



Bioactive compounds with antioxidant properties  
Educational subject description sheet

**Basic information**

<p><b>Field of study</b> Food Technology</p> <p><b>Speciality</b> -</p> <p><b>Organizational unit</b> The Faculty of Biotechnology and Food Science</p> <p><b>Study level</b> Second-cycle (engineer) programme</p> <p><b>Study form</b> Full-time</p> <p><b>Education profile</b> General academic</p>	<p><b>Education cycle</b> 2022/23</p> <p><b>Subject code</b> ND000000NFT-AMS.MI2.3239.22</p> <p><b>Lecture languages</b> english</p> <p><b>Mandatory</b> optional</p> <p><b>Block</b> major subjects (conducted) in foreign languages</p> <p><b>Disciplines</b> Food technology and nutrition</p> <p><b>Subject related to scientific research</b> Yes</p> <p><b>Subject shaping practical skills</b> Nie</p>	
<p><b>Teacher responsible for the subject</b></p>	Anna Michalska, Paulina Nowicka	
<p><b>Other teachers conducting classes</b></p>	Anna Michalska, Paulina Nowicka, Pedro J Zapata Coll	
<p><b>Period</b> Semester 2</p>	<p><b>Examination</b> exam</p> <p><b>Activities and hours</b> lecture: 20 laboratory classes: 10</p>	<p><b>Number of ECTS points</b> 3.0</p>

## Goals

C1	Provide a knowledge about bioactive compounds and antioxidants
C2	Present the methods used for determination of in vitro antioxidant capacity of agri-food products
C3	Provide an information about quantification and identification techniques for bioactive compounds in food products
C4	Provide a knowledge about influence of the processing on bioactive compounds and antioxidants in foods
C5	Provide knowledge about the connection between bioactive compounds and human health

## Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
<b>Knowledge - Student knows and understands:</b>			
W1	acquire the knowledge about natural source of bioactive compounds and antioxidants	NT_P7S_WG01	written exam
W2	know the analytical techniques to identify and quantify bioactive compounds	NT_P7S_WG02, NT_P7S_WK06	written exam
W3	know the mechanisms of the methods used for determination of in vitro antioxidant capacity of agri-food products	NT_P7S_WG01, NT_P7S_WG02	written exam
W4	know the influence of processing on bioactive compounds and antioxidants in the maintenance of functional properties	NT_P7S_WG04, NT_P7S_WG05	written exam
<b>Skills - Student can:</b>			
U1	has the ability to extract bioactive compounds	NT_P7S_UW02, NT_P7S_UW05	performing tasks
U2	has the ability to evaluate the content of selected groups of bioactive compounds	NT_P7S_UW03, NT_P7S_UW05	performing tasks
U3	has the ability to differentiate the methods for determination of antioxidant capacity	NT_P7S_UW01	test, performing tasks
U4	has the ability to determine antioxidant capacity of agri-food products by common methods	NT_P7S_UW03, NT_P7S_UW05	test, performing tasks
U5	has an ability to use a specific terminology in English	NT_P7S_UK07	written exam, test, performing tasks
<b>Social competences - Student is ready to:</b>			
K1	Able to adjust the extraction process in dependence of the type of bioactive compounds	NT_P7S_KK01	test
K2	Able to perform analytical determination of bioactive compounds and antioxidant capacity	NT_P7S_KK01	test
K3	Able to design process parameters in order to maintain the content of bioactive compounds and antioxidants	NT_P7S_KO02	test

## Balance of ECTS points

Activity form	Activity hours*	
lecture	20	
laboratory classes	10	
consultations	5	
report preparation	10	
collecting and studying literature	5	
exam participation	5	
class preparation	10	
presentation/report preparation	10	
<b>Student workload</b>	<b>Hours</b> 75	<b>ECTS</b> 3.0
<b>Workload involving teacher</b>	<b>Hours</b> 35	<b>ECTS</b> 1.2
<b>Practical workload</b>	<b>Hours</b> 20	<b>ECTS</b> 0.8

\* hour means 45 minutes

## Study content

No.	Course content	Activities
1.	(1) Characterisation of bioactive compounds and antioxidant in agri-food products (2) Extraction methods (3) Analytical techniques to determine bioactive compounds (4) Analytical techniques for determination of antioxidant capacity (5) Functional foods and nutraceuticals (6) Changes in compounds bioactives during its development, post-harvest and process of fruits and vegetables (7) Innovations in design of agri-food products with improved content of bioactives and antioxidants	lecture
2.	(1) Determination of major groups of bioactive compounds (2) Evaluation of antioxidant capacity of agri-food products (3) Influence of the processing on the bioactive compounds and	laboratory classes

## Course advanced

### Teaching methods:

problem-solving method, presentation / demonstration, discussion, participation in research, lecture, classes, blended learning

<b>Activities</b>	<b>Examination methods</b>	<b>Percentage in subject assessment</b>
lecture	written exam	60%
laboratory classes	test, performing tasks	40%

## **Literature**

### **Obligatory**

1. D. Valero Garrido, M. Serrano Mula (2010) Postharvest biology and technology for preserving fruit quality. Boca Raton, FL Taylor & Francis Group.
2. H. Dominguez, M. Gonzalez Munoz (2018) Water Extraction of Bioactive Compounds. Elsevier.
3. M. Carocho, P. Morales, I. C.F.R. Ferreira (2018) Antioxidants: Reviewing the chemistry, food applications, legislation and role as preservatives, Trends in Food Science & Technology, 71, 107-120.
4. Horszwald A., Andlauer W. (2011) Characterisation of bioactive compounds in berry juices by traditional photometric and modern microplate methods. Journal of Berry Research, 1, 189-199.

### **Optional**

1. Majerska J., Michalska A., Figiel A. (2019) A review of new directions in managing fruit and vegetable processing by-products. Trends in Food Science and Technology, 88, 207-219.
2. Michalska A., Lech K. (2020) Spray drying of antioxidant rich foods (Taylor & Francis Group). Chapter 4, Handbook on Spray Drying Applications for Food Industries, Ed. M. Selvamuthukumar,

## Kierunkowe efekty uczenia się

Kod	Treść
NT_P7S_KK01	The graduate is ready to critical and self-critical capacity to assess, contrast, and decide upon scientific advances in agro-food technology and quality.
NT_P7S_KO02	The graduate is ready to apply knowledge acquired and form judgments that include reflection on social and ethical responsibilities in the agro-food field.
NT_P7S_UK07	The graduate can communicate abilities with professionals also in foreign language at B2 + level of the European Training Description System and to a higher degree use a specific terminology
NT_P7S_UW01	The graduate can use tools to search for relevant and reliable information to resolve problems, develop strategies, and advise agro-food industries.
NT_P7S_UW02	The graduate can develop and produce reports and procedures to manage food quality and safety based on continuous improvement.
NT_P7S_UW03	The graduate can formulate innovation strategies to control the raw materials that influence improvements in the quality of finished products.
NT_P7S_UW05	The graduate can create procedures for incorporating ingredients into foods with functional and nutritional properties and evaluate their market potential for acceptance by consumers. develop and use tools to assess co-products in the agro-food industry.
NT_P7S_WG01	The graduate knows and understands integrate knowledge in food production and technology to provide scientific and technical advice to producers and consumers.
NT_P7S_WG02	The graduate contrast and interpret advances in agro-food biotechnology and their practical applications.
NT_P7S_WG04	The graduate knows and understands scientific progress in the production and preparation of food, ensuring the improvement of quality in production.
NT_P7S_WG05	The graduate understands and apply scientific advances in animal production to be used in R&D of animal production industries.
NT_P7S_WK06	The graduate know the tools for scientific and legal information searches in agro-food technology.