

**Course name:****NEW TRENDS IN FOOD PROCESSING AND PRESERVATION TECHNOLOGY**

ECTS	5
Course status	optional
Course final assessment/evaluation of outcomes	exam
Prerequisites	no prerequisites

**Main field of study:****FOOD TECHNOLOGY AND HUMAN NUTRITION**

Profile of study	academic
The code of studies (education level)	SI/SM (bachelor/master)
Semester of studies	winter/summer
Language of instruction	English

**Course offered by:**

Name of faculty offering the course	Faculty of Food Technology
Name of department offering the course	Department of Biotechnology and General Technology of Food
Course coordinator	Prof. Krzysztof Surówka PhD. DSc. Eng.

**Learning outcomes of the course:**

Symbol of outcome	Description of learning outcome	Reference to	
		main field of study outcomes	discipline#
<b>KNOWLEDGE – student knows and/or understands:</b>			
NTiFPP_Z_W1	physical, chemical, biochemical and microbiological processes which occur during food processing and preservation	TŻ2_W01	RT
NTiFPP_Z_W2	the knowledge of advanced methods, techniques, instruments and materials which are currently used or are introduced to food industry	TŻ2_W01, TŻ2_W04	RT
<b>SKILLS – student is able to:</b>			
NTiFPP_Z_U1	use advanced methods of food processing and preservation and is able to optimize their parameters	TŻ2_U01, TŻ2_U03	RT
NTiFPP_Z_U2	choose appropriate analytical methods to study changes occurring in the course of food processing and manage to interpret obtained results	TŻ2_U01, TŻ2_U03	RT
<b>SOCIAL COMPETENCE- student is ready to:</b>			
NTiFPP_Z_K1	aware of necessity of target-oriented training and self-improvement in food technology domain	TŻ2_K01	RT

**Teaching contents:**

<b>Lectures</b>	<b>30 hours</b>
New possibilities in food technology resulting from the scientific achievements of the 20th and 21st centuries. New groups of food products and expectations of the modern consumers	
Minimally processed food, hurdles technology	
Texturization of biopolymers - extrusion technique	
Pressure membrane operations, electrodialysis, osmotic dehydration	
The use of infrared and microwave heating in food technology	

Topics of the lectures	Modified atmosphere packaging and controlled atmosphere storage of foods. Sous-vide products and cook-chill ready meals
	Shock freezing, basics of cryogenics
	Vacuum cooling and high-pressure freezing
	Hybrid techniques in drying
	Freeze-drying. Cryoconcentration
	Electrical stimulation of meat
	Cold plasma in food processing
	High pressure processing of food
	Pulsed electric field processing
	High intensity pulsed light technology
	Ultrasounds in food processing and preservation
	Irradiation of foods and the use of a non-ionizing electric field
	Robotics and automation in contemporary food industry
	Artificial intelligence in food processing
	Possibilities of using new preservatives of chemical and biotechnological origin
Accomplished learning outcomes	NTiFPP_Z_W1, NTiFPP_Z_W2
Verification methods, rules and criteria of outcome assessment	Written exam (test); to obtain a positive score, it is necessary to provide at least 50% correct answers to the questions asked. Exam score is 70% of the final grade of the module.
<b>Classes</b>	<b>15 hours</b>
Topics of the classes	Ultrafiltration in food technology
	Texturization of food, 3D printing
	Freeze-drying and hybrid drying technologies
Accomplished learning outcomes	NTiFPP_Z_W1, NTiFPP_Z_W2, NTiFPP_Z_U1, NTiFPP_Z_U2, NTiFPP_Z_K1
Verification methods, rules and criteria of outcome assessment	<p>Passing the laboratory exercises on the basis of:</p> <ul style="list-style-type: none"> <li>- ability to use selected devices used in exercises - participation in the assessment of exercises 10%</li> <li>- 3 colloquia in the field of exercises (each passed for min. 60% points) - participation in the assesment of exercises 70%,</li> <li>- individually written reports (average of obtained ratings) - participation in final assesment of exercises 20%.</li> </ul> <p>Exercises score is 30% of the final grade of the module</p>
<b>References:</b>	
Basic	<p>1. Da-Wen Sun (Ed.). <i>Emerging technologies for food processing</i>. Second edition, 2014. Amsterdam, Boston, Heidelberg, London, New York, Oxford, Paris, San Diego, San Francisco, Singapore, Sydney, Tokyo. Academic Press, Elsevier ISBN: 978-0-12-411479-1. Available at: <a href="https://www.researchgate.net/profile/Yang_Tao16/publication/265379212_High-Pressure_Processing_of_Foods_An_Overview/links/54ade9c50cf2828b29fcb77e/High-Pressure-Processing-of-Foods-An-Overview.pdf">https://www.researchgate.net/profile/Yang_Tao16/publication/265379212_High-Pressure_Processing_of_Foods_An_Overview/links/54ade9c50cf2828b29fcb77e/High-Pressure-Processing-of-Foods-An-Overview.pdf</a></p> <p>2. <i>Emerging Technologies for the Food Industry</i>. Vol. 1-3. C. Anandharamakrishnan, J.A. Moses (eds), Apple Academic Press, 2024.</p> <p>3. <i>Novel Food Processing: Effect on Rheological and Functional Properties</i>. J. Ahmed, H.S. Ramaswamy, S. Kasapis, J.I. Boye, CRC Press Boca Raton, 2009.</p>

Supplementary	<p>1. <i>Handbook of Food Products Manufacturing t. I i II</i>, Y.H. Hui (ed.), 2007, J. Wiley &amp; Sons Inc., Hoboken, NJ.</p> <p>2. <i>Emerging Food Processing Technologies</i>, M. Gavahian (ed), Springer, 2022.</p> <p>3. <i>European Parliament. Technology options for feeding 10 billion people. Options for sustainable food processing. State of the art report IC STOA 2013/122, November 2013. PE 513.533. CAT BA-04-13-048-EN-C. DOI 10.2861/4330. ISBN 978-92-823-5122-2. Available at: <a href="http://www.europarl.europa.eu/RegData/etudes/etudes/etudes/2013/513533/IPOL-JOIN_ET(2013)513533_EN.pdf">http://www.europarl.europa.eu/RegData/etudes/etudes/2013/513533/IPOL-JOIN_ET(2013)513533_EN.pdf</a></i></p>
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**Structure of learning outcomes:**

Discipline: nutrition and food technology	5	ECTS**
Discipline: # (provide appropriate symbol - if the course relates to more than one academic discipline )	...	ECTS**

**Structure of student activities:**

Contact hours	49	hours	2.0	ECTS**
including:				
lectures	30	hours		
classes and seminars	15	hours		
consultations	2	hours		
participation in research	0	hours		
mandatory traineeships	0	hours		
participation in examinations	2	hours		
e-learning	0	hours	...	ECTS**
student own work	76	hours	3.0	ECTS**

\*\* stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25 - 30 hours of classes

# academic discipline code: RT nutrition and food technology