

**A COURSE SYLLABUS – DOCTORAL SCHOOL
REGARDING THE QUALIFICATION CYCLE FROM 2022 TO 2026**

GENERAL INFORMATION ABOUT COURSE				
Course title	Food Oxidants and Antioxidants			
Name of the unit running the course	Doctoral School at University of Rzeszów			
Type of course (<i>obligatory, optional</i>)	optional specialist subject			
Year and semester of studies	I/II			
Discipline	nutrition and food technology			
Language of Course	polish/english			
Name of Course coordinator	Prof. dr hab. Izabela Sadowska-Bartosz			
Name of Course lecturer	Prof. dr hab. Izabela Sadowska-Bartosz			
Prerequisites	Basic knowledge of food biochemistry, biophysics, food technology			
BRIEF DESCRIPTION OF COURSE (100-200 words)				
<p>The aim of the course is to familiarize doctoral students with the knowledge of oxidation processes in food, in particular free radical processes. Sources of free radicals, both oxygen-centered and non-oxygen centered, will be presented. The mechanisms of action of antioxidants, their chemical structure, occurrence in raw materials and food products, as well as interactions between antioxidants in food will also be presented. Moreover, the role of natural antioxidants in the prevention of free radical diseases will be discussed. The bioavailability of natural antioxidants and their role in the human body will also be reviewed. Doctoral students will learn about the methods of determining the content of antioxidants (sample preparation, extraction, spectroscopic methods, chromatography methods) and methods of analysing the antioxidant capacity.</p>				
COURSE LEARNING OUTCOMES AND METHODS OF EVALUATING LEARNING OUTCOMES				
Learning outcome	The description of the learning outcome defined for the course	Relation to the degree programme outcomes (symbol)	Learning Format (Lectures, classes,...)	Method of assessment of learning outcomes (e.g. test, oral exam, written exam, project,...)
Knowledge (no.)	(Knows and understands)			
1	To an extent that makes it possible to revise existing paradigms – global achievements, including theoretical foundations and general issues and selected detailed issues – specific to nutrition and food technology.	P8S_WG/1	Lectures	Exam/written assignment
2	Trends in development and the latest discoveries in nutrition and food technology, current scientific achievements, including global achievements, regarding research in the area of nutrition and food technology.	P8S_WG/2	Lectures	Exam/written assignment
3	The conceptual network of nutrition and food technology (also in a foreign language) and related disciplines.	P8S_WG/3	Lectures	Exam/written assignment
4	Fundamental dilemmas of modern civilization.	P8S_WK/1	Lectures	Exam/written assignment

Skills (no.)	(Able to)					
5	Use knowledge from various fields of science or the field of arts to creatively identify and innovatively solve complex problems or perform tasks of a research nature, particularly: – define the purpose and subject of scientific research, formulate a research hypothesis, – develop research methods, techniques and tools and apply them in a creative manner, – draw conclusions on the basis of scientific research.	P8S_UW/1	Lectures	Exam/written assignment		
6	Use scientific literature to identify and solve research and innovation problems; can use the appropriate workshop to create new elements of these achievements.	P8S_UW/2	Lectures	Exam/written assignment		
7	Conduct a critical analysis and evaluation of scientific research results, expert activity and other creative works and their contribution to the development of knowledge.	P8S_UW/3	Lectures	Exam/written assignment		
8	Use a foreign language at the B2 level of the Common European Framework of Reference for Languages (CEFR) to a degree that allows for participation in the international scientific and professional environment.	P8S_UK6	Lectures	Exam/written assignment		
Social competence (no.)	(Ready to)					
9	Recognize the importance of knowledge in solving cognitive and practical problems.	P8S_KK3	Lectures	Exam/written assignment		
LEARNING FORMAT – NUMBER OF HOURS						
Semester (no.)	Lectures	Seminars	Lab classes	Internships	others	ECTS
II	15	-	-	-	-	2
METHODS OF INSTRUCTION						
Lecture - multimedia presentation, discussion						
COURSE CONTENT						
1. Oxidation processes, especially free radical-mediated, in food and in the human body 2. Antioxidants and their mechanism of action						

3. Natural and synthetic antioxidants - presence in food.
4. Bioavailability of natural antioxidants, interactions with other food ingredients.
5. Antioxidants in the human body - health benefits.
6. Methods of determination of antioxidants.
7. Methods for determination of total antioxidant capacity.

COURSE ASSESSMENT CRITERIA

Participation in classes, preparation of presentations, participation in scientific discussions/
the Writing Assessment

TOTAL PhD STUDENT WORKLOAD REQUIRED TO ACHIEVE THE INTENDED LEARNING OUTCOMES – NUMBER OF HOURS AND ECTS CREDITS

Activity	Number of hours
Scheduled course contact hours	15
Other contact hours involving the teacher (consultation hours, examinations)	10
Non-contact hours – student`s own work (preparation for classes or examinations, project, etc.)	25
Total number of hours	50
Total number of ECTS credits	2

INSTRUCTIONAL MATERIALS

Compulsory literature:	<ol style="list-style-type: none"> 1. Bartosz G. Druga twarz tlenu. Wolne rodniki w przyrodzie. PWN, Warszawa, 2003. 2. Bartosz G. (ed.), Food Oxidants and Antioxidants: Chemical, Biological, and Functional Properties, CRC Press, 2013. 3. Kut K, Cieniek B, Stefaniuk I, Bartosz G, Sadowska-Bartosz I. A Modification of the ABTS• Decolorization Method and an Insight into Its Mechanism. Processes. 2022;10(7):1288. doi:10.3390/pr10071288. 4. Sadowska-Bartosz I, Bartosz G. Evaluation of The Antioxidant Capacity of Food Products: Methods, Applications and Limitations. Processes. 2022;10(10):2031. doi:10.3390/pr10102031. 5. Sadowska-Bartosz I, Bartosz G. Effect of antioxidants supplementation on aging and longevity. Biomed Res Int. 2014;404680. doi: 10.1155/2014/404680. 6. Grzesik M, Bartosz G, Stefaniuk I, Pichla M, Namieśnik J, Sadowska-Bartosz I. Dietary antioxidants as a source of hydrogen peroxide. Food Chem. 2019 Apr 25;278:692-699. doi: 10.1016/j.foodchem.2018.11.109.
Complementary literature:	<ol style="list-style-type: none"> 1. Sadowska-Bartosz I, Bartosz G. Prevention of protein glycation by natural compounds. Molecules. 2015; 20(2):3309-34. 2. Jan Pokorny, Nedyalka Yanishlieva, Michael Gordon (ed.), Antioxidants in food. Practical applications, CRC Press, Boca Raton, Boston, New York, Washington DC, 2001.

.....
Date and signature of the Course lecturer

.....
Approved by the Head of the Department or an authorised person