DESCRIPTION/Syllabi of Curricula/Module

Short Name of the University/Country code Date (Month / Year)	DSEA/ P11 Jan 2019
TITLE OF THE MODULE	**Code**
Methods of mathematical processing of medical biological data	

Teacher(s)	Department
Coordinating: Iryna Getman, PhD **Others:**	Department of Computer and Information Technology (CIT)

Study cycle (BA/MA)	Level of the module (Semester number)	Type of the module (compulsary/elective)
Bachelor	6th semester (third year) for Bachelors	**elective**

Form of delivery (theory/lab/exercises)	Duration (weeks/months)	Language(s)
lectures, labs	18 weeks 6th semester	Ukrainian / English

Prerequisites	
Prerequisites: study of the disciplines "Probability theory, probability processes and mathematical statistics", "Digital processing of biomedical signals"	**Co-requisites (if necessary):** Statistica, MS Excel

ECTS (Credits of the module)	Total student workload hours	Contact hours	Individual work hours
5	150	72	78

Aim of the module (course unit): competencies foreseen by the study programme

The student must be able:
- to conduct complex analysis of data from biomedical research using modern regression analysis tools;
- to build a qualitative prediction model of survival analysis;
- to conduct preliminary data analysis based on Kaplan-Meier life tables and estimates;
- to check the built analytical models for adequacy;
- to interpret results of simulation including ROC analysis.

Learning outcomes of module (course unit)	Teaching/learning methods (theory, lab, exercises)	Assessment methods (written exam, oral exam, reports)
Knowledge: - methods for constructing linear regression, prerequisites for obtaining reliable estimates of linear regression by the method of least squares; - regressions with binary and ordered dependent variables; - regressive survival models (Cox, lognormal, exponential, normal); - methods for constructing survival tables, finding Kaplan Meier estimates, criteria for dividing survival into subgroups.	Work with lecture notes and fundamental subject literature	Knowledge test
Skills: - to build adequate regression linear equations, monitor them and give a qualitative interpretation of the simulation results; - to build adequate binary regression models and interpret the simulation results; - to perform ROC analysis, calculate specificity and sensitivity; - to build different regression models of survival, check adequacy of the real model of the possible process; - to apply modern information tools for the analysis of medical and biological data.	Lectures, labs, consultations	Attending lectures, performing individual work and presentations
Competences: - readiness to execute, perform, report and reasonably protect the results of the work done; -ability to understand the main problems in	Lectures, labs, consultations	Reports and presentations

their subject area, to choose methods and means of solving them		

Themes	Contact work hours							Time and tasks for individual work	
	Lectures	Consultations	Seminars	Practical work	Laboratory work	Placements	Total contact work	Individual work	Tasks
1 Construction of one-factor linear regression.	6					6	12	9	Lab work protection
2 Construction of regression models with binary dependence of variables.	4					4	8	10	Lab work protection
3 Construction of regression models with ordered alternatives in the dependent variable.	4					4	8	10	Lab work protection
4 Construction of survival tables. Finding Kaplan-Meier estimates, construction of survival curves.	4					4	8	10	Lab work protection
5 Construction of regression models in survival analysis.	4					4	8	10	Lab work protection
6 Construction of impact measurement models. DiD method.	4					4	8	10	Lab work protection
7 Evaluation of sensitivity and specificity of regression models in survival analysis.	4					4	8	10	Lab work protection
8 Conducting ROC analysis for models with a discrete dependent variable. Construction of clipping curves.	6				6		12	9	Lab work protection
Total	36				36		72	78	

Assessment strategy	Weight in %	Deadlines	Assessment criteria
Computer testing, written answers to theory questions	40%	during the semester	Good response to the questions
Lab work protection	60%	during the semester	The work is done completely

				without mistakes or minor errors

Author	Year of issue	Title	No of periodical or volume	Place of printing. Printing house or internet link
Compulsory literature				
A. Glanz	1998	Primer of IOSTATISTICS		Institute for Health Policy Studies University of California, San Francisco
Popechetelev E.P.	1997	Methods of biomedical research. System Aspects: Tutorial.		Zhytomyr: ZhITI
Additional literature				
Rebrova O.Yu.	2002	Statistical analysis of medical data. Application of the STATISTICA application package		Media sphere
Gojko O.V.	2004	Practical use of the STATISTICA package for the analysis of biomedical data: a tutorial for university students		Kiev, Tutorial for university students (Recommended by MES of Ukraine,ISBN 966-8326-31-8)