DESCRIPTION OF THE COURSE OF STUDY

Course code	**0719-2ID-F49-B**	
Name of the course in	Polish	**Biostatystyka**
	English	**Biostatistics**

1. **LOCATION OF THE COURSE OF STUDY** within the system of studies

1.1. Field of study	**Data engineering**
1.2. Mode of study	**Full-time studies**
1.3. Level of study	**First-cycle engineering studies**
1.4. Profile of study*	**General academic**
1.5. Person/s preparing the course description	**Dr hab. Aldona Kubala-Kukuś, prof. UJK**
1.6. Contact	**aldona.kubala-kukus@ujk.edu.pl**

2. **GENERAL CHARACTERISTICS OF THE** course of study

2.1. Language of instruction	**English**
2.2. Prerequisites*	**Statistics 1**

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

3.1. **Form of classes**		**Lecture (30 h), laboratory (30 h), project (15 h)**
3.2. **Place of classes**		**Classes in the UJK classroom**
3.3. **Form of assessment**		**Graded assessment**
3.4. **Teaching methods**		**Informational lecture, laboratory (practical exercises using Statistica and MS Excel)**
3.5. **Bibliography**	**Required reading**	**[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 edition** **[3] A. Stanisz, Przystępny kurs statystyki: z zastosowaniem STATISTICA PL na przykładach z medycyny. T. 1-3**
	Further reading	**4] Introduction to Biostatistical Applications in Health Research with Microsoft Office Excel, Robert P. Hirsch, ISBN: 978-1-119-08965-0** **[5] 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 LEARNING OUTCOMES**

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

Knowledge (lecture, laboratory, project)

C1 – Familiarization with basic knowledge of databases in medicine.

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

Skills (lecture, laboratory, project)

C3 – Developing skills in searching for information in medical databases.

C4 – Developing skills in using selected statistical methods using a program supporting statistical calculations in medical applications.

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

Lecture: Introduction to biostatistics. Types of statistical data in the context of medical applications. Distributions of statistical data. Descriptive statistics of medical data and data visualization. Types of statistical inference. Point and interval estimation of population parameters commonly used in medical applications. Statistical hypotheses. Testing statistical hypotheses (medical data). Hypothesis testing: one- and two-sample inference. Nonparametric methods. Goodness-of-fit tests. Tests of independence. Regression and correlation methods. Analysis of variance. Research design in medicine. Randomized trials. Cohort studies. Cross-sectional studies. Statistical methods in population studies. Statistical evaluation of diagnostic tests. Determining and interpreting ROC curves. Logistic regression. Survival analysis. Right-censored data. Left-censored data. Meta-analysis.

Laboratory: Using Excel to analyze statistical data. Statistical graphs using Excel. Creating a simple medical data-

base in Excel. Managing Excel data (merging, sorting, and filtering data). Searching for information in medical bibliographic databases. Introduction to Statistica. Basic probability concepts. Data analysis using descriptive statistics and graphics. Assessing the normality of medical data using tests and graphical methods. Point and interval estimation - calculation and interpretation. Hypothesis testing: one- and two-sample inference. Nonparametric methods. Goodness-of-fit tests. Tests of independence. Regression and correlation methods. Analysis of variance. Statistical methods in population studies. Statistical evaluation of diagnostic tests. Application of the logistic regression model. Estimating and interpreting the odds ratio. Creating a survival curve. Comparing survival outcomes across groups. Survival analysis using the Cox proportional hazards model. Left-censored data. Right-censored data. Analytical and graphical presentation of meta-analysis results. Note: In order to implement the above content, Statistica (licensed commercial software) and MS Excel are used for calculations and data visualization.

4.3 Intended learning outcomes

Code	A student, who passed the course	Relation to learning outcomes
within the scope of **KNOWLEDGE:**		
W01	Knows biostatistical methods used in medicine, including medical databases and spreadsheets	ID1A_W02 ID1A_W06 ID1A_W07
W02	Knows basic statistical analysis methods used in population and diagnostic studies	ID1A_W02 ID1A_W06 ID1A_W07
W03	Knows the principles of conducting scientific research, observational studies, and experimental studies aimed at developing medicine	ID1A_W02 ID1A_W06 ID1A_W07
within the scope of **ABILITIES:**		
U01	Utilizes medical databases, including online databases, and searches for necessary information using available tools	ID1A_U01 ID1A_U05 ID1A_U06
U02	Selects appropriate statistical tests, performs statistical analyses, and applies appropriate methods for presenting results. Interprets meta-analysis results and analyzes survival probability	ID1A_U01 ID1A_U05 ID1A_U06
U03	Explains the differences between prospective and retrospective studies, randomized controlled trials, case/control studies, and experimental studies, and evaluates them according to the credibility and quality of scientific evidence	ID1A_U01 ID1A_U05 ID1A_U06 ID1A_U11
U04	Plans and conducts basic research, interprets results, and draws conclusions	ID1A_U11
within the scope of **SOCIAL COMPETENCE:**		
K01	Is ready to establish priorities for implementing tasks in the field of biostatistics, plan work, familiarize themselves with scientific and popular science content, and critically evaluate received content	ID1A_K01
K02	Is ready to formulate and argue opinions on analyzed problems in the field of biostatistics	ID1A_K01

4.4. **Methods of assessment of the intended learning outcomes**

Teaching outcomes *(code)*	Method of assessment (+/-)																					
	Exam oral/written*			Test*			Project*			Effort in class*			Self-study*			Group work*			Others* e.g. standardized test used in e-learning		
	Form of classes			*Form of classes*			*Form of classes*			*Form of classes*			*Form of classes*			*Form of classes*			*Form of classes*		
	L	*C*	*...*	*L*	*C*	*...*	*L*	*C*	*P*	*L*	*C*	*...*	*L*	*L*	*...*	*L*	*L*	*...*	*L*	*C*	*...*
W01				+					+					+			+				
W02				+					+					+			+				
W03				+					+					+			+				
U01				+					+					+			+				
U02				+					+					+			+				
U03				+					+					+			+				
U04				+					+					+			+				

K01				+					+					+			+			
K02				+					+					+			+			

**delete as appropriate*

4.5. **Criteria of assessment of the intended learning outcomes**		
Form of classes	**Grade**	**Criterion of assessment**
lecture (L) (including e-learning)	**3**	Achievement <50 - 60) % of requirements used in assessment methods
	3,5	Achievement <60 - 70) % of requirements used in assessment methods
	4	Achievement <70 - 80) % of requirements used in assessment methods
	4,5	Achievement <80 - 90) % of requirements used in assessment methods
	5	Achievement <90 - 100) % of requirements used in assessment methods
Laboratory (L)* (including e-learning)	**3**	Achievement <50 - 60) % of requirements used in assessment methods
	3,5	Achievement <60 - 70) % of requirements used in assessment methods
	4	Achievement <70 - 80) % of requirements used in assessment methods
	4,5	Achievement <80 - 90) % of requirements used in assessment methods
	5	Achievement <90 - 100) % of requirements used in assessment methods
Project (P)* (including e-	**3**	Achievement <50 - 60) % of requirements used in assessment methods
	3,5	Achievement <60 - 70) % of requirements used in assessment methods
	4	Achievement <70 - 80) % of requirements used in assessment methods
	4,5	Achievement <80 - 90) % of requirements used in assessment methods
	5	Achievement <90 - 100) % of requirements used in assessment methods

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

Category	**Student's workload**	
	Full-time studies	**Extramural studies**
NUMBER OF HOURS WITH THE DIRECT PARTICIPATION OF THE TEACHER /CONTACT HOURS/	***75***	
Participation in lectures	*30*	
Participation in laboratories	*30*	
Project	*15*	
INDEPENDENT WORK OF THE STUDENT/NON-CONTACT HOURS/	***50***	
Preparation for the lecture	*10*	
Preparation for the laboratories	*15*	
Preparation for the project	*25*	
TOTAL NUMBER OF HOURS	***125***	
ECTS credits for the course of study	**5**	

**delete as appropriate*

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

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