INDBIOT-E06: **BY-PRODUCTS IN THE BIOTECHNOLOGICAL AND FOOD INDUSTRY**	
GENERAL INFORMATION	
Course Coordinator(s)	Drago Šubarić, PhD, full prof.
Associate(s)	Antun Jozinović, PhD, assist. 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	
The aim of this course is to upgrade the existing and acquire new knowledge in the field of occurrence of various by-products in food and biotechnological industries with the aim of their better disposal and potential utilization for the production of new products.	
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	
BIOTEH-7; INDBIOT-4	
Learning Outcomes at the Course Level	
After completion of lectures, seminars and exercises, self-study and the passed exam students will: 1. Interpret the applicable European and world waste management regulations; 2. Analyze and categorize the waste / by-products of the biotechnology and food industries; 3. Compare the basic characteristics of the individual by-products; 4. Analyze the most common ways of disposing of certain types of by-products; 5. Suggest potential ways of utilizing by-products to produce new products.	
Course Content	
Lectures. Legal framework and directives for waste management. Relationship between production and generation of waste / by-products in biotechnology and food industries. Waste / by-product - definitions and differences. Ways to dispose of waste / by-products from the biotechnology and food industries. Characteristics of various by-products (from sugar and oil industries, by-products of fruit and vegetable processing, by-products of wine production, brewing industry and grain processing) and the possibility of utilizing different by-products to produce new products. **Seminar**. By-products of different industries and potential of their applications. **Laboratory exercises**. Determination of physical and chemical properties of various by-products from biotechnology and food industry (color, protein content, fats, dietary fiber, total polyphenols, antioxidant activity). Preparation of various by-products for potential further application (drying, milling, sieving). Use of prepared by-products in the production of new products.	
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	0.125	1-5	Attendance at classes	Keeping records	5	10
Seminars	0.75	1-5	Seminar work preparation	Presentation of seminar work	10	20
Laboratory exercises	0.125	1-5	Attendance at exercises	Laboratory exercises report	5	20
Final exam	3	1-5	Studying for the final exam	Written and oral 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
Nigam PS, Pandey A. Biotechnology for Agro-Industrial Residues Utilisation. Springer, 2009.	-	-

Additional Literature

Oreopoulou V, Russ W. Utilization of By-Products and Treatment of Waste in the Food Industry. Springer, 2007.
Chandrasekaran M. Valorization of Food Processing By-Products. CRC Press, 2013.
Scientific and professional papers (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 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.