

1st Year – Elective Courses

BIOTECH-E01: METHODOLOGY OF SCIENTIFIC-RESEARCH WORK	
GENERAL INFORMATION	
Course Coordinator(s)	Maja Miškulin, MD, PhD, Full Prof.
Associate(s)	Ivan Miškulin, PhD, Assist. Prof.
Study Programme	Interdisciplinary Graduate Study Programme in English: Biotechnology
Course Status	Elective
Year of Study, Semester	1 st year/ 2 nd Semester
Credits (ECTS)	3
Teaching Method (number of classes)	Lectures: 20; Seminars: 10; Exercises: 0
Expected Number of Students in the Course	25-30
COURSE DESCRIPTION	
Course Aims	
The aim of this course is to acquaint students with the basics of scientific methodology, the basics of scientific research work, scientific thinking and writing, as well as basic ethical principles in science and the basics of statistical methods. The ultimate goal of this course is to enable students to apply scientific methodology in independent scientific research work.	
Prerequisites for Enrolment and the Entry Competencies Required for the Course	
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Learning Outcomes at the Programme Level Contributed by the Course	
BIOTECH-4; BIOTECH-6; BIOTECH-7; BIOTECH-10	
Learning Outcomes at the Course Level	
After completing the course, the student will be able to:	
<ol style="list-style-type: none"> 1. Clarify and summarize the role and meaning of science and research. 2. Select and apply reliable types of sources and ways of accessing scientific and professional information's. 3. Identify and categorize relevant scientific literature. 4. Compare the types of scientific research and explain their particularities. 5. Describe experimental research and distinguish its characteristics, strengths and limitations. 6. Distinguish between ethical and unethical approaches in experimental work. 	
Course Content	
<p>Lectures: Scientific thinking. Basic features of scientific research and writing. Information in science. Primary publications. Secondary Publications. Tertiary publications. Citations. Indexing. Types of scientific research. Main features of basic research. Features of translational research. Characteristics and categorization of epidemiological researches. Experimental research. A randomized controlled clinical trial. Types of samples and sampling. Total population. Target population. Representativeness. Probability-based sampling. Convenient sampling. Simple random sample. Stratified random sample. Subgroup sample or cluster sample. Systematic sample. Questionnaire - a data collection instrument. Standard Questionnaire. Features of a good questionnaire. Basic ethical principles in researches. Informed consent. Privacy and confidentiality of information. Conflict of interest. Scientific virtue. Scientific journals and reports. Structure of scientific work. Types of data. Preparation of data for computer processing. Data processing. Data presentation. Statistical tests, p value and statistical inference.</p> <p>Seminars: Plan and conduction of scientific research. Presentation of results in a randomized controlled clinical trial. Electronic sources of information. Work of Ethics Committees.</p> <p>Methodical exercises: Relevant databases. Designing a survey questionnaire for one's own research.</p> <p>Independent project assignent: Planning and conducting of one's own research.</p>	

Teaching Methods						
Lectures; seminars; methodical exercises; independent project assignment.						
Students' Obligations						
Attendance at all forms of classes is mandatory and the students are obligated to attend all knowledge tests. The students may be absent from 30% (full-time students) and 50% (part-time students) of each of the forms of classes, provided that the absence is justified. An exercise or a seminar which has not been completed must be made up through a midterm exam.						
Monitoring the Activity of the Students (<i>Connecting Learning Outcomes, Teaching Methods, and Grading</i>)						
Class-related activity	ECTS	Learning outcome	Student activity	Evaluation method	Grade points	
					Min.	Max.
Attending classes (lectures, seminars, exercises)	0.25	1-6	Attendance at classes	Keeping records.	2	10
Seminar paper	0.50	3	Seminar paper - production and presentation	Assessment of the quality of the written seminar paper and the presentation itself.	6	20
Methodical exercises	0.25	4-6	Practical work	Success in designing a survey questionnaire and using and searching databases within methodical exercises.	12	20
Final exam - project assignment	2.00	1-6	Project assignment preparation - planning and conducting one's own questionnaire survey	Assessment of the quality of the project assignment.	30	50
Total	3				50	100

Evaluation of the written part of the final exam

Percentage of correct answers (%)	Grade
60.00-64.99	30
65.00-69.99	33
70.00-74.99	36
75.00-79.99	39
80.00-84.99	42
85.00-89.99	45

90.00-94.99	48
95.00-100.00	50

Forming the final grade:

The points granted for the final exam are added to the grade points awarded during class attendance. The grading process is conducted by absolute distribution, i.e. based on total achievements, and compared to the numerical system in the following manner:

A – Excellent (5): 90-100 grade points; B – Very Good (4): 80-89.99 grade points; C – Good (3): 65-79.99 grade points; D – sufficient (2): 50-64.99 grade points

Mandatory Literature (available in the library and via other media)

Title	Number of copies in the library	Availability via other media
Ferenczi E, Muirhead N: One Stop Doc Statistics and Epidemiology. London: Hodder Arnold, 2006.		yes
Walliman N: Research methods – the basics. London and New York: Routledge Taylor & Francis Group, 2011.		yes

Additional Literature

Laake P, Benestad H, Olsen, BR: Research Methodology in the Medical and Biological Sciences 1st Ed., London: Academic Press, 2007.

Quality Assurance Procedures Designed to Ensure the Acquisition of Outcomes and Competencies

Anonymous, quantitative, standardised student survey on the course and the teacher’s work implemented by the Quality improvement office of the Faculty of Medicine Osijek and/or the Faculty of Food Technology Osijek.

Note

E-learning is not included in the class quota, but it is used in teaching and it contains links to various sites and video and audio materials available on websites.