



**Course: Biostatistics**

**Course Coordinator:** Gordana Žauhar, PhD, Associate Professor

**Department:** Medical Physics and Biophysics

**Study program:** Integrated Undergraduate and Graduate University Study of Medicine in English

**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.):**

Biostatistics is a compulsory course on the second year of the Integrated Undergraduate and Graduate University Study of 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. The estimated duration of course is 7 weeks.

**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, 5ed., 2020.  
<https://accessmedicine.mhmedical.com/Book.aspx?bookid=2724>

**COURSE TEACHING PLAN:**

**The list of lectures (with topics and descriptions):**

**L1** Introduction to Statistics. Statistics in Medicine. Scales of Measurement.

**L2** Presenting of Data in Tables and Graphs. Summarizing and Displaying Numerical Data in Graphs. Empirical Distribution and Data Grouping Within Intervals of a Continuous Variable and Classes.

**L3** Measures of central tendency - arithmetical mean, mode, median, geometrical mean and harmonic mean.

- L4** Measures of Variation - range, mean deviation, variance, and standard deviation. Variability coefficient. Percentiles, deciles and quartiles.
- L5** Normal Probability Distributions. The position of a result within the group (z-Scores).
- L6** Population and the sample. Inferences about the population based on sample-results. Confidence limits.
- L7** Statistical significance of differences between the means of mutually independent samples.
- L8** Statistical significance of differences between the means of mutually dependent (correlated) samples.
- L9** Analysis of Variance (ANOVA).
- L10** Correlation between variables.
- L11** Regression analysis.
- L12** Analysis and Comparison of Qualitative Data. Proportions. Inferences about Two Proportions: Independent Samples.
- L13** Chi-Square Test. Mc-Nemar test (Chi-Square Test for Dependent Samples).
- L14** Written Knowledge Assessment
- L15** Final Lecture and Preparation for the Exam

**The list of practical with descriptions:**

- P1-2** Preparing and Writing Data In The Data Processing Program.
- P3** Visualising of Data. Histograms. Pie Charts. Time Series Graph.
- P4** Descriptive Statistics. Calculation of Basic Measures of Centre and Variation of the Numerical Data. Graphic Representation of Empirical Distribution
- P5** Testing of Data Distribution for Normality with Kolmogorov-Smirnov test
- P6** z-Scores (determination of the position for each result in the normal distribution with z-scores)
- P7** Comparing the means of two independent samples with Student t-test
- P8** Comparing the means of two dependent samples
- P9** Analysis of Variance (ANOVA)
- P10** Correlation and regression
- P11** Comparison of Qualitative Data
- P12** The Chi-squared Test
- P13** Non-Parametric Methods
- P14** Repeating and Testing of Knowledge
- P15** Repeating and Testing of Knowledge

**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:**

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:**

<b>Number of correct answers</b>	<b>Credits</b>
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 **BIOSATISTICS**.

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

<b>Date</b>	<b>Lectures (time and place)</b>	<b>Seminars (time and place)</b>	<b>Instructor</b>
19/4/2022 Tuesday	L1-3 (8:00-11:00) LH9		Gordana Žauhar, PhD, Associate Professor
21/4/2022 Tuesday		P1-2 g3 (9.00-11.00) LH9	Diana Mance, PhD, Assistant Professor
		P1-2 g1 (11.00-13.00) LH9	Doris Šegota, Assistant
22.04.2022 Friday		P1-2 g2 (12.00-14.00) LH9	Doris Šegota, Assistant
25/4/2022 Monday	L4-5 (13:00-15:00) LH9		Gordana Žauhar, PhD, Associate Professor
26/4/2022 Tuesday		P3-4 g2 (9.00-11.00) LH9	Doris Šegota, Assistant
28/4/2022 Thursday		P3-4 g3 (9.00-11.00) LH9	Diana Mance, PhD, Assistant Professor
		P3-4 g1 (11.00-13.00) LH9	Doris Šegota, Assistant
02/5/2022 Monday	L6-7 (13:00-15:00) LH9		Gordana Žauhar, PhD, Associate Professor
03/5/2022 Tuesday		P5-6 g2 (9.00-11.00) LH9	Doris Šegota, Assistant
05/5/2022 Thursday		P5-6 g3 (9.00-11.00) LH9	Diana Mance, PhD, Assistant Professor
		P5-6 g1 (11.00-13.00) LH9	Doris Šegota, Assistant
09/5/2022 Monday	L8-9 (13:00-15:00) LH9		Marta Žuvić, PhD, Full Professor
10/5/2022 Tuesday		P7-8 g2 (9.00-11.00) LH9	Doris Šegota, Assistant
12/5/2022 Thursday		P7-8 g3 (9.00-11.00) LH9	Diana Mance, PhD, Assistant Professor
		P7-8 g1 (11.00-13.00) LH9	Doris Šegota, Assistant
16/5/2022 Monday	L10-11 (13:00-15:00) LH9		Marta Žuvić, PhD, Full Professor
17/5/2022 Tuesday		P9-10 g2 (9.00-11.00) LH9	Doris Šegota, Assistant
19/5/2022 Thursday		P9-10 g1(9.00-11.00) LH9	Doris Šegota, Assistant
		P9-10 g3 (11.00-13.00) LH9	Diana Mance, PhD, Assistant Professor
23/5/2022 Monday	L12-13 (13:00-15:00) LH9		Marta Žuvić, PhD, Full Professor
24/5/2022 Tuesday		P11-12 g2 (9.00-11.00) LH9	Doris Šegota, Assistant
26/5/2022 Thursday		P11-12 g3 (9.00-11.00) LH9	Diana Mance, PhD, Assistant Professor
		P11-12 g1 (13.00-15.00) LH9	Doris Šegota, Assistant

31/05/2022 Tuesday		P13-15 g2 (8:00-11:00) LH9	Doris Šegota, Assistant
01/06/2022 Wednesday		P13-15 g3 (8:00-11:00) LH9	Diana Mance, PhD, Assistant Professor
		P13-15 g1 (13:00-16:00) LH9	Doris Šegota, Assistant
2/06/2022 Thursday	L14-15 (13,00-15,00) LH9		Gordana Žauhar, PhD, Associate Professor

**List of lectures and practicals:**

	<b>LECTURES (Topics)</b>	<b>Teaching hours</b>	<b>Location/Lecture room</b>
L1	Introduction to Statistics. Statistics in Medicine. Scales of Measurement.	1	LH9
L2	Presenting of Data in Tables and Graphs. Summarizing and Displaying Numerical Data in Graphs.	1	LH9
L3	Measures of Central Tendency	1	LH9
L4	Measures of Variation - range, mean deviation, variance, and standard deviation. Variability coefficient.	1	LH9
L5	Normal Probability Distributions. The position of a result within the group (z-Scores).	2	LH9
L6	The population and the sample.	1	LH9
L7	Statistical significance of differences between the means of mutually independent samples.	1	LH9
L8	Correlation between variables. Regression Analysis.	1	LH9
L9	Statistical significance of differences between the means of mutually dependent (correlated) samples.	1	LH9
L10	Multivariate testing. Analysis of Variance (ANOVA).	1	LH9
L11	Comparison of Qualitative Data	1	LH9
L12	Chi-Square Test	1	LH9
L13	Mc-Nemar test (Chi-Square Test for Dependent Samples)	1	LH9
L14	Written Knowledge Assessment	1	LH9
L15	Final Lecture and Preparation for the Exam	1	LH9
	<b>TOTAL TEACHING HOURS</b>	<b>15</b>	

	<b>PRACTICALS (Topics)</b>	<b>Teaching hours</b>	<b>Location/Lecture room</b>
P1-2	Preparing and Writing Data Into The Data Processing Program.	2	LH9
P3	Visualising of Data. Histograms. Pie Charts. Time Series Graph.	1	LH9
P4	Descriptive Statistics. Calculation of Basic Measures of Centre and Variation of the Numerical Data.	1	LH9
P5	Testing of Data Distribution for Normality	1	LH9
P6	z-Scores	1	LH9
P7	Comparing the means of two independent samples with Student t-test	1	LH9
P8	Correlation and regression	1	LH9
P9	Comparing the means of two dependent samples	1	LH9
P10	Analysis of Variance (ANOVA)	1	LH9
P11	Comparison of Qualitative Data	1	LH9
P12	The Chi-squared Test	1	LH9
P13	Non-Parametric Tests	1	LH9
P14	Repeating and Testing of Knowledge	1	LH9
P15	Repeating and Testing of Knowledge	1	LH9
	<b>TOTAL TEACHING HOURS</b>	<b>15</b>	

	<b>FINAL EXAM DATES</b>
1.	16/06/2022
2.	01/07/2022
3.	12/09/2022