Sveučilište u Rijeci
University of Rijeka

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

Krešimirova 40/42 • 51000 Rijeka • CROATIA
Phone : + 385 51 559 200; 559 202, 559 203

Course: Scientific research in dental medicine
Course Coordinator: Romana Peršić Bukmir, DMD, PhD, Assistant Professor
Course Collaborators: Diana Mance, PhD, Associate Professor, Ema Paljević, DMD, PhD, Elvis Božac, DMD
Department: Department of Endodontics and Restorative Dentistry
Study program: University Integrated Undergraduate and Graduate Study of Dental Medicine (in English)
Study year: 3rd
Academic year: 2024./25.

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.):

The course Scientific research in dental medicine is a compulsory course in the third year of the University integrated undergraduate and graduate study of Dental Medicine. It consists of 15 hours of lectures, 5 hours of practicals and 10 hours of seminars, a total of 30 hours (3 ECTS). The course is conducted in lecture halls, practicums and via e-courses on the Merlin platform.
The aim of the course is to train students in the application of "evidence-based dental medicine" in clinical practice. During classes, students will learn the basics of using statistical and IT skills, critical reading and analysis of scientific articles.
The subject includes basic knowledge about the methodology of scientific research work, biostatistics, oral epidemiology, and the creation and publication of scientific work. The acquired knowledge from this course will make it easier for the student to shape the goals and methodology of the graduation thesis, and to find and process the available scientific literature.

Teaching is conducted in the form of lectures, seminars and practicals during the 5th semester. At the end of the lectures and practicals of the statistical part, there will be a midterm exam. At the end of the course, there will be a final exam.
Student earns 3 ECTS points by completing all teaching activities, taking the midterm and the final exams.

Assigned reading:

Marušić M. Uvod u znanstveni rad u medicini. 6. izdanje. Zagreb: Medicinska naklada, 2016.
Špalj S. Oralna epidemiologija. [Internet]. Rijeka: Sveučilište u Rijeci, Medicinski fakultet; 2015, [pristupljeno 30.12.2021.] Dostupno na: https://urn.nsk.hr/urn:nbn:hr:184:379215
Boris Petz, Vladimir Kolesarić, Dragutin Ivanec: Petzova statistika, Naklada Slap, Jastrebarsko, 2012.
Dawson B, Trapp R.G, „Basic & Clinical Biostatistics “, McGraw-Hill, 5ed., 2020. (e-book) https://accessmedicine.mhmedical.com/Book.aspx?bookid=2724

Optional/additional reading:

Silobrčić V. Kako sastaviti, objaviti i ocijeniti znanstveno djelo, 6. izdanje. Zagreb: Medicinska naklada, 2008.

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Štrucelj H. Osnove metodologije znanstveno-istraživačkoga rada. Zagreb, Rijeka, Medicinska naklada, 2020.

COURSE TEACHING PLAN:

The list of lectures (with topics and descriptions):

L1 Science in dental medicine
Expected learning outcomes
Define science and its importance
State the fundamental features of science
Describe the scientific features of dental medicine
Explain the fundamental properties of science

L2 Scientific research in dental medicine
Expected learning outcomes
Describe the prerequisites of quality scientific research work
Distinguish between null and alternative hypothesis
Define the level of statistical significance
State the determinants of the population
Differentiate between types of samples

L3 Types of research in dental medicine
Expected learning outcomes
Describe observational research
Define experimental research
Distinguish between control and experimental groups
List and define other types of research
Define a clinical trial as a type of research

L4 Research planning in dental medicine
Expected learning outcomes
List the steps in research planning
Define the goal of the research
Distinguish the basic items of the research protocol
Explain confounding factors
Define data collection and processing

L5 Searching for scientific information
Expected learning outcomes
Explain the basic characteristics of medical literature
Describe the path of searching for information
List sources of bibliographic data (Medline/PubMed, Embase, Scopus, WoS)
Define the reasons for unrestricted access to scientific information

L6 Descriptive statistics
Expected Learning Outcomes
List the types of data and measurement scales and give examples of each.

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Distinguish between types of statistical tables and graphical representations of data.
Distinguish between data distributions.
Describe the normal distribution of data.
Define the properties of the normal distribution.
Establish the null hypothesis.
Distinguish between parametric and non-parametric statistical tests.
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.

L7 Correlation and linear regression.
Expected Learning Outcomes
Recognize in which cases it is useful to calculate Pearson and Spearman correlation coefficient.
Distinguish between complete and incomplete correlation.
Distinguish between positive and negative correlation.
Describe and apply a simple linear regression model.
Determine the equation of the regression line.
Explain the 95% confidence interval.

L8 T-test and appropriate non-parametric tests
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.
Apply non-parametric versions of t-test to test.

L9 Analysis of variance (ANOVA) and appropriate non-parametric tests
Expected Learning Outcomes
Recognize instances where ANOVA and its non-parametric versions can be used for statistical analysis.
Distinguish between and within groups variation.
Perform statistical tests using ANOVA/non-parametric version of ANOVA.
Perform post-hoc analysis.
Interpret the results of the statistical analysis.
Present the results of the statistical analysis.

L10 Chi-2 test, McNemar test, Fisher exact test
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.

L11 Types of scientific publications
Expected learning outcomes
Define the purpose of a scientific publication
List the types of articles that are published in a scientific journal

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Describe other types of scientific research work (graduate thesis, master's thesis, dissertation)

L12 Scientific article
Expected learning outcomes
List and explain the basic parts of a scientific article
Define bibliometric indicators of scientific journals

L13 Publication of research and critical assessment of scientific articles
Expected learning outcomes
Describe the registration of clinical studies
Explain the procedure for publishing an article
State the general criteria for evaluating the quality of scientific articles

L14 Basics of oral epidemiology
Expected learning outcomes
Define the basic characteristics of oral epidemiology
Explain the influence of physical and social environmental factors on the oral health of the population

L15 Organization and organization of research in oral epidemiology
Expected learning outcomes
Explain the basic issues in the organization of epidemiological research in dental medicine (research protocol, hypothesis and study design, target population, sample size, research methods).
List the basic epidemiological indicators of oral diseases and conditions

The list of seminars with descriptions:

S1 Recognition of basic terminology in research examples 1
Expected learning outcomes
Explain the types of research in dental medicine
Define steps in research planning
S2 Recognition of basic terminology in research examples 2
Expected learning outcomes
Discuss the basic characteristics of oral epidemiology and basic epidemiological indicators in dental medicine
S3 Analysis and critical reading of articles (Examples of original scientific articles)
Expected learning outcomes
List the main parts of the original scientific article
Explain the hypothesis, type of research, sample selection using examples from the literature
S4 Analysis and critical reading of articles (Examples of review articles)
Expected learning outcomes
Analyze the basic features of review articles using examples from the literature
S5 Analysis and critical reading of articles (Examples of case reports)
Expected learning outcomes
Discuss the characteristics of case presentations using examples from the literature
S6-10 Creation and Poster presentation (work in groups)
Expected learning outcomes
Create and present a scientific poster according to a predetermined topic. Poster presentation is created in groups of 3-5 students according to detailed instructions and is additionally coordinated by the seminar coordinator

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The list of practicals with descriptions:

P1 Descrptive statistics.
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.
Test the normality of the distribution.
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.

P2 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.

P3 T-test and appropriate non-parametric tests
Expected Learning Outcomes
Recognize situations in which the t-test and its non-parametric version should be used.
State the appropriate null hypothesis.
Use a statistical program to perform a t-test (and appropriate non-parametric tests) samples.
Interpret the results of statistical tests..

P4 Analysis of variance (ANOVA) and appropriate non-parametric tests
Expected Learning Outcomes
Perform ANOVA (and appropriate non-parametric version of the test) 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.

P5 Chi-2 test, McNemar test, Fisher exact test
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.

Students' obligations:

Students are obliged to regularly attend and actively participate in all forms of classes.
Theoretical knowledge prepared according to lecture topics is mandatory for students' participation in seminars and practicals. The student can be absent from a maximum of 20% of each form of teaching with justification. Absence greater than 20 %, regardless of the reasons, makes it impossible for the student to

take the final exam and implies re-enroling of the course for the next academic year. Creating a poster presentation, taking a midterm and a final exam are mandatory.

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

Student evaluation is conducted according to the current **Ordinance on Studies of the University of Rijeka (approved by the Senate).**
Students' work will be evaluated during the course, and at the midterm and final exam after the course is completed. The final exam consists of a written test. Completing all student's obligations, including making a poster presentation, and passing the colloquium are the conditions for taking the final exam. The final exam consists of a written test (free-form questions or a test with questions and multiple-choise answers).

Final grade:
Out of a total of **100 evaluation points**, the student can obtain **50 points** on the midterm exam and another **50 points** on the final exam.
To pass the midterm exam, the student must obtain a minimum of 25 grade points (50%).
To pass the final exam, the student must obtain a minimum of 25 grade points (25%).
Grading of students is done using ECTS (A-F) and numerical system (5-1) as follows:
A (5) – 90-100 grade points
B (4) – 75-89.99 grade points
C (3) – 60-74.99 grade points
D (2) – 50-59.99 grade points
F (1) – 0-49.99 grade points

Other important information regarding to the course:

Any use of another's text or other form of author's work, as well as the use of ChatGPT or any of another tool whose functionality is based on artificial intelligence technology, without clear and unambiguous citation of sources, is considered a violation of someone else's copyright and the principle of academic integrity and represents serious violation of student obligations, which entails disciplinary responsibility and disciplinary measures accordingly Ordinance on disciplinary responsibility of students.
Consultations:
Assistant professor Romana Peršić Bukmir, DMD, PhD: Monday from 9.00-10.00 a.m. proceeding e-mail arrangement.

COURSE SCHEDULE (for the academic year 2023/2024)

Date	Lectures (time and place)	Seminars (time and place)	Practicals (time and place)	Instructor
14/1/2024				
	L1-L5 (8.00-12.00)			Romana Peršić Bukmir
	Lecture hall, Krešimirova 42			
15/1/2024	L6,7 (8:00-10:00)			Diana Mance

	O-161, FIZRI			
			P1,2 (10:00-12:00) O-161, FIZRI	Diana Mance
16/1/2024	L8,9 (8:00-10:00) O-161, FIZRI			Diana Mance
			P3,4 (10:00-12:00) O-161, FIZRI	Diana Mance
17/1/2024	L10 (12:00-13:00) O-161, FIZRI			Diana Mance
			P5 (13:00-14:00) O-161, FIZRI	Diana Mance
20/1/2024	L11-15 (8.00-12.00)			Romana Peršić Bukmir
	Lecture hall, Krešimirova 42			
21/1/2024	S 1-4	14.00-17.00; online		Ema Paljević, Romana Peršić Bukmir
22/1/2024	S 5-7	14.00-16.15; online		Ema Paljević, Romana Peršić Bukmir
23/1/2024	S 8-10	14.00-16.15; online		Ema Paljević, Romana Peršić Bukmir

List of lectures, seminars and practicals:

	LECTURES (Topics)	Teaching hours	Location/Lecture room
L1	Science in dental medicine	1	Lecture hall, Krešimirova 42
L2	Scientific research in dental medicine	1	Lecture hall, Krešimirova 42
L3	Types of research in dental medicine	1	Lecture hall, Krešimirova 42
L4	Research planning in dental medicine	1	Lecture hall, Krešimirova 42
L5	Searching for scientific information	1	Lecture hall, Krešimirova 42
L6	Descriptive statistics	1	O-161, FIZRI

L7	Correlation and linear regression	1	O-161, FIZRI
L8	T-test and appropriate non-parametric tests	1	O-161, FIZRI
L9	Analysis of variance (ANOVA) and appropriate non-parametric tests	1	O-161, FIZRI
L10	Chi-2 test, McNemar test, Fisher exact test	1	O-161, FIZRI
L11	Types of scientific publications	1	Lecture hall, Krešimirova 42
L12	Scientific article	1	Lecture hall, Krešimirova 42
L13	Publication of research and critical assessment of scientific articles	1	Lecture hall, Krešimirova 42
L14	Basics of oral epidemiology	1	Lecture hall, Krešimirova 42
L15	Organization and organization of research in oral epidemiology	1	Lecture hall, Krešimirova 42
	TOTAL TEACHING HOURS	**15**	

	SEMINARS (Topics)	Teaching hours	Location/Lecture room
S1	Recognition of basic terminology in research examples 1	1	Online
S2	Recognition of basic terminology in research examples 2	1	Online
S3	Analysis and critical reading of articles (Examples of original scientific articles)	1	Online
S4	Analysis and critical reading of articles (Examples of review articles)	1	Online
S5	Analysis and critical reading of articles (Examples of case reports)	1	Online
S6	Creation and Poster presentation (work in groups)	1	Online
S7	Creation and Poster presentation (work in groups)	1	Online
S8	Creation and Poster presentation (work in groups)	1	Online
S9	Creation and Poster presentation (work in groups)	1	Online
S10	Creation and Poster presentation (work in groups)	1	Online
	TOTAL TEACHING HOURS	**10**	

	PRACTICALS (Topics)	Teaching hours	Location/Lecture room
P1	Descriptive statistics	1	O-161, FIZRI
P2	Correlation and linear regression	1	O-161, FIZRI
P3	T-test and appropriate non-parametric tests	1	O-161, FIZRI
P4	Analysis of variance (ANOVA) and appropriate non-parametric tests	1	O-161, FIZRI

P5	Chi-2 test, McNemar test, Fisher exact test	1	O-161, FIZRI
	TOTAL TEACHING HOURS	5	

	FINAL EXAM DATES
1.	
2.	
3.	

	Lectures	**Seminars**	**Practicals**	**Total**
Total number	15	10	5	30
On-line		10		
Percentage		33%		