Sveučilište u Rijeci • Fakultet dentalne medicine
University of Rijeka • Faculty of Dental Medicine

Course: Statistics
Course Coordinator: Gordana Žauhar, PhD, Associate Professor
Department: Medical Physics and Biophysics
Study program: Integrated Undergraduate and Graduate University Study of Dental Medicine
Study year: second
Academic year: 2021/22

SYLLABUS

Course description (a brief description of the course, general instructions, where and in what form the lessons are organized, necessary equipment, instructions for attendance and preparation for classes, student obligations, etc.):

Statistics is a compulsory course on the second year of the Integrated Undergraduate and Graduate University Study of Dental Medicine, with 15 hours of lectures and 15 hours of exercises. It is held during IV. Semester. Lectures are held in lecture hall number 9, and practical in the computer classroom at the Faculty of Medicine.

COURSE STRUCTURE
Formal lectures: 15 hours
Practicals: 15 hours
Total hours: 30

The objective of the course is to teach students about statistical reasoning, when and how to apply and how to interpret the basic statistical tests. In this way students will develop the ability of quantitative approach to data gathering, analysis and interpretation within the fields of biological sciences and humanities, which is the necessary requirement for their professional development, ability to critically follow the scientific and technical literature and participate in its creation.

Assigned reading:

Triola M.M, Triola M.F, Biostatistics for the Biological and Health Sciences, Pearson, 2018.

Optional/additional reading:

Dawson B, Trapp R.G, Basic & Clinical Biostatistics, McGraw-Hill, 2004.

COURSE TEACHING PLAN:

The list of lectures (with topics and descriptions):

L1 Introduction. Applied statistics in biomedicine and health care.
Expected Learning Outcomes
Give examples of the application of statistics in biomedicine and health care.
Describe the course of the research process.
Distinguish between descriptive and inferential statistics.
Distinguish between sample and population.

Apply the process of generalization about the population based on sample analysis.

L2 Graphical and tabular presentation of data.

Expected Learning Outcomes

List the types of data and measurement scales and give examples of each.

Distinguish between types of statistical tables and graphical representations of data.

Represent data using tables and graphs.

L3 Normal distribution. Z-score.

Expected Learning Outcomes

Distinguish between data distributions.

Describe the normal distribution of data.

Define the properties of the normal distribution.

Establish the null hypothesis.

Determine the position of a single outcome in a normal distribution using the z-score.

Distinguish between parametric and non-parametric statistical tests.

L4 Measures of central tendency and variability.

Expected Learning Outcomes

List measures of central tendency and measures of data variability.

Describe a boxplot.

Select an appropriate measure of central tendency and an appropriate measure of data variability depending on the distribution of the data.

L5 Correlation and linear regression.

Expected Learning Outcomes

Recognize in which cases it is useful to calculate Pearson correlation coefficient.

Distinguish between complete and incomplete correlation.

Distinguish between positive and negative correlation.

Calculating the Pearson correlation coefficient, determining its statistical significance and interpreting its
meaning.

Calculating and explaining the coefficient of determination.

Describe and apply a simple linear regression model.

Determine the equation of the regression line.

Explain the 95% confidence interval.

L6 T-test for independent samples.

Expected Learning Outcomes

Distinguish between dependent and independent samples.

Describe the procedure for performing a t-test.

State the appropriate null hypothesis.

Apply the t-test to test the difference in arithmetic means for two independent samples.

L7 T-test for dependent samples.

Expected Learning Outcomes

Distinguish between dependent and independent data.

Describe the procedure for performing a t-test for dependent samples.

State the null hypothesis.

Apply the t-test to test the difference in arithmetic means for two dependent samples.

L8 Introduction to non-parametric tests.

Expected Learning Outcomes

Distinguish between cases where statistical analysis is performed using parametric tests and cases where
non-parametric statistical tests are used for analysis.

Calculate proportions and the standard error of proportions.

Compare qualitative data using the chi-square test.

Comparison of qualitative data using the McNemar test.

L9 One-way analysis of variance (ANOVA).

Expected Learning Outcomes
Recognize instances where ANOVA can be used for statistical analysis.
Distinguish between and within groups variation.
Perform statistical tests using ANOVA.
Perform post-hoc analysis.
Interpret the results of the statistical analysis.
Present the results of the statistical analysis.
L10 Review and the first midterm exam.
Expected Learning Outcomes
Perform appropriate statistical analysis.
Interpret the results of statistical analysis.
Draw conclusions based on the statistical analysis performed**.**
L11 Final Lecture
Expected Learning Outcomes
Systematization of course material.

The list of practicals with descriptions:

P1 Graphical and tabular presentation of data.
Expected Learning Outcomes
Become familiar with the basics of using software support for statistical data analysis.
Prepare and enter/load data into a computer program.
Graphically represent data using an Excel spreadsheet and appropriate statistical program.
P2 Normality of distribution. Z-score.
Expected Learning Outcomes
Test the normality of the distribution.
Determine the position of an individual result in a group of normally distributed data.
P3 Measures of central tendency and variability.
Expected Learning Outcomes
Recognize and calculate the appropriate measure of central tendency and measure of variability for given
data.
Compute and interpret individual measures of central tendency and measures of data variability.
P4 Correlation and linear regression
Expected Learning Outcomes
Calculate the correlation coefficient using a statistical program.
Determine the statistical significance of the correlation coefficient and interpret its meaning.
Determine the equation of the regression line.
Draw a scatter plot and a regression line in a computer program.
Edit the graph in a computer program.
P5 T-test for independent samples
Expected Learning Outcomes
Recognize situations in which the t-test for independent samples can be used.
State the appropriate null hypothesis.
Use a statistical program to perform a t-test for independent samples.
Interpret the results of the t-test.
P6 T-test for dependent samples.
Expected Learning Outcomes
Recognize situations in which the t-test for dependent samples can be used.
State the appropriate null hypothesis
Use a statistical program to perform a t-test for dependent samples.
Interpret the results of the t-test.

P7 Introduction to non-parametric testing.
Expected Learning Outcomes
Recognize when to use the chi-2 test and when to use the McNemar test for statistical analysis.
Explain and perform the chi-2 test procedure for one sample, multiple independent samples, and two
dependent samples (McNemar test).
Perform chi-2 testing for one sample, multiple independent samples, and two dependent samples
(McNemar test) and Fisher's exact test in the appropriate statistical program.
P8 One-way analysis of variance (ANOVA)
Expected Learning Outcomes
Perform ANOVA using a statistical program.
Perform a post-hoc analysis using a statistical program.
Interpret the results of the statistical analysis performed.
Present the results of the statistical analysis.
P9 Repetition and second midterm exam
Expected Learning Outcomes
Use a statistical program to perform appropriate statistical analysis.
Interpret the results of statistical analysis.
Draw conclusions based on the statistical analysis performed

Students' obligations:

Students' obligations are course attendance and active participation in all practicals.

Assessment (exams, description of written / oral / practical exam, the scoring criteria):

Evaluation of students' work:
Student assessment is carried out according to the current Regulations on Studies of the University of Rijeka.
Students can obtain a total of 100 credits (a maximum of 70 credits during the course and a maximum of 30 credits on the final exam). Students are allowed to take the final exam if they acquire a minimum of 35 credits during the trimester.

Evaluation of Students' Work During the Course (Maximum 70 credits)

a) Active participation during practicals (3 credits)
b) Midterm exam (32 credits)
c) Colloquium (35 credits)

The attendance at lectures and practicals is mandatory. If necessary, a student can be absent from 30% of the classes.

a) Active participation during seminars:

During the practicals student participation and dedication will be monitored. At the end of each practical, students are also given homework assignments. A maximum of 3 points is awarded through active participation. Activities scoring is done in the following way:

number of correctly assigned homework assignments	credits

0	0
1	1
2	2
3	3

b) Midterm Exam (32 credits)

Students have to pass the written midterm exam (in form of a test consisting of 3 problem tasks). In order to pass the midterm exam students have to score at least 50% (16 credits).

c) Colloquium from practical (35 credits)

Practicals end up with a colloquium. The colloquium examines the resolution of statistical tasks in the computer program "Statistica". It is possible to collect up to 35 credits.

Final exam:

Students have to pass the written exam (in form of a test consisting of 29 questions, each containing 5 statements). In order to pass the written part of the exam students have to score at least 50% (15/29 correct answers).

Assessment of the written part of the final exam:

Number of correct answers	Credits
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	30

The ECTS grading system is defined by the following criteria:

A (5) – 90-100 credits
B (4) – 75-89,9 credits
C (3) – 60-74,9 credits
D (2) – 50-59,9 credits

Other important information regarding to the course:

Retaking the course:

A student who acquires less than 35 credits during the course has failed the course and is graded with **F** and must retake the course **STATISTICS.**

COURSE SCHEDULE (for academic year 2021./2022.)

Date	Lectures (time and place)	Practicals (time and place)	Instructor
23/2/2022 Wednesday	L1-3 (9:00-11:30) LH9	P1-2 (12:00-14:00) LH9	Gordana Žauhar, PhD, Associate Professor Đeni Smilović-Radojčić, PhD
24/2/2022 Thursday	L4-5 (9:00-11:00) LH9	P3-4 (11:00-13:00) LH9	Gordana Žauhar, PhD, Associate Professor Đeni Smilović-Radojčić, PhD
25/2/2022 Friday	L6-7 (9:00-11:00) LH9	P5-6 (11:00-13:00) LH9	Gordana Žauhar, PhD, Associate Professor Đeni Smilović-Radojčić, PhD
28/2/2022 Monday	L8-9 (12:00-14:00) LH3	P7-8 (14:00-16:00) LH3	Gordana Žauhar, PhD, Associate Professor Đeni Smilović-Radojčić, PhD
04/3/2022 Friday	L10-11 (10:00-12:00) LH5	P9-10 (12:00-14:00) LH9	Gordana Žauhar, PhD, Associate Professor Đeni Smilović-Radojčić, PhD
07/3/2022 Monday	L12-13 (09:00-11:00) LH9	P11-12 g1 (13:00-15:00) LH9	Gordana Žauhar, PhD, Associate Professor Đeni Smilović-Radojčić, PhD
08/3/2022 Tuesday		P13-15 g1 (12:00-15:00) LH9	Đeni Smilović-Radojčić, PhD
10/3/2022 Thursday	L14-15 (14:00-16:00) LH9		Gordana Žauhar, PhD, Associate Professor

List of lectures and seminars:

	LECTURES (Topics)	Teaching hours	Location/Lecture room
L1	Introduction. Applied statistics in biomedicine and health care.	1	LH9
L2	Graphical and tabular presentation of data.	1	LH9
L3	Normal distribution. Z-score.	2	LH9
L4	Measures of central tendency and variability.	2	LH9
L5	Correlation and linear regression.	2	LH9
L6	T-test for independent samples.	1	LH3
L7	T-test for dependent samples.	1	LH3
L8	Introduction to non-parametric tests.	1	LH5
L9	One-way analysis of variance (ANOVA).	2	LH5
L10	Review	1	LH9
L11	Final Lecture	1	LH9
	TOTAL TEACHING HOURS	**15**	

	PRACTICALS (Topics)	Teaching hours	Location/Lecture room
P1	Graphical and tabular presentation of data	2	LH9
P2	Normality of distribution. Z-score	2	LH9
P3	Measures of central tendency and variability	2	LH9
P4	Measures of central tendency and variability	2	LH9
P5	T-test for independent samples	2	LH9
P6	T-test for dependent samples	2	LH9
P7	Non-parametric testing.	2	LH3
P8	One-way analysis of variance (ANOVA)	2	LH3
P9	Repetition	1	LH9
	TOTAL TEACHING HOURS	**15**	

	FINAL EXAM DATES
1.	11/03/2022
2.	25/03/2022
3.	1/07/2022