INDBIOT-E02:	**MICROREACTORS**
GENERAL INFORMATION	
Course Coordinator(s)	Marina Tišma, PhD, assoc. prof.
Associate(s)	Mirela Planinić, PhD, full prof.
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 20; Seminars 10; Exercises 15
Expected Number of Students in the Course	25-30
COURSE DESCRIPTION	
Course Aims	
This course aims to provide knowledge on basic principles and application of microreactors.	
Prerequisites for Enrolment and the Entry Competencies Required for the Course	
-	
Learning Outcomes at the Programme Level Contributed by the Course	
BIOTECH-1; INDBIOT-3	
Learning Outcomes at the Course Level	
After successful completion of this course students are expected to be able to: 1. Enumerate and understand advantages and disadvantages of microreactors over classical reactors. 2. Differentiate and explain flow in microchannels. 3. Understand the scale-up process in microfluidics. 4. Enumerate and understand the application of free and immobilized in microreactors. 5. Enumerate and understand the application of microreactors in analytics and bioseperation processes. 6. Perform biocatalysis in microreactors.	
Course Content	
Lectures. Introduction to microreactors. Advantages of microreactor technology over classical reactors. Flow in microreactors. Methods of constructions. Application of microreactors in biotechnology. Enzymatic microreactors. Application of microreactors in analytics. Application of microreactors in bioseparation processes. Industrial application of microreactors. **Seminar**. Case study **Laboratory exercise**. Oxidation of gallic acid catalysed by laccase in a different microchannels	
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 hich 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	0.25	1-6	Attendance at classes	Keeping records	2	10
Seminars	0.75	3-5	Seminar work	Presentation of seminar work	10	20
Laboratory exercise	1	6	Practical work	Laboratory exercises report	8	20
Final exam	2	1-6	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
Ehrfeld W, Hessel V, Löwe H: Microreactors: New Technology for Modern Chemistry, Wiley, 2000		

Additional Literature

Scientific literature available on-line.

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 Food Technology Osijek and/or the Faculty of Medicine 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.