MEDBIOT-E07: **APPLICATION OF FLOW CYTOMETRY IN RESEARCH**	
GENERAL INFORMATION	
Course Coordinator(s)	Martina Mihalj, PhD, Assoc. Prof.
Associate(s)	Ines Drenjančević, PhD, Full Prof. Anita Matić, PhD, Assist. Prof. Zrinka Mihaljević, PhD
Study Programme	Interdisciplinary Graduate Study Programme in English: Biotechnology
Course Status	Elective
Year of Study, Semester	2nd Year / 4th Semester
Credits (ECTS)	4
Teaching Method (number of classes)	Lectures: 15; Seminars: 15; Exercises: 15
Expected Number of Students in the Course	25-30
COURSE DESCRIPTION	
Course Aims	
The aim of this course is to introduce students to the possibilities of applying flow cytometry in biomedical research and medical diagnostics. Students should acquire the basic knowledge and practical skills necessary to plan and perform flow cytometry, and to analyse, present and interpret the gained results.	
Prerequisites for Enrolment and the Entry Competencies Required for the Course	
Completed and passed 1st year exams.	
Learning Outcomes at the Programme Level Contributed by the Course	
BIOTECH-2; BIOTECH-7; MEDBIOT-2; MEDBIOT-3; MEDBIOT-5	
Learning Outcomes at the Course Level	
After completing the course, the student will be able to: 1. Explain argumentatively basic principles underlying flow cytometry, including instrument set-up – fluidics, optics, electronics and software. 2. Recommend mandatory controls in flow cytometry and methods used to exclude non-specific signals. 3. Critically evaluate the results of immunophenotyping of peripheral blood leukocytes by using specialized FACS data analysis software. 4. Analyse gained results by using specialized FACS data analysis software. 5. Critically evaluate the results of the various studies available in the scientific and professional literature.	
Course Content	
Lectures: Introduction to Flow Cytometry; Preparation of samples for flow cytometry, antibody selection, fluorochromes; compensation; Flow cytometry controls; Application of flow cytometry in biomedical research and medical diagnostics. **Seminars:** Experiment planning on given in-vivo / in-vitro models I; Experiment planning on default *in vivo* / *in vitro* models II **Exercises:** Experiment planning – introduction to flow cytometer, antibody panels planning, selection of antibodies; setup of the sample aquisition settings on the device, compensation, antibody titration; Peripheral blood leukocyte immunophenotyping – Cell surface staining; Determination of cytokines and transcription factors - intracellular staining; Analysis of the obtained data, presentation and interpretation of the results.	
Teaching Methods	
Lectures; seminars; laboratory exercises	
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 *(Connecting Learning Outcomes, Teaching Methods, and Grading)*

Class-related activity	ECTS	Learning outcome	Student activity	Evaluation method	Grade points	
					Min.	Max.
Attending classes	0.2	1-5	Attendance at classes	Keeping records	2	10
Seminars	1	1-5	Seminar preparation and presentation	Presentation	10	20
Lab. practice	0.8	4	Laboratory exercises	Report	8	20
Final exam	2	1-5	Studying for the final exam	Written exam	30	50
Total	**4**				**50**	**100**

Evaluation of the written part of the final exam:

Percentage of correct answers (%)	Grade
>95.00	50
90.00-94.99	47
85.00-89.99	45
80.00-84.99	40
75.00-79.99	38
70.00-74.99	35
65.00-69.99	33
60.00-64.99	30

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
Roth B: Flow Cytometry: Current Aspects. Callisto Reference, 2015.	10	yes
Hawley TS, Hawley RG: Flow Cytometry Protocols. 4th Ed., Springer Protocols, 2018.	10	yes

Additional Literature

Scientific and professional papers related to particular chapters (available online)

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 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.