Order number: 1

Attachment No. 3		**Subject program of the second cycle of studies**			
1.	Title of the teaching subject	Trends in Food Process Engineering			
2.	Code	FE1M1			
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 Department of Food Technology and Biotechnology			
5.	Degree (first, second, third cycle)	Second cycle			
6.	Academic year / semester	Year	I	semester	I
7	Course load expressed in ECTS credits	8 ECTS			
8.	Teacher (in the case of multiple teachers designated responsible teacher*)	Dr. Elena Velichkova Nikova* Dr. Irina Mladenovska			
9.	Language of instruction	English			
10.	Necessary prerequisites for listening and passing the subject	Knowledge of food engineering, knowledge of food composition and knowledge of food processing and preservation methods.			
11.	Objectives of the subject program (competencies) and learning outcomes:	**Objectives of the program:** Acquaintance with the properties and structure of food important for the final product and their influence during food processing; familiarization with a series of modern processes in food engineering. **Learning outcomes:** The student should acquire knowledge about new and innovative techniques in the processing of food and beverages in the food sector.			
12.	Detailed course content by chapter and unit with learning outcomes for each chapter	Food properties important in food engineering: thermophysical and transport properties, occurrence of phase boundaries. Overview of conventional and modern processes in food production. Thermal processes and processing of raw materials without the application of heat. Application of interference technology. Minimal food processing processes (pulsed electric field, vacuum infusion, ionizing radiation, ultraviolet radiation, white pulsed light, hydrostatic pressure, ohmic heating, etc.). Aseptic technology and aseptic packaging of food in pieces. Coatings and encapsulation. Engineering aspects of osmotic dehydration. Solid food processing. Microstructure of food; food texture and porosity formation; stability of the structure. Food extrusion (properties of extruded food, physicochemical transformations during extrusion, extrusion equipment). Gels and gelling agents for food; tires and stabilizers. Biotechnology in food production, canning with antibiotics and antiseptics.			
13	Interrelationship of subjects	This subject is related to other subjects from the area			
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. Individual and possibly group or team			

		collaborative and cooperative methods of active learning will be used from the teaching methods. Developing skills for displaying and presenting research according to the latest relevant scientific research in the field of food chemistry and physics.		
15.	Total available fund on time	240		
16.	Forms of teaching activities	16.1.	Lectures - theoretical teaching. hours	45
		16.2.	Exercises (laboratory, classroom), seminars, teamwork: lessons	45
		16.3.	Practice: classes	30
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	10 points
	19.2.	Seminar work/project, written and oral presentation: points	10 points
	19.3.	Final exam: points	80 points

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	Based on Article 10 para. 5 of the Guidelines for self-evaluation and assessment of the quality of UKIM in Skopje, anonymous surveys of students are conducted on the quality of the teacher and associate staff and an anonymous survey on the general conditions for studying	

22.	Literature					
	22.1.	Required reading				
		Ord. number	Author	Title	Publisher	Year
		1.	G, GF Lopez, GV Barbosa-Canovas	Food Engineering: Integrated Approaches,	Springer, New York	2008
		2.	S. Jun, JMIruayaraj,	Food Processing Operations Modeling, Design and Analysis, 2nd edn.	CRC Press, Boca Raton	2009

		3.	MAJS van Boekel	Kinetic Modeling of Reactions in Foods	CRC Press, Boca Raton	2009
		4.	Jatindra K. Sahu	Introduction to Advanced Food Process Engineering	CRC Press, Boca Raton	2014
	22.2.	Additional literature				
		Ord. number	Author	Title	Publisher	Year
		1.	Elena Velichkova Nikova	Food Process Engineering Practicum	Faculty of Technology and Metallurgy	2023
		2.	Scientific papers from renowned journals from the last five years in the field of food-structure and properties, for each topic of the program			