hirsch, ISBN: 978-1-119-08965-0 [4] 9781119089865 Workbook to Accompany Introduction to Biostatistical Applications in Health Research with Microsoft Office Excel, Wiley, 2016, Robert P. Hirsch

### 4. OBJECTIVES, SYLLABUS CONTENT AND INTENDED TEACHING OUTCOMES

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

##### Knowledge (lectures and classes)

C1 – To give students an elementary knowledge of databases in medicine.

C2 – Presentation of planning principles and research in medicine as well as basic methods of description and statistical inference in medical research.

##### Abilities (lectures and classes)

C3 – Developing skills to find information in medical databases.

C4 – Developing skills to use selected statistical methods with the usage of program supporting statistical calculations.

##### Social competence (classes)

C5 – Developing skills to cooperate in a group on the project.

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

Lectures: 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. Statistical hypotheses. Process of statistical hypothesis testing. Type I and type II errors. The statistical power of a test. Hypothesis testing: one- and two-sample inference. Nonparametric methods. Goodnes-of-fit tests. Test of independence. Regression and correlation methods. Analysis of variance. 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 methods in population studies. Statistical evaluation of diagnostic tests. Receiver operating characteristic curve. Logistic regression. Survival analysis. Meta-analyses.

Classes: Using Excel for statistical data analysis. Statistics graphs with Excel. Pivot tables in Excel. Data acquisition in Excel. Creating a simple medical database in Excel. Excel data management (merging, sorting, filtering of data). Searching for information in medical bibliographic databases. Introduction to Statistica. Elementary probability concepts. Exploring data by descriptive statistics and graphics. Assessing normality of data by tests and graphical methods. Point and interval estimation – computing and interpretation. Hypothesis testing: one- and two-sample inference. Nonparametric methods. Goodnes-of-fit tests. Test of independence. Regression and correlation methods. Analysis of variance. Statistical methods in population studies. Statistical evaluation of diagnostic tests. Receiver operating characteristic curve – obtaining and interpretation. Application of logistic regression model. Estimation and interpretation of odds ratio. Creation of survival curve. Comparing survivals in groups. Survival analysis in Cox proportional hazard model. Analytical and graphical presentation of meta-analysis results.

Note: for implementation of the above content to support calculation and visualization of data, the program Statistica is used (licensed commercial program) and/or free software R program (released under the GPL), as well as MS Excel program.

#### 4.3 Education outcomes in the discipline

Code	A student, who passed the course	Relation to teaching outcomes
within the scope of <b>KNOWLEDGE:</b>		
W01	knows the basic computer and biostatistical methods used in medicine, including medical databases, spreadsheets and basics of computer graphics;	B.W31.
W02	knows the basic methods of statistical analysis used in population and diagnostic studies;	B.W32.
W03	knows the principles of conducting scientific research, observational and experimental and in vitro studies aimed at the development of medicine.	B. W34
within the scope of <b>ABILITIES:</b>		
U01	uses databases, including online ones, and searches for necessary information using available tools;	B.U11.
U02	selects appropriate statistical tests, performs basic statistical analyzes and uses suitable methods of presentation of results; interprets the results of the meta-analysis and carries out analysis of the likelihood of survival	B.U12.
U03	explains the differences between prospective and retrospective studies, randomized and case/control studies and experimental research, and ranks them according to the reliability and quality of scientific evidence;	B U13
U04	plans and performs basic scientific research, interprets the results and draws conclusions.	B.U14

4.4. Methods of assessment of the intended teaching outcomes																						
Teaching outcomes (code)		Method of assessment (+/-)																				
		Exam oral/written*			Test*			Project*			Effort in class*			Self-study*			Group work*			Participation in Lectures*		
		Form of classes			Form of classes			Form of classes			Form of classes			Form of classes			Form of classes					
		L	C	...	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...	L	C	...
W01		+																				
W02		+																				
W03		+																				
U01		+																				
U02		+																				
U03		+																				
U04		+																				

\*delete as appropriate

4.5. Criteria of assessment of the intended teaching outcomes		
Form of classes	Grade	Criterion of assessment
lecture (L)	3	at least 50% and not more than 60% of the total number of available points
	3,5	more than 60% and not more than 70% of the total number of available points
	4	more than 70% and not more than 80% of the total number of available points
	4,5	more than 80% and not more than 90% of the total number of available points
	5	more than 90% of the total number of available points
classes (C)*	3	at least 50% and not more than 60% of the total number of available points
	3,5	more than 60% and not more than 70% of the total number of available points
	4	more than 70% and not more than 80% of the total number of available points
	4,5	more than 80% and not more than 90% of the total number of available points
	5	more than 90% of the total number of available points

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

Category	Student's workload
	Full-time studies
<b>NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/</b>	<b>80</b>
Participation in lectures*	30
Participation in classes, seminars, laboratories*	50
Preparation in the exam/final test*	
Others*	
<b>INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/</b>	<b>45</b>
Preparation for the lecture*	10
Preparation for the classes, seminars, laboratories*	15
Preparation for the exam/test*	20
Gathering materials for the project/Internet query*	
Preparation of multimedia presentation	
Others*	
<b>TOTAL NUMBER OF HOURS</b>	<b>125</b>
ECTS credits for the course of study	5

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

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