

COURSE OUTLINE “BIOSTATISTICS”

1. GENERAL

SCHOOL	HEALTH SCIENCES		
DEPARTMENT	MOLECULAR BIOLOGY AND GENETICS		
LEVEL OF STUDIES	ISCED LEVEL 6		
COURSE CODE	MBG104	SEMESTER	4 th
COURSE TITLE	BIOSTATISTICS		
TEACHING ACTIVITIES <i>If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.</i>		HOURS/WEEK	ECTS CREDITS
		3	4
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	BACKGROUND		
PREREQUISITES:	NO		
TEACHING & EXAMINATION LANGUAGE:	GREEK		
COURSE OFFERED TO ERASMUS STUDENTS:	NO		
COURSE URL:	https://eclass.duth.gr/courses/ALEX01313/		

2. LEARNING OUTCOMES

<p>Learning Outcomes <i>Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.</i></p>																	
<p>Purpose of the course:</p> <ul style="list-style-type: none"> • the introduction to the research methods used in the biological sciences • the presentation of the most important statistical techniques for the description and analysis of research data and • familiarity with the R statistical environment • Expected learning outcomes: <p>After successful completion of the course, the student should:</p> <ul style="list-style-type: none"> • understand the basic concepts of statistical science, • understand and correctly interpret statistical significance. • understand the conditions required for the application of the statistical methods he/she chooses to use. • understand the necessity of checking these conditions and being able to choose alternative statistical methods, • understand the capabilities of R's statistical environment, • import data through R, perform various analyses and perform statistical analysis of the data • interpret analyses to answer biological questions. 																	
<p>General Skills <i>Name the desirable general skills upon successful completion of the module</i></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><i>Search, analysis and synthesis of data and information,</i></td> <td style="width: 50%; border: none;"><i>Project design and management</i></td> </tr> <tr> <td style="border: none;"><i>ICT Use</i></td> <td style="border: none;"><i>Equity and Inclusion</i></td> </tr> <tr> <td style="border: none;"><i>Adaptation to new situations</i></td> <td style="border: none;"><i>Respect for the natural environment</i></td> </tr> <tr> <td style="border: none;"><i>Decision making</i></td> <td style="border: none;"><i>Sustainability</i></td> </tr> <tr> <td style="border: none;"><i>Autonomous work</i></td> <td style="border: none;"><i>Demonstration of social, professional and moral responsibility and sensitivity to gender issues</i></td> </tr> <tr> <td style="border: none;"><i>Teamwork</i></td> <td style="border: none;"><i>Critical thinking</i></td> </tr> <tr> <td style="border: none;"><i>Working in an international environment</i></td> <td style="border: none;"><i>Promoting free, creative and inductive reasoning</i></td> </tr> <tr> <td style="border: none;"><i>Working in an interdisciplinary environment</i></td> <td style="border: none;"></td> </tr> </table>		<i>Search, analysis and synthesis of data and information,</i>	<i>Project design and management</i>	<i>ICT Use</i>	<i>Equity and Inclusion</i>	<i>Adaptation to new situations</i>	<i>Respect for the natural environment</i>	<i>Decision making</i>	<i>Sustainability</i>	<i>Autonomous work</i>	<i>Demonstration of social, professional and moral responsibility and sensitivity to gender issues</i>	<i>Teamwork</i>	<i>Critical thinking</i>	<i>Working in an international environment</i>	<i>Promoting free, creative and inductive reasoning</i>	<i>Working in an interdisciplinary environment</i>	
<i>Search, analysis and synthesis of data and information,</i>	<i>Project design and management</i>																
<i>ICT Use</i>	<i>Equity and Inclusion</i>																
<i>Adaptation to new situations</i>	<i>Respect for the natural environment</i>																
<i>Decision making</i>	<i>Sustainability</i>																
<i>Autonomous work</i>	<i>Demonstration of social, professional and moral responsibility and sensitivity to gender issues</i>																
<i>Teamwork</i>	<i>Critical thinking</i>																
<i>Working in an international environment</i>	<i>Promoting free, creative and inductive reasoning</i>																
<i>Working in an interdisciplinary environment</i>																	

Production of new research ideas

- Search, analysis and synthesis of data and information, ICT Use
- Autonomous work
- Teamwork
- Working in an interdisciplinary environment
- Production of new research ideas
- Demonstration of social, professional and moral responsibility and sensitivity to gender issues
- Critical thinking

3. COURSE CONTENT

1. Introduction to statistics for biologists – the mathematical basis of Biology
2. Introduction to R: advantages of R, Getting started with R, R-Studio
3. Variables, operators and data: variables in R, operators and simple operations on variables, functions, multidimensional data, importing data from files, writing results to files
4. Data types: vectors, operations on vectors, two-dimensional arrays, data frames, arrays of more than two dimensions, lists
5. Data frames, factors and set manipulations: data frame manipulations, factors, subsetting
6. Graphics: creating, saving and printing graphics
7. Descriptive statistics: measures of central tendency, measures of dispersion, histograms, sampling and random samples, functions that simulate distributions
8. Induction and hypothesis testing: normality testing, comparison of mean values, comparison of ratios and proportions, statistical tests through permutation tests
9. Analysis of Variance and Multiple Hypothesis tests: multiple pairwise tests, multiple hypothesis testing, variance test, analysis of variance (ANOVA), multi-way ANOVA, non-parametric tests
10. Correlation and linear regression: correlation, variance and covariance, regression, simple linear regression, model comparison and parameter ranking
11. Lab Exercise I: introduction to the R and Rstudio environment, descriptive statistics
12. Lab Exercise II: statistical analyses with real data
13. Presentation and analysis of scientific literature

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD <i>Face to face, Distance learning, etc.</i>	Face to face	
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i>	Use of ICT in Teaching Use of ICT in Communication with students Use of ICT in Laboratory Exercise	
TEACHING ORGANIZATION <i>The ways and methods of teaching are described in detail. Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc. The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i>	Activity	Workload/semester
	Lectures	39
	Group project	10
	Workshops	6
	Bibliographic research & analysis	65
	Course Total	120
STUDENT EVALUATION <i>Description of the evaluation process</i>	Student evaluation languages Greek	

Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others

Please indicate all relevant information about the course assessment and how students are informed

Method (Formative or Concluding)

Formative

Student evaluation methods

Written exam with multiple choice test (20%)

Written Exam with Short Answer Questions (25%)

Written Exam with Problem Solving (25%)

Written Exam with Essay Development Questions (20%)

Written Assignment (5%)

Laboratory Assignment (5%)

The evaluation criteria are presented in the course work guide which is available on the course website.

5. SUGGESTED BIBLIOGRAPHY

ΑΝΑΛΥΣΗ ΔΕΔΟΜΕΝΩΝ ΜΕ ΤΗΝ R

Κωδικός Βιβλίου στον Εύδοξο: 122081759

Έκδοση: 2/2023

ΝΙΚΟΛΑΟΥ ΧΡΙΣΤΟΦΟΡΟΣ

ISBN: 978-618-202-154-5

ΕΚΔΟΣΕΙΣ ΔΙΣΙΓΜΑ ΙΚΕ

Βιοστατιστική των Επιστημών Βιολογίας και Υγείας

Κωδικός Βιβλίου στον Εύδοξο: 94644937

Έκδοση: 1/2021

Triola M. Marc, Triola F. Mario, Roy Jason

ISBN: 9789925576289

BROKEN HILL PUBLISHERS LTD

Εφαρμοσμένη Στατιστική με έμφαση στις επιστήμες υγείας

Κωδικός Βιβλίου στον Εύδοξο: 59397001

Έκδοση: 1η/2016

Μπερσίμης Σωτήριος - Σαχλάς Αθανάσιος

ISBN: 9789604186600

ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε.

Εφαρμοσμένη Στατιστική με R

Κωδικός Βιβλίου στον Εύδοξο: 122079828

Έκδοση: 2η/2023

Χρόνης Γεώργιος

ISBN: 9786182210246

ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε.

The textbooks cover 70-85% of the material. However, notes from the course presentations are also distributed electronically.