Rok akademicki:		Grupa przedmiotów:		Numer katalogowy:	

Course title in Polish:	Innowacyjne technologie w przemyśle spożywczym			**ECTS**	**1,0**
Course title in Englis:	Cutting-edge technologies in food industry				
Major:	Food Technology and Nutrition				
Coordinator name:	dr hab. Katarzyna Samborska, dr inż. Artur Wiktor				
Lecturer(s**)**:	dr hab inż. Katarzyna Samborska, dr inż. Artur Wiktor, academic teachers from Department of Food Engineering and Process Management				
Faculty/department:	Faculty of Food Sciences, Department of Food Engineering and Process Management				
Faculty for which course is offered:	Wydział Nauk o Żywności				
Status of the course:	a) facultative	b) levelII yearI	c) full-time studies		
Didactic cycle:	winter semester	language: english			
The aims of the course:	The core of this subject is to present the general overview of emerging food processing technologies. The aim is to extend students' knowledge in the principles, advantages, drawbacks or limitations of innovative techniques in nanotechnology, extrusion, membrane technology, drying, non-thermal technologies and alternative thermal processing technologies.				
Form of the course, number of hours:	a) Laboratory classes: 0 hours; b) Lectures: 15 hours;				
Learning activities and teaching methods:	Lectures				
Full course description:	Lectures in the following domains: nanotechnology, extrusion, membrane technology, innovative drying technologies (microwave vacuum drying, foam vacuum drying, new hybrid drying technologies), non-thermal techniques in food preservation, decontamination, heat and mass transfer based processes (high hydrostatic pressure, pulsed electric field, ultrasound, cold plasma), alternative thermal processing technologies (microwave heating, radio frequency processing, Ohmic heating), consumer acceptance of non-thermal technologies.				
Prerequisite:	Process engineering				
Presuppositions:	Students should have basic knowledge in process engineering and organic chemistry				
Learning outcomes:	01 - the student characterizes innovative techniques applied recently in nanotechnology, extrusion, membrane technology, drying, non-thermal technologies, and alternative thermal processing technologies 02 - the student characterizes basics of non-thermal technologies mechanism of action	03 - the student is able to describe advantages and limitations of cutting-edge technologies 04 - the student is able to propose own possible application of cutting-edge technologies in food processing 05 - the student is able to characterize the impact of cutting-edge technologies on quality of food and environment			
The way of verifying learning outcomes:	The verification of learning outcomes in written form (test)				
The way of learning outcomes documentation:	Stored tests written by students				
The elements influencing the final note:	Written test 100%				
Place of course:	Lecture rooms				

Literature:

1. Ohlsson, T., Bengtsson, N. (2002). Minimal processing of foods with non-thermal methods. Minimal processing technologies in the food industry. Woodhead Publishing.
2. Feng, H., Barbosa-Canovas G.V., Weiss, J. (2011). Ultrasound technologies for food and bioprocessing, Springer.
3. Barba, F.J, Parniakov, O., Pereiera, S.A., Wiktor, A., Grimi, N., Boussetta, N., Saraiva, J.A., Raso, J., Martin-Belloso, O., Witrowa-Rajchert, D., Lebovka, N., Vorobiev, E. (2015). Current applications and new opportunities for the use of pulsed electric fields in food science and industry. Food Research International, 77, 773-798.

4. Mujumdar A.S., Jangam S.V. (2012). Some innovative drying technologies for dehydration of foods. Department of Mechanical Engineering, National University of Singapore, Singapore.
5. Jiao B., Cassano B., Drioli E. (2004). Recent advances on membrane processes for the concentration of fruit juices: a review. Journal of Food Engineering 63 (2004) 303–324.
6. Tiwari A., Jha S.K. (2017). Extrusion cooking technology: Principal mechanism and effect on direct expanded snacks, An overview. International Journal of Food Studies, 6, 113-128.
7. Xiaojia H., Huey-Min H. (2016). Nanotechnology in food science: Functionality, applicability, and safety ssessment. Journal of Food and Drug Analysis, 24, 671-681.

Notices:

Quantitative indicators characterizing the course:

Summary amount of hours in contact with teacher and individual work needed to reach the learning outcomes:	**30 h**
Summary amount of ECTS credits in direct contact with teacher:	**1 ECTS**
Summary amount of ECTS credits in practical classes:	**0 ECTS**

Compatibility table of the specific learning outcomes with the effects of the course:

No./Symbol of the learning outcomes	Learning outcomes:	Compatibility to the specific learning outcomes
01	the student characterizes innovative techniques applied recently in nanotechnology, extrusion, membrane technology, drying, non-thermal technologies, and alternative thermal processing technologies	K_W02, K_W08, K_W04, K_W17
02	the student characterizes basics of non-thermal technologies mechanism of action	K_W02, K_W04, K_W17
03	the student is able to describe advantages and limitations of cutting-edge technologies	K_W02, K_W04, K_W17
04	the student is able to propose own possible application of cutting-edge technologies in food processing	K_W02, K_U06, K_W17
05	the student is able to characterize the impact of cutting-edge technologies on quality of food and environment	K_W14, K_K01, K_W17