GENERAL INFORMATION		
Course name	**Medical Statistics 2**	
Course director	**Assoc. Prof. Mario Štefanić, MD, PhD**	
Assistants	Prof. Maja Miškulin, MD, PhD Asst. Prof. Ivan Miškulin, PhD	
Study program	**Integrated undergraduate and graduate university study program Medical Studies in German**	
Course status	Elective	
Year of study, semester	5th year, 10th semester	
Credits allocated and form of instruction	ECTS student workload	**1**
	Number of teaching hours (L+S+E)	**15** (5+0+10)

COURSE DESCRIPTION

Course objectives

The objective of the course is to teach students a systematic approach to the organization, processing and interpretation of data in medicine and healthcare. To learn the basics of the corresponding, critical and competent choice of methods for presentation, description and statistical analysis of data. To understand the importance of appropriate processing, analysis and presentation of data in scientific and technical literature.

Course requirements

There are no specific requirements for this course except those defined in the study program curriculum.

Learning outcomes at the Programme level

1.1., 2.2., 3.4., 3.5., 4.2.

Expected learning outcomes *(5-10 learning outcomes)*

Knowledge

1. Understanding the theory of hypothesis testing – the significance of differences, probability, degree and direction of the relationship, type I and type II errors, power of a statistical test.
2. Contrast and use value, and conditions for using parametric and nonparametric significance tests.
3. Distinguishing independent and dependent samples (design) and applying appropriate parametric and nonparametric tests.
4. Parametric significance tests (ANOVA, Student t-test).
5. Nonparametric significance tests (Mann-Whitney, Kruskal-Wallis, Wilcoxon, Friedman).
6. Analysis of correlation between quantitative characteristics: Pearson's and Spearman's correlation coefficient.
7. Description and use of the regression analysis model. Predictive model potential, interpretation of results.
8. Application of vital statistics indicators. Survival analysis.

Skills

1. Computer-aided data testing for normal distribution (Shapiro-Wilk, Kolmogorov-Smirnov test). Homogeneity of variances.
2. Distinction between dependent and independent samples, parametric and nonparametric significance tests.
3. Computer-aided testing of differences between sets of respondents using parametric tests (ANOVA and Student's t-test).
4. Computer-aided testing of differences between sets of respondents using nonparametric tests (Mann-Whitney, Kruskal-Wallis).

5. Computer-aided testing of differences between 2 dependent samples using parametric (paired test) or nonparametric test (Wilcoxon).
6. Computer-aided calculation of correlation coefficients (Pearson's and Spearman's).
7. Computer-aided application of linear regression model for predictive analysis.
8. Computer-aided survival analysis (Kaplan-Meier, Cox regression model).

Course content

Statistical tests – basic concepts. P-value, power of a test. Review of parametric and nonparametric tests for quantitative data. Reasons for application. Independent and dependent samples. 2 independent sets. Student's t-test, conditions and application, 2 dependent sets, repeated measures: t-test for difference, conditions and application. The Mann-Whitney U test, the Wilcoxon signed-rank test. Difference test, 3 or more sets. One-way analysis of variance, application, presumptions. Variance partitioning. F-statistics. Post hoc tests. Nonparametric methods. Reasons for application. The Kruskal-Wallis test. The Friedman test. Correlation analysis. Correlation, correlation coefficient, Pearson's coefficient. Dispersion diagram. Interpretation. Spearman's correlation coefficient. Linear regression. Standard equation form. The least squares method. Regression coefficient, model assessment. Diagnostics, graph. Vital statistics indicators. Kaplan-Meier curves. Logrank test. Cox regression model.

Form of instruction		
	☒ lectures	☐ individual assignments
	☐ seminars and workshops	☐ multimedia and Internet
	☒ exercises	☐ laboratory
	☐ distance learning	☐ mentoring activities
	☐ field course	☐ other

Student obligations

Come to class prepared by studying the recommended literature for each unit and actively participate in all forms of instruction. The student must participate in at least 70% of classes to pass the course.

Monitoring student learning

Attendance	x	Active participation	x	Seminar paper		Experimental work	x
Written exam	x	Oral exam		Essay		Research	
Project		Continuous assessment		Paper		Practical work	x
Portfolio							

Assessment and evaluation of students during class and on the final exam

Students' performance will be evaluated during class and on the final exam. Students are evaluated numerically and descriptively (insufficient (1), sufficient (2), good (3), very good (4), excellent (5)). During classes, a student can earn a maximum of 100 points. Students can earn a maximum of 20 points during classes through different types of activities. On the final exam, students can earn a maximum of 80 points. The final grade represents the sum of the points earned during classes and on the final exam.

Mandatory reading

1. Weiss C. Basiswissen Medizinische Statistik. Springer-Verlag Berlin Heidelberg Auflage: 5, 2010

Additional reading

1. Dawson B, Trapp RG. Basic&Clinical Biostatistics. Lange Medical Books/McGraw Hill, 2004
2. Kirkwood BR, Sterne JAC. Essential medical statistics (2nd. edit.). Blackwell Publishing, 2003
3. Bortz J, Lienert GA. Kurzgefasste Statistik für die klinische Forschung (Springer-Lehrbuch). Springer, Auflage: 2, 2003

5. Rowe P. Statistik für Mediziner und Pharmazeuten (Verdammt Clever!). Wiley-VCH Verlag GmbH, 2012

The number of copies of mandatory reading in proportion to the number of students currently taking this course

Title	*Number of copies*	*Number of students*
Weiss C. Basiswissen Medizinische Statistik. Springer-Verlag Berlin Heidelberg Auflage: 5, 2010	A purchased license for online textbooks shall be used https://bfdproxy48.bfd-online.de/login.htm?back=http%3a%2f%2fpartner.bfd-online.info.bfdproxy48.bfd-online.de%2fameos%2fbfdAboGateway%3faboId%3d264117 Access will be granted to all students enrolled in the study program	

Quality monitoring methods ensuring the acquisition of knowledge upon completion, skills and competences

The quality of course performance is monitored through an anonymous student survey on the quality of the organization and conduction of classes, the course content and the work of professors. The usefulness of the lectures from the students' perspective, the curriculum content, the professor preparedness, the clarity of the presentation, the amount of new content and the quality of the presentation are evaluated. The curriculum and its execution are administratively compared. The participation of students in lectures and exercises, as well as the excuses for missing classes, are controlled and analyzed.