Order number: 4

Annex no. 3		**Subject program of the second cycle of studies**			
1.	Title of the teaching subject	Design of sustainable food products and processes			
2.	Code	FE1M11			
3.	Study program	Food Engineering-Innovation, Sustainability and Technologies			
4.	Organizer of the study program (unit, i.e. institute, department, department)	Faculty of Technology and Metallurgy Institute of Organic Technology Food Technology and Biotechnology			
5.	Degree (first, second, third cycle)	Second cycle			
6.	Academic year / semester	Year	1	semester	1
7	Course load expressed in ECTS credits	6 ECTS			
8.	Teacher (in the case of multiple teachers designated responsible teacher)	Dr. Vesna Rafajlovska, professor			
9.	Language of instruction	English language			
10.	Necessary prerequisites for listening and passing the subject				
11.	Objectives of the subject program (competencies) and learning outcomes:	Study of the basics and criteria for product and process design for the purpose of sustainability of the food industry in correlation withenvironmental, social and economic aspects.			
12.	Detailed course content by chapter and unit with learning outcomes for each chapter	*Designing sustainable food products.*Selection of raw materials from renewable choices, local producers, produced with organic practices, minimally processed raw materials. Development of product formulations that provide acceptable organoleptic characteristics, high nutritional value, functional properties, health effects, and allow reduction of waste during processing. Selection of packaging materials and systems for re-use or recycling of packaging, biodegradable packaging, edible packaging. Optimizing shelf life by applying natural or less energy-intensive methods and reducing the use of additives. Designing sustainable food processes. Energy efficiency - use of renewable energy sources, optimization of process parameters, selection of equipment to reduce energy consumption and carbon emissions in the production of food products. Water saving - implementation of water saving and waste water recycling technologies. Waste management - implementing waste reduction strategies. Optimization of processes - increasing the efficiency of resources, ensuring the quality characteristics of the product, valorization of by-products, reduction of waste and its utilization. Challenges and opportunities. Consumer acceptance- consumer education about the benefits of sustainable food products. Economic sustainability - production of sustainable food products and economically competitive processes. Technological innovations - development of new technologies to improve sustainability in food processing.			

		Learning outcomes: After completing the course in this subject, the studentwill learn to design processes that have a minimal impact on the environment and at the same time ensure obtaining safe and quality food.				
13	Interrelationship of subjects					
14.	Detailed description of teaching and working methods for the subject	Interactive theoretical and practical teaching combined with independent work and individual consultations will be applied in all teaching chapters of the course to a varying extent, depending on the number of students. Of the teaching methods, individual and possibly group or team collaborative and cooperative methods of active learning will be used. Developing skills for displaying and presenting research according to the latest relevant scientific research in the field of product and process design in the sustainability of the food industry.				
15.	Total available fund on time	180 Active teaching 4 hours x15 weeks = 60 hours Project, independent tasks and homework = 120				
16.	Forms of teaching activities	16.1.	Lectures - theoretical teaching. hours	45		
		16.2.	Exercises (laboratory, classroom), seminars, teamwork: lessons	10		
		16.3.	Practice: classes	5		
17.	Other forms of activities	17.1.	Project assignments: lessons	20		
		17.2.	Independent assignments: lessons	20		
		17.3.	Home study - assignments	80		
18.	Conditions of signature	Realized 60% of activities under number 16 and 17				
19.	Method of assessment					
	19.1.	Tests: points		30		
	19.2.	Seminar work/project, written and oral presentation: points		10		
	19.3.	Final exam: points		60		
20.	Evaluation criteria (points/grade)	up to 50 points	5 (five) (F)			
		51 x to 60 points	6 (six) (E)			
		61 x to 70 points	7 (seven) (D)			
		from 71 to 80 points	8 (eight) (C)			
		from 81 to 90 points	9 (nine) (B)			
		from 91 to 100 points	10 (ten) (A)			
21.	A method of monitoring the quality of teaching	Anonymous survey/self-evaluation				
22.	Literature					
	22.1.	Required reading				
		Ord. number	Author	Title	Publisher	Year
		1.	Ceschin, F. Gaziulusoy, I.	Design for Sustainability	Routledge Taylor & Francis Group	2020

		2.	Benetto, E. Guiton, KGM	Designing Sustainable Technologies, Products and Policies	Springer Open	2018
		3.	Kant, R. Gurung, K. Yadav, S.	Sustainable Material, Design, and Process	CRC Press	2024
	22.2.	Additional literature				
		Ord. number	Author	Title	Publisher	Year
		1.	Authors of scientific papers	Scientific papers in the field of interest	Publishers of scientific papers	2010-202X