NARODOWA AGENCJA
WYMIANY AKADEMICKIEJ

Programme of the degree course:

INTERDISCIPLINARY BIOECONOMY STUDIES

Programme content:

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1. Description of the study programme

Description of the study programme		
University unit:		
Faculty of Agriculture and Economics		
Field of studies:	Interdisciplinary Bioeconomy Studies	
ISCED Classification	*088*	
Level code of the Polish Qualifications Framework	*P7S*	
Study cycle	*Second cycle*	
Profile	*General academic*	
Form(s) of study	*Stationary*	
Professional title awarded to graduates	*Master*	
Language of lecture	*English*	
Field of science and scientific discipline or discipline of the arts	*leading discipline: field of agricultural sciences, discipline of agriculture and horticulture 55% (RR)*	
	field of social sciences, discipline of economics and finance 45% (SE)	
Number of semesters		*4*
The number of ECTS points necessary to complete studies at a given level		120
The total number of ECTS credits that a student must acquire in courses with the direct participation of academic teaching staff or other persons who organise courses		61.8
The total number of ECTS points that a student must obtain in courses in the humanities or social sciences		5
Total number of hours		1295
The share of classes carried out in the study programme by academic teachers and employees employed at the University as their primary place of work		95%

Justification for the creation of the study programme

Education concept	The study programme contributes to achieving the goals of the URK 2021-2025 strategy, implementing the values contained in the advertising slogan "The best of nature". It is closely linked to the creation of innovative fields of study and the internationalisation of universities, as the aim of its introduction is to attract international students. The dependence of economies on non-renewable resources and the environmental problems caused by a linear approach to production and consumption pose challenges on which the existence of future generations depends. To overcome these challenges and shift the economy to a low- or zero-emissions mode, where the exploitation of non-renewable resources is phased out, it is necessary to examine production and resources from a new perspective. Interdisciplinary bioeconomy studies are based on the principles of respect for the environment and natural resources while focussing on the fulfilment of social needs. The circular bioeconomy, which is the subject of these studies, makes it possible to replace conventional refined products with biorefinery products, to fully utilise the potential of biological raw materials through a cascaded approach, which increases economic efficiency and reduces the ecological footprint. It frees states and businesses from natural monopolies for extractive raw materials. Process and product innovations in biorefineries have great potential for bringing about a long-term drop in prices due to the inexhaustibility of the resources they use, in contrast to the prices of conventional refined products. The circular bioeconomy also strengthens food security. In this way, it supports the achievement of all Sustainable Development Goals.
Outline of the graduate's profile and professional qualifications	The aim of the IBS is to train a graduate who is aware of the limits of nature and societal needs; and who understands the potential of biomass, the process of its creation and the challenges involved. They know how to utilise biological resources, and know what processes to use to exploit their full potential. They also know how to convert the remaining by-product into a fully-fledged product to close the cycle of matter in the economy and nature. Training in the IBS programme takes place in three thematic blocks: - Socio-economic context: the student learns about the contemporary economic and social context of the bioeconomy and is given the tools necessary to understand the principles of production, industrial operation and project implementation. One important element of the programme is the promotion of creative thinking and mandatory design thinking workshops. - The context of the circular economy: The student learns about the different levels of the material cycle in the economy and the environment: from the principles of sustainable primary production to the processing of biomass in biotechnological processes and the recovery of nutrients. In simple terms, the student will learn how to grow a plant in a way that does not jeopardise the natural environment, will know what can be made from it and what can be made from the waste generated in the production process, and finally, will learn how to use the residues to produce compost for subsequent crops. - In-depth production context: The student will learn detailed processes, methods and directions of processing biomass into non-food commodities, including bioplastics, biofuels and cosmetics.
Employment opportunities	IBS graduates have knowledge of the production processes in the bioeconomy and understand their economic interrelationships both at the level of the overall economy and the activities of individual economic units. Depending on the profile of their competences, they can choose elective subjects to develop their career paths to work in consultancy, designing the value chain in the bioeconomy and/or

	working for institutions that implement sustainable development policies, or to work in the production and processing of biological resources.
Further education opportunities	IBS graduates know that they need to continue their education. The core curriculum enables you to manage further development and, thanks to suitable study/postgraduate programmes, to develop your knowledge, skills and competences in social areas (management, consultancy) or in relation to production processes and the quality of biomass and bio-based products. Thanks to their interdisciplinary knowledge, graduates can continue their training within the Doctoral School.
Requirements for candidates for studies	Completed first-cycle studies in agricultural, engineering, technical or social sciences. Knowledge of English to at least B2 level.

2. Description of the learning outcomes

Description of the learning outcomes implemented by the study programme			
Study field	**Interdisciplinary Bioeconomy Studies**		
Study cycle: second			
Study profile: general academic			
Form of study: stationary, MA			
Description component code	Description	Effect reference	
		PRK*	Discipline
KNOWLEDGE – the student knows and understands:			
IBS_W01	in-depth concepts and problems of agricultural and related sciences in relation to the production of renewable biological resources and their utilisation while respecting the principles of sustainable development	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W02	the complexity of natural phenomena and natural and biotechnological processes that occur and are used in the bioeconomy	P7U_W P7S_WG	RR, SE
IBS_W03	principles of the functioning of living organisms at different levels of organisation and possibilities for their use in the bioeconomy	P7U_W P7S_WG	RR, SE
IBS_W04	characteristics of the different types of biomass and modern technological processes related to the processing of biomass and bioproducts	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W05	threats to the functioning of the bioeconomy and threats and risks associated with the implementation of the bioeconomy	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W06	factors determining the development and functioning of the bioeconomy, with a special focus on rural areas	P7U_W P7S_WK	RR, SE
IBS_W07	advanced certification and quality assessment systems, other characteristics of biomass, biomass and bioproduct production systems, with a particular focus on environmental impact	P7U_W P7S_WG	RR, SE
IBS_W08	principles for designing and analysing the results of scientific experiments that enable a better understanding of the phenomena occurring in the bioeconomy and their mutual interactions	P7U_W P7S_WG P7S_WK	RR, SE

IBS_W09	environmental issues and planetary boundaries, as well as changes in the socio-economic structure resulting from the assumed management paradigm and the relationships between the environment, economy and society	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W10	concepts and problems of the modern economy and society, with a particular focus on the problems of the circular bioeconomy	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W11	the evolutionary nature of the economy and the specificity of the circular economy, with particular reference to biological flows	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W12	at an advanced level, principles, directions and tools for the implementation of a sustainable development economy	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W13	at an advanced level, economic and institutional conditions of the bioeconomy in a global, macro-regional and regional context,	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W14	the functioning of companies and the behaviour of economic entities	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W15	the specificity and features of the biomass and bioproducts market	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W16	in-depth principles of management in the bioeconomy, taking into account the principles of professional ethics	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W17	principles of sustainable production of primary and secondary biomass	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W18	in-depth questions on the natural environment and environmental protection	P7U_W P7S_WG P7S_WK	RR, SE
IBS_W19	the values underlying social and economic development and the conditions shaping them	P7U_W P7S_WK	RR, SE
IBS_W20	the importance of the innovative nature of the bioeconomy and the related principles of industrial property and copyright protection	P7U_W P7S_WK	RR, SE

SKILLS – the student is able to:			
IBS_U01	independently plan experiments in the field of bioeconomy and interpret their results	P7U_U P7S_UW, P7S_UU	RR, SE
IBS_U02	design a production process/produce bio-based products	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U03	design, implement and modify methods/technologies for the bioeconomy	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U04	assess the quality, properties and functionality of biomass and biomaterials	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U05	assess the environmental, social and economic impact of production systems and products	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U06	monitor and implement the biomass production in line with the principles of sustainable development	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U07	plan/design a closed biomass cycle at the level of an economic unit and the relationship between entities	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U08	determine and assess the effects of economic activities and external effects	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U09	conduct a socio-economic analysis of phenomena/projects related to the area of bioeconomy	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U10	write and manage a project, and define key indicators of the project management process	P7U_U P7S_UW, P7S_UO	RR, SE
IBS_U11	plan an economic strategy for biomass and bio-based products	P7U_U P7S_UW, P7S_UO P7S_UK	RR, SE
IBS_U12	communicate with different people orally and in writing in English	P7U_U	RR, SE

		P7S_UW, P7S_UK	
IBS_U13	use online databases and search engines for scientific publications	P7U_U P7S_UW, P7S_UK	RR, SE
IBS_U14	prepare written works and presentations on specific issues of the bioeconomy using appropriate theoretical approaches	P7U_U P7S_UW, P7S_UK P7S_UU	RR, SE
SOCIAL COMPETENCES – the student is ready to:			
IBS_K01	engage in further training in a targeted and responsible way and organise the learning process and the transfer of objective knowledge in the field of bioeconomy	P7U_K P7S_KR P7S_KK	RR, SE
IBS_K02	coordinate teamwork and define goals, priorities and methods of implementing specific tasks	P7U_K P7S_KO P7S_KR	RR, SE
IBS_K03	engage in responsible reflections on the importance of social, professional and ethical responsibility in the bioeconomy	P7U_K P7S_KO	RR, SE
IBS_K04	engage in creative cooperation with other people/entities	P7U_K P7S_KO P7S_KR	RR, SE
IBS_K05	speak publicly about the bioeconomy and discuss related issues constructively	P7U_K P7S_KK	RR, SE
IBS_K06	engage in critical reflection on the responsibility, risks and economic, social and environmental impacts of the circular bioeconomy and 'business as usual'	P7U_K P7S_KO P7S_KK	RR, SE
IBS_K07	communicate knowledge about environmental and socio-economic issues, including climate change and directions of socio-economic development, using reasoned argumentation	P7U_K P7S_KK P7S_KR	RR, SE
IBS_K08	function in a world of information overload and critically evaluate the information acquired	P7U_K P7S_KK	RR, SE
IBS_K09	consciously pursue and implement the idea of sustainable development	P7U_K P7S_KO	RR, SE

IBS_K10	consciously recognise the economic potential of biomass and circular processes in the bioeconomy	P7U_K P7S_KK	RR, SE
IBS_K11	plan and implement educational and/or scientific strategies	P7U_K P7S_KO	RR, SE

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

3. Curriculum

Study plan								
Study field:	**Interdisciplinary Bioeconomy Studies**							
Study cycle:	second							
Study profile:	general academic							
Form of study:	stationary, MA							
Study semester								**1**
No.	Course	ECTS	Total number of teaching hours	Incl.:				Form of final assessment
				Lectures	Seminars	Exercise classes		
						Classroom	Specialist	
Obligatory								
1.	Sustainable primary production of biological resources	5	60	25			35	E[1]
2.	Ecosystem protection	5	50	25			25	E
3.	Project management in the bioeconomy	5	60	20			40	E
4.	Proseminar	3	50		50			Z[2]
5.	Foreign language	2	30			30		Z
A	**Obligatory, total**	**20**	**250**	**70**	**50**	**30**	**100**	**- - -**
Optional								
1.	Course 1	5	60	30		30		Z
2	Course 2	5	60	30			30	Z
B	**Optional, total*** **	**10**	**120**	**60**	**0**	**30**	**30**	**- - -**
C	**In one semester, total (A+B)**	**30**	**370**	**130**	**50**	**60**	**130**	**- - -**

[1] Graded exam
[2] Graded credit

Study semester								2
No.	Course	ECTS	Total number of teaching hours	Incl.:				Form of final assessment
				Lectures	Seminars	Exercise classes		
						Classroom	Specialist	
Obligatory								
1.	Organisation and economics of industrial production in the bioeconomy	4	50	25			25	E
2.	Agricultural chemistry and plant nutrition	4	50	20			30	E
3.	Biotechnology and industrial processes in the bioeconomy	4	50	25			25	E
4.	Commodity science and product quality in the bioeconomy	4	50	20			30	E
5.	Design Thinking Workshop	4	50	5		45		Z
A	**Obligatory, total**	**20**	**250**	**95**	**0**	**45**	**110**	**- - -**
Optional								
1.	Course 1	5	60	30			30	Z
2.	Course 2	5	60	30		30		Z
B	**Optional, total*** **	**10**	**120**	**60**	**0**	**30**	**30**	**- - -**
C	**In one semester, total (A+B)**	**30**	**370**	**155**	**0**	**75**	**140**	**- - -**

Study semester								3
No.	Course	ECTS	Total number of teaching hours	Incl.:				Form of final assessment
				Lectures	Seminars	Exercise classes		
						Classroom	Specialist*	
Obligatory								
1.	Sustainable development and natural resources economics	5	60	30		30		E
2.	Biofuels and biorefining	5	60	30			30	E
3.	Innovative bio-based materials	5	60	30			30	E
4.	Waste management	5	60	15		40	5	E
A	**Obligatory, total**	**20**	**240**	**105**	**0**	**70**	**65**	**- - -**
Optional								
1.	Course 1	5	60	30			30	Z
2.	Course 2	5	60	30		30		Z
B	**Optional, total*** **	**10**	**120**	**60**	**0**	**30**	**30**	**- - -**
C	**In one semester, total (A+B)**	**30**	**360**	**165**	**0**	**100**	**95**	**- - -**

Study semester								4
No.	Course	ECTS	Total number of teaching hours	Incl.:				Form of final assessment
				Lectures	Seminars	Exercise classes		
						Classroom	Specialist	
Obligatory								
1.	Seminar	6	60		60			Z
2.	Thesis	7						Grade from Review
3.	Master Thesis Diploma Exam	2	0					E
A	**Obligatory, total**	**15**	**60**	**0**	**60**	**0**	**0**	**- - -**
Optional								
1.	Course 1	5	45		45			Z
2.	Course 2	5	45		45			Z
3.	Course 3	5	45		45			Z
B	**Optional, total*** **	**15**	**135**	**0**	**135**	**0**	**0**	**- - -**
C	**In one semester, total (A+B)**	**30**	**195**	**0**	**195**	**0**	**0**	**- - -**

Total for the study cycle								
No	Specification	ECTS	Total number of teaching hours	Incl.:				Total number of exams
				Lectures	Seminar	Exercise classes		
						Classroom	Specialist *	
1.	**Total for the study cycle (all courses 185 ECTS)**	**120**	**1295**	**450**	**245**	**235**	**365**	**12**
Incl.:	Obligatory	75	800	270	110	145	275	12
	Optional	45	495	180	135	90	90	0
2.	**Share of the optional courses [%]**	**37.5%**						
3.	**Humanities**	1. Design Thinking Workshops 4 ECTS (obligatory)						

		2. Ethics of the economy and environment 5 ECTS (optional) 3. Seminar in the humanities: Economic history 5 ECTS (optional) 4. Seminar: Culture and postmodernism 5 ECTS (optional) 5. Seminar: Philosophy of the nature and basics of the natural sciences 5 ECTS (optional)
4.	**Contemporary languages**	A specialised language course, 2 ECTS in the first semester
)*	Specialist exercise classes incudes: laboratory classes, workshops, field classes	
)**	E – graded exam; Z – graded credit; ZAL – non-graded credit	
)***	Provided in the amount to be completed by the student	

OPTIONAL COURSES								
	Course	ECTS	h	Lectures	Seminar	Exercise classes: classroom	Exercise classes: specialist	Form of final assessment
Sem. 1	Anthropopressure	5	60	30		30		Z
	Animal breeding and animal production in the bioeconomy	5	60	30		15	15	Z
	Innovative biopreparations in plant protection	5	60	30			30	Z
	Multifunctional development of rural areas	5	60	30		30		Z
Sem. 2	Soil quality, resources and protection	5	75	30		15	30	Z
	ISO quality auditor	5	60	30		30		Z
	Marketing of an organic farm	5	60	30		30		Z
	Sustainable innovation in the modern world	5	60	30		30		Z
	Global raw material security	5	60	30		15	15	Z
Sem. 3	Dietary supplements of plant origin	5	60	30			30	Z
	Basics of production of bio-based cosmetics	5	60	30			30	Z

	Insects as an element of the bioeconomy	5	60	30			30	Z
	Information in ecosystems	5	60	15		45		Z
	Ethics of the economy and environment	5	60	30		30		Z
Sem. 4	Seminar in the humanities: Economic history	5	45		45			Z
	Seminar: Culture and postmodernism	5	45		45			Z
	Seminar: Changes in work processes	5	45		45			Z
	Philosophy of the nature and basics of the natural sciences	5	45		45			Z
	Seminar: Socio-economic dilemmas of the modern world	5	45		45			Z

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

1.1

Subject: **Sustainable primary production of biological resources**	
ECTS	5
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	1
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Agroecology and Plant Production
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
ZPP_W1	* concepts and problems related to the primary production of renewable biological resources	IBS_W01	RR
ZPP_W2	* plant production processes for the needs of the bioeconomy in the context of different natural conditions and production systems	IBS_W02 IBS_W08	RR
ZPP_W3	* the importance and tools of sustainable development for the concept of bioeconomy in the field of primary production	IBS_W17	RR
ZPP_W4	* methods and instruments for the protection of plants and ecosystems that are suitable for specific production systems, with a particular focus on production using methods that exclude negative externalities	IBS_W18	RR; SE
SKILLS – can:			
ZPP_U1	* assess the impact of primary production systems and individual tools and methods on the natural environment	IBS_U05	RR; SE
ZPP_U2	* select, implement and evaluate methods for the production of primary biomass	IBS_U06	RR; SE
ZPP_U3	* communicate in the subject area in English	IBS_U12	RR; SE

SOCIAL COMPETENCES - is ready to:			
ZPP_K1	* independently manage the learning process and	IBS_K01	RR
ZPP_K2	* inform the community about issues related to a sustainable economy, taking on different roles in teamwork	IBS_K02	RR; SE

Teaching content:	
Lectures	**25 h**
Topics of classes	1. Sustainable agriculture - the impact of agriculture on food production and food security 2. Analysing the impact of climate change on the circular economy 3. Integrated agricultural systems as an element of the bioeconomy 4. Modern technologies in sustainable crop production 5. Sustainable low-input cereal agricultural technology 6. Development of meadows and pastures 7. Sustainable production of large-grain legumes 8. Sustainable production of small-seeded legumes 9. Sustainable production of root crops 10. Sustainable production of tuber crops 11. Sustainable production of oilseeds 12. Sustainable production of fibre crops 13. ELF approach to farm management: from the field to the table
Achieved learning outcomes	*ZPP_W1, ZPP_W2, ZPP_W3, ZPP_W4*
Methods of verification and principles and criteria of evaluation	*Passing the lectures: written exam - test and computational tasks or problem questions* *A percentage scale has been introduced for the assessment of learning outcomes, defined as follows:* *1. Unsatisfactory grade (2.0): awarded if the student achieves less than 50% of the effects applicable to a particular component in at least one of the three components (K, S or C) of the subject learning outcomes.* *2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the effects applicable to a particular component in each of the three components (K, S or C) of the learning outcomes.* *3. Satisfactory Plus grade (3.5): awarded on the basis of the arithmetic mean of the three components (K, S or C) of the learning outcomes (average 61-70%).* *4. For the grades "good" (4.0 - average 71-80%), "good plus" (4.5 - average 81-90%) and "very good" (5.0 - average >90%), a similar calculation method as described under point 3 was used.* *Final grade = 0.4 x examination grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student activity during class.*
Project exercises	**25 h**
Topics of classes	1. Biology of crop yields - principles 2. Technology of cereal cultivation 3. Project assumptions - cereal crops 4. Grass production technology 5. Production technology for small-seeded legumes 6. Technology for the production of large-seeded legumes 7. Project assumptions - legumes 8. Project assumptions - utilisation of meadows and pastures 9. Technology for the production of root crops 10. Project assumptions - root crops

	11. Technology for the production of oil crops 12. Project assumptions - oil plants 13. Technology for the production of fibre crops
Achieved learning outcomes	ZPP_U1, ZPP_U2; ZPP_U3 ZPP_K1, ZPP_K2
Methods of verification and principles and criteria of evaluation	The basis for passing the exercises is the preparation of 4 thematic projects 1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the effects applicable to a particular component in at least one of the three components (K, S or C) of the subject-related learning outcomes. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the effects applicable to a particular component in each of the three components (W, U or K) of the learning outcomes. 3. Satisfactory Plus grade (3.5): awarded on the basis of the arithmetic mean of the three components (K, S or C of the learning outcomes (average 61-70%). 4. For the grades "good" (4.0 - average 71-80%), "good plus" (4.5 - average 81-90%) and "very good" (5.0 - average >90%), a similar calculation method as described under point 3 was used. Final grade = 0.4 x examination grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student activity during class.

Field trips	**10 h**
Topics of classes	Biological cycle of crops, primary production Biometric data acquisition technology
Achieved learning outcomes	
Methods of verification and principles and criteria of evaluation	Mandatory presence

Literature

Basic	Acquaah G. Principles of crop production: theory, techniques, and technology. 2002 Eric Lichtfouse, Mireille Navarrete. Sustainable Agriculture - Tom 1, 2009 Eric Lichtfouse, Marjolaine Hamelin, Mireille Navarrete, Philippe Debaeke. Sustainable Agriculture, Tom 2. 2011
Supplementary	Gliessman, S.R. 2007. Agroecology: The Ecology of Sustainable Food Systems. CRC Press LLC, Boca Raton, FL. Nestle, M. 2002. Food Politics: How the Food Industry Influences Nutrition and Health. University of CA Press, Ltd., London. Powers, L. E. and R. McSorley. 2000. Ecological principles of agriculture. Delmar Thomson Learning, Albany, NY

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				4	ECTS*
Discipline: economics and finance (SE)				1	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	25	h		
	Exercises and seminars	35	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		

	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

1.2

Subject: **Ecosystem protection**	
ECTS	5
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	1
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Microbiology and Biomonitoring
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
OE_W1	* concepts and problems in the field of environmental protection in relation to the sustainable production of renewable biological resources and their utilisation in compliance with the principles of sustainable development	IBS_W01	RR
OE_W2	* the complexity of natural phenomena and natural processes in the natural environment	IBS_W02	RR
OE_W3	* principles of the functioning of living organisms at different levels of organisation and possibilities of their use in the bioeconomy	IBS_W03	RR
OE_W4	* issues of environmental protection in connection with social needs	IBS_W18	RR; SE
SKILLS – can:			
OE_U1	* carry out biomonitoring of the ecosystem and use bioindication to assess the state of the environment	IBS_U01	RR; SE
OE_U2	* assess the environmental impact of production systems	IBS_U05	SE; RR
OE_U3	* identify and evaluate the impact of economic activities on ecosystems	IBS_U08	SE
OE_U4	* use online databases and search engines for scientific publications in the field of environmental sciences	IBS_U13	SE; RR

OE_U5	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
OE_K1	* engage in further training in a targeted way and organise the learning process and transfer of objective knowledge in the area of environmental protection	IBS_K01	RR
OE_K2	* coordinate teamwork and define goals, priorities and methods of implementing specific tasks in laboratory and field work	IBS_K02	RR; SE
OE_K3	* engage in creative cooperation with other people	IBS_K04	RR; SE
OE_K4	* convey knowledge about environmental problems, including climate change, using substantive argumentation	IBS_K07	SE

Teaching content:	
Lectures	**25 h**
Topics of classes	1. Biosphere: characteristics and dynamics. Evolution. Biodiversity. Biomes and ecozones. 2. Natural resources. Resources and sustainable development. Non-renewable resources. Renewable resources. 3. Environmental damage. Environmental stressors. 4. Bioeconomy: a European way to utilise our natural resources - action plans. 5. Environmental impact of forestry. Wood in the bioeconomy. 6. Agriculture and the environment. 7. Aquatic ecology. 8. Waste management - waste in the bioeconomy. 9. Urban ecology. Urban bioeconomy. 10. Ecologically sustainable development.
Achieved learning outcomes	*OE_W1, OE_W2, OE_W3, OE_W4, OE_U3, OE_K1, OE_K4*
Methods of verification and principles and criteria of evaluation	Written exam. The share of lecture evaluation in the final grade is 60%.
Lab exercises	**25 h**
Topics of classes	1. Soil biomonitoring methods. 2. Forest biomonitoring methods. 3. Methods of biomonitoring of crops - pests - on the example of a selected agricultural plant. 4. Methods of biomonitoring of crop plants - diseases - on the example of a selected agricultural plant. 5. Methods of biomonitoring of crops - weeds - on the example of a selected agricultural plant. 6. Invasive plants. 7. Bioindication of a selected ecosystem using algae. 8. Bioindication of a selected ecosystem using lichens. 9. Bioindication of a selected ecosystem using invertebrates. 10. Laboratory assessment of water pollution - Phytotoxkit for the liquid phase. 11. Laboratory assessment of water pollution - Modern Water test. 12. Laboratory assessment of toxicity of soils and sediments - Phytotoxkit.
Achieved learning outcomes	*OE_U1, OE_U2, OE_U4, OE_U5; OE_K2, OE_K3*
Methods of verification and principles and criteria of evaluation	Individual and group reports on laboratory experiments and observations of natural processes. The share of exercise evaluation in the final evaluation is 40%.

Literature

Basic	Friedland A., Relyea R., Courard-Hauri D. 2019. Essentials of Environmental Science. Second Edition. WH Freeman Elmqvist T., Fragkias M., Goodness J., et al. (Eds.) 2013. Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities. Springer, Dordrecht. Chapin F.S., Matson P.A., Vitousek P.M. (Eds.) 2011. Principles of Terrestrial Ecosystem Ecology, Springer New York, NY
Supplementary	https://ec.europa.eu/knowledge4policy/publication/updated-bioeconomy-strategy-2018_en European Commission, 2018, Bioeconomy: the European way to use our natural resources- Action plan 2018 Galanakis C.M. 2023. Biodiversity, Functional Ecosystems and Sustainable Food Production. Springer Nature Switzerland

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				3.0	ECTS*
Discipline: economics and finance (SE)				2.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		75	h	3	ECTS*
Incl.	Lectures	25	h		
	Exercises and seminars	25	h		
	Consultations	3	h		
	Participation in research	20	h		
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		50	h	2	ECTS*

1.3

Subject: **Project management in the bioeconomy**	
ECTS	5
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	1
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Management and Business Economics
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
PM_W1	* project definitions and methods and tools of project management, with a special focus on the bioeconomy sector	IBS_W16	SE
PM_W2	* principles of team management, including methods of division of labour and distribution of roles in the project team	IBS_W16	SE
SKILLS – can:			
PM_U1	* prepare and manage the project and determine key indicators of the project management process	IBS_U10	RR; SE
PM_U2	* manage a team, communicate properly and can act as a team leader	IBS_U12	RR; SE
PM_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
PM_K1	* coordinate teamwork and define goals, priorities and methods of implementing specific tasks	IBS_K02	RR; SE
PM_K2	* engage in creative cooperation with other people/entities	IBS_K04	RR; SE

Teaching content:

Lectures	**20 h**
Topics of classes	1. Specificity of project management: project definition, project attributes and characteristics 2. The importance of projects in the bioeconomy 3. Process of project management 4. Project life cycle (phases): Initiation phase, planning phase, implementation phase (execution), completion phase 5. Project management framework: Development of the project's mission, vision, goals and objectives 6. Resource and budget planning: estimation of resources, estimation of duration of activities, estimation of costs 7. Risk management planning: sources of risk, risk dynamics according to the phases of the project life cycle, project schedule and critical path 8. Project team management: organisational culture, challenges of the project team, dealing with conflicts, functions and tasks of the project manager, requirements for the project manager, project team management 9. Project implementation and control. Change control process.
Achieved learning outcomes	*PM_W1, PM_W2*
Methods of verification and principles and criteria of evaluation	Written examination. A percentage scale has been introduced for the assessment of learning outcomes, defined as follows: 1. Unsatisfactory (2.0): awarded if the student achieves less than 50% of the required results for a particular component. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the required results for a particular component. 3. Satisfactory Plus grade (3.5): is awarded if the student achieves at least 61-70%. 4. For the grades "good" (4.0 - average 71-80%), "good plus" (4.5 - average 81-90%) and "very good" (5.0 - average >90%), a similar calculation method was used as described under point 3. Final grade = 0.5 x examination grade (lectures) + 0.5 summative grade (exercises) NOTE: The teacher formulates a grade based on the student's level of mastery of the applicable curriculum content of a particular subject, based on his/her own teaching experience and observations, using the formal criteria above.

Project exercises	**40 h**
Topics of classes	1. Team building - roles in the team, phases of creating a project team. Discussion 2. The role of the project manager and leader. Characteristics of a leader vs. manager. Individual task and group discussion 3. Team communication - team cooperation, emotional intelligence. teamwork 4. Organisation of teamwork - planning, setting goals, delegating, specificity of distributed teams. Working in teams 5. Work Life Balance as a new philosophy of project work - at the individual and team level. Working in teams 6. Creative planning and problem solving - techniques used in business. Brainstorming and discussion 7. Design thinking, designing the future and their application. Teamwork and presentation 8. Project planning and verification - from idea to project (exercises will concern the development of projects in teams): • Business justification for the implementation of the project, • SWOT analysis for the selected project, • Stakeholder analysis, • Risk analysis, • Resources and costs, • Project financing,

	• Responsibility Matrix (RACI), • Work breakdown structure and milestones, • Examples of good practice in bioeconomy projects, • Team consultations, • Presentation and evaluation of prepared projects. Discussion and summary of classes.
Achieved learning outcomes	*PM_U1, PM_2, PM_U3; PM_K1, PM_K2*
Methods of verification and principles and criteria of evaluation	Assessment of projects and presentations prepared in teams. The summative grade is the average of the grades obtained during the semester. Final grade = 0.5 exam grade (lectures) + 0.5 tutorial grade.

Literature

Basic	Phil S. 2020. Reimagining Collaboration: Slack, Microsoft Teams, Zoom, and the Post-COVID World of Work (The Future of Work). Motion Publishing. Gordon J. 2018. The Power of a Positive Team: Proven Principles and Practices that Make Great Teams Great. Willey, New Jersey. Heagney J. 2016. Fundamentals of Project Management. American Management Association, New York.
Supplementary	Watt A. 2014. Project management. Victoria: BCcampus, BC Open Textbook Project. Lock D. 2013. Project management. Gower, Burlington, Vt. Lange L. et al. 2015. Development of the Nordic bioeconomy: NCM reporting. Test centers for green energy solutions – biorefineries and business needs, Copenhagen, Denmark: Nordic Council of Ministers.

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				1.0	ECTS*
Discipline: economics and finance (SE)				4.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	20	h		
	Exercises and seminars	40	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

1.4

Subject: **Proseminar**	
ECTS	3
Status	Obligatory
Form of final assessment	Graded credit
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	1
Language of instruction	English

Subject teacher

Coordinator's unit	various units co-leading the course
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
PR_W1	* the research process in the agricultural and social sciences	IBS_W08 IBS_W01	RR, SE
PR_W2	* rules for creating scientific works in a formal context	IBS_W19 IBS_W20	RR, SE
PR_W3	* issues and principles related to the principles of protection of intellectual property and industrial property	IBS_W20	RR, SE
SKILLS – can:			
PR_U1	* express themselves clearly on the topic in oral and written form in English	IBS_U12	RR; SE
PR_U2	* explain the process of scientific activity and plan it before analysing and	IBS_U02 IBS_U03	RR; SE
PR_U3	* discuss the problems of the bioeconomy in relation to the production and social context	IBS_U08 IBS_U09	RR; SE
PR_U4	* research scientific publications independently	IBS_U13	RR, SE
PR_U5	* propose research methods	IBS_U01	RR, SE

SOCIAL COMPETENCES - is ready to:			
PR_K1	* organise their own learning process and prepare to undertake their first research work in the form of a master's thesis	IBS_K01	RR; SE
PR_K2	* reflect on the meaning of their work as well as their tasks and place in the economic and social system in the context of involvement in the bioeconomy area	IBS_K03	RR; SE
PR_K3	* plan the course of activities related to the creation of a master's thesis	IBS_K11	RR, SE

Teaching content:	
Seminar	**50 h**
Topics of classes	1. Specificity and rules of writing a master's thesis 2. Introduction to the methodology of scientific work 3. The issue of intellectual property 4. Presentation of supervisors and research areas for master's theses 5. Selection of master's theses topics 6. Introductory discussion of the subject of master's theses
Achieved learning outcomes	*PR_W1; PR_W2, PR_U1; PR_U2; PR_U3; PR_U4, PR_U5; PR_K1; PR_K2; PR_K3*
Methods of verification and principles and criteria of evaluation	Preparation of oral presentations in accordance with established guidelines and their delivery (70% of the share in the final grade), preparation of a master's thesis outline (10%), preparation of a list of selected literature items in accordance with applicable editorial requirements (10%), activity (10%).

Literature

Basic	C.R. Kothrani, Research Methodology. Methods and Techniques, 2004, New Age International Limited. N. Walliman, Research methods and basis, 2011, Routledge.
Supplementary	Texts and books indicated by the teacher

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				1.5	ECTS*
Discipline: economics and finance (SE)				1.5	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		50	h	2	ECTS*
Incl.	Lectures				
	Exercises and seminars	45	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		25	h	1	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

1.5

Subject: **Anthropopressure**	
ECTS	5
Status	Elective
Form of final assessment	Graded credit
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	1
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Microbiology and Biomonitoring
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
A_W1	* the impact of agriculture on the environment in historical and contemporary terms on a global scale and the role of humans in biogeochemical changes throughout history	IBS_W01	RR
A_W2	* issues of planetary boundaries and changes in the socio-economic structure resulting from the adopted management paradigm and the relations between the environment, economy and society	IBS_W09	RR
A_W3	* the concept of the Anthropocene, civilisation, globalisation, generation, social responsibility	IBS_W10	RR; SE
A_W4	* values underlying social and economic development and the conditions shaping them	IBS_W19	SE
SKILLS – can:			
A_U1	* determine the effects of the development of agriculture and industry throughout history on a global scale	IBS_U08	SE
A_U2	* carry out a socio-economic analysis of selected phenomena that negatively affect the state of the environment	IBS_U09	SE
A_U3	* communicate precisely in a group, verbally and in writing, regarding the issues discussed during classes	IBS_U12	RR; SE
A_U4	* use online databases and search engines for scientific publications in the field of agricultural and social sciences	IBS_U13	RR; SE

A_U5	* prepare a written work on anthropopressure issues using appropriate theoretical approaches based on information from various sources	IBS_U14	RR; SE
A_U6	* communicate in the subject area in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
A_K1	* engage in further training in a targeted way and organise the learning process and transfer of objective knowledge about anthropopressure	IBS_K01	RR; SE
A_K2	* engage in reflection on the importance of social and ethical responsibility in the area of environmental degradation	IBS_K03	RR
A_K3	* engage in creative cooperation with other people in shaping the public sphere	IBS_K04	RS
A_K4	* express opinions on anthropopressure and constructive discussion on related issues	IBS_K05	SE
A_K5	* communicate knowledge about environmental and socio-economic issues, including climate change and directions of socio-economic development, using reasoned argumentation	IBS_K07	SE
A_K6	* function in a world of information overload and critically evaluate the information acquired	IBS_K08	RR; SE

Teaching content:	
Lectures	**30 h**
Topics of classes	1. Outline of the history of humanity, civilisations, evolution of Western civilisation, agricultural, scientific, industrial and social revolutions. 2. Economic development and its environmental effects from a historical perspective. 3. Anthropocene. 4. Globalisation, population explosion. 5. Urbanisation. 6. Food and food security. 7. Planetary boundaries. 8. Primary production and planetary boundaries. 9. Global warming. 10. Biodiversity and its importance. 11. Degradation of the natural environment. 12. Social sciences towards the problem of contemporary threats - post-industrialism, postmodernism, clash of civilisations, ethics of responsibility. 13. Anti-scientific tendencies in culture and politics. 14. Modern agriculture: opportunities and threats. 15. Towards sustainability – is the bioeconomy the solution?
Achieved learning outcomes	A_W1, A_W2, A_W3, A_W4, A_U5,; A_K2, A_K4
Methods of verification and principles and criteria of evaluation	Written work on assigned topic for evaluation, activity in classes. The share of lecture evaluation in the final grade is 60%.
Exercise classes	**30 h**
Topics of classes	1. Where is Western civilisation heading? – Text analysis, development of a possible scenario. 2. Anthropocene: The human age. Film and discussion. 3. Cultural and social phenomena of postmodernity: consumerism, destiny - Anglicisation, tabloidisation, mediatisation, atomisation, technopolisation of life, McDonaldisation, instant culture, zapping, cocooning, healthism, cultural and moral pluralism, moral relativism - analysis. 4. Generations - worldview and preferences - debate based on an analysis.

	5. Breaking boundaries: The science of our planet. Film and discussion. 6. Social responsibility - group work on activities in daily life that are in line with the ethics of responsibility. 7. Responsibility towards the environment - group work on activities in everyday life that are in line with the ethics of responsibility. 8. We minimise consumption, clothing/food - group work, list of methods, discussion, comparison. 9. We minimise meat consumption - group work, arguments for and against, discussion, comparison. 10. Infographic, internet memory, poster, film about the topics covered in class - group work, demonstration.
Achieved learning outcomes	*A_U1, A_U2, A_U3, A_U4, A_U6; A_K1, A_K3, A_K4, A_K5, A_K6*
Methods of verification and principles and criteria of evaluation	Assessment of group projects and participation in discussions. The share of exercise assessment in the final assessment is 40%

Literature

Basic	Benner S., Lax G., Crutzen P.J., Pöschl U., Lelieveld J., Brauch H.G. (Eds.). 2022. Paul J. Crutzen and the Anthropocene: A New Epoch in Earth's History. Springer Cham Padilla L.A. (Eds.). 2021. Sustainable Development in the Anthropocene. Springer Cham Rockström J. Klum M. (Eds.). 2015. Big World, Small Planet: Abundance within Planetary Boundaries. Bokförlaget Max Ström, Stockholm Biggs R., Schlüter M., Schoon M.L. (Eds.). 2015. Principles for building resilience: Sustaining ecosystem services in social-ecological systems. Cambridge University Press, Cambridge https://www.anthropocene.info/
Supplementary	https://goodanthropocenes.net/ Genus A. (Eds.). 2016. Sustainable Consumption. Springer Cham https://www.stockholmresilience.org/research/planetary-boundaries/the-nine-planetary-boundaries.html

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				3.0	ECTS*
Discipline: economics and finance (SE)				2.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

1.6

Subject: **Animal husbandry and animal production in the bioeconomy**	
ECTS	5
Status	Elective
Form of final assessment	Graded credit
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	1
Language of instruction	English

Subject teacher

Coordinator's unit	Faculty of Animal Husbandry and Biology, Department of Animal Genetics, Breeding and Ethology
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
AHP_W1	* methods and results of the application of population and molecular genetics in animal breeding	IBS_W01 IBS_W02	RR
AHP_W2	* principles and techniques of livestock feeding and feed production, taking into account the principles of circular bioeconomy	IBS_W01 IBS_W02	RR
AHP_W3	* basic breeds and functional types of livestock,	IBS_W01 IBS_W02 IBS_W12 IBS_W16	RR
AHP_W4	* breeding and breeding methods, technologies and economic efficiency of animal production	IBS_W01 IBS_W02	RR; SE
AHP_W5	* relationships between different animal production systems, animal welfare, quality of animal products and the natural environment	IBS_W01 IBS_W02 IBS_W12 IBS_W16	RR, SE
AHP_W1	* precise animal production methods and intelligent technologies for farm management	IBS_W01	RR

		IBS_W02	
	SKILLS – can:		
AHP_U1	* assess the breeding value of the animal, choose the appropriate selection method and determine the effectiveness of the breeding work	IBS_U03 IBS_U05	RR
AHP_U2	* assess the nutritional requirements of the animals, determine balanced feed rations and * assess the quality of the feed	IBS_U03 IBS_U05	RR
AHP_U3	* determine the type, breed and functional value of livestock species	IBS_U03	RR
AHP_U4	* organise animal production in accordance with the principles of animal welfare, environmental protection, obtaining high-quality products and profitability	IBS_U02 IBS_U03 IBS_U05 IBS_U08 IBS_U09	RR; SE
AHP_U5	* use modern digital technologies for sustainable breeding	IBS_U02 IBS_U03 IBS_U05 IBS_U08 IBS_U09	RR; SE
AHP_U6	* communicate in the specialised field in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
AHP_K1	* assess the socio-economic and environmental impact of animal production	IBS_K03 IBS_K06	RR, SE
AHP_K2	* take measures to improve food quality, animal welfare and environmental protection	IBS_K03 IBS_K07	RR, SE
AHP_K3	* work in a team to carry out tasks that require individual knowledge and creativity	IBS_K02 IBS_K04	RR, SE

Teaching content:	
Lectures	**30 h**
Topics of classes	• Genetic aspects of sustainable intensification of animal production; design and organisation of animal breeding programmes • Introduction to animal nutrition and feed production • Basic issues of cattle, pigs, sheep, poultry and horses breeding • Animal health and welfare in various animal production systems • Environmental and socio-economic aspects of animal production • Digital decision support systems in sustainable animal production
Achieved learning outcomes	*AHP_W01, AHP_W02, AHP_W03, AHP_W04, AHP_W05*
Methods of verification and principles and criteria of evaluation	Written assessment Rating 3.0 Knowledge and practical skills 56-60% Rating 3.5 Knowledge and practical skills 61-70% Rating 4.0 Knowledge and practical skills 71-80 Rating 4.5 Knowledge and practical skills 81-90% Rating 5.0 Knowledge and practical skills >90%
Exercise classes	**15 h**
Topics of classes	• Biodiversity, purpose of breeding, intensity of selection and genetic progress

	• Assessment of the nutritional value of feed, formulating food rations for dairy cows, beef cattle and sheep • Animal welfare and breeding environment vs. the natural environment • Quality of dairy and meat products • Decision support problems in cattle, pig and poultry production • Simulation of agroecological practices in farm management; improving the sustainable development of a dairy farm - using a computer game (SEGAE)
Achieved learning outcomes	*AHP_U1, AHP_U2, AHP_U3, AHP_U4, AHP_U5; A_U6; AHP_K1, AHP_K2, AHP_K3*
Methods of verification and principles and criteria of evaluation	Test summarising exercises and field trip - open and closed questions, project development Rating 3.0 Knowledge and practical skills 56-60% Rating 3.5 Knowledge and practical skills 61-70% Rating 4.0 Knowledge and practical skills 71-80 Rating 4.5 Knowledge and practical skills 81-90% Rating 5.0 Knowledge and practical skills >90%

Field trips	**15 h**
Topics of classes	• Cattle herd management – field trip • Pig herd management – field trip • Field trip to sheep and goat breeding • Field trip to a poultry farm
Achieved learning outcomes	AHP_U1, AHP_U2, AHP_U3, AHP_U4, AHP_U5, AHP_K1, AHP_K2, AHP_K3
Methods of verification and principles and criteria of evaluation	Test summarising exercises and field trip - open and closed questions, project development Rating 3.0 Knowledge and practical skills 56-60% Rating 3.5 Knowledge and practical skills 61-70% Rating 4.0 Knowledge and practical skills 71-80 Rating 4.5 Knowledge and practical skills 81-90% Rating 5.0 Knowledge and practical skills >90%

Literature

Basic	1. Animal Breeding and Genetics, Matthew L. Spangler (ed.). Springer New York, NY, 2022. 2. Farm Animal Metabolism and Nutrition, J.P.F. D'Mello (ed.) CABI Publishing, 2000. 3. Sustainable Animal Production: The Challenges and Potential Developments for Professional Farming 1st Edition, A. Aland (ed.), F. Madec (ed.). Wageningen Academic Publishers, 2009.
Supplementary	1. Thornley J.H.M., France J.: Mathematical Models in Agriculture. 2nd Edition. CAB International, 2007. 2. Phillips C.J.C.: Principles of Cattle Production, 2nd Edition. CAB International, 2009. 3. Jouan J., Carof M., Baccar R., Bareille N., Bastian S., Brogna D., Burgio G., Couvreur S., Cupiał M., Dufrêne M., Dumont B., Gontier P., Jacquot A.-L., Kański J., Magagnoli S., Makulska J., Pérès G., Ridier A., Salou T., Sgolastra F., Szeląg-Sikora A., Tabor S., Tombarkiewicz B., Węglarz A., Godinot O. 2021. SEGAE: An online serious game to learn agroecology. Agricultural Systems, 191, 103145. https://doi.org/10.1016/j.agsy.2021.103145

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)			4.0	ECTS*
Discipline: economics and finance (SE)			1.0	ECTS*
Structure of student activity				
Classes carried out with the direct participation of the teacher	65	h	2.6	ECTS*

Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

1.7

Subject: **Innovative biopreparations in plant protection**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	1
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Microbiology and Biomonitoring
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
IPP_W1	* the principles of functioning of living organisms and the possibility of their use in biopreparations in plant protection	IBS_W03	RR
IPP_W2	* problems and challenges related to innovative biopreparations in plant protection	IBS_W05	RR
SKILLS – can:			
IPP_U1	* assess the possibilities of using innovative biopreparations	IBS_U05	RR
IPP_U2	* implement innovative biopreparations in plant protection	IBS_U03	RR
IPP_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
IPP_K1	* constructively discuss topics related to innovative biopreparations in plant protection	IBS_K05	RR
IPP_K2	* recognise the importance of objective knowledge about innovative biopreparations in plant protection	IBS_K01	RR

Teaching content:	
Lectures	**30 h**
Topics of classes	1. Plant protection products. Biopreparations. Regulations. 2. Substances of plant origin in plant protection 3. Microorganisms in plant protection 4. Macroorganisms in plant protection 5. Biofungicides 6. Bioinsecticides 7. Bioherbicides 8. Bio-seed dressings 9. Products that stimulate plant resistance to pests 10. Application of nanotechnology in plant protection 11. Modern biopesticide formulations 12. Safety in the production and use of biopesticides 13. The biopesticide market – prospects, challenges and threats
Achieved learning outcomes	*IPP_W1, IPP_W2*
Methods of verification and principles and criteria of evaluation	Written assessment in the form of a test (single-choice questions) + participation in the discussion and student activity. The condition for taking the exam is to obtain a positive grade in completing the practical part. At least 50% of correct answers must be given for a positive mark. Final grade of classes = 0.5 x grade from lectures + 0.5 x grade from lab. Exercises
Lab exercises	**30 h**
Topics of classes	1. Microorganisms in plant protection. 2. Cultivation of bacteria for the production of biopesticides. 3. Entomogenic and antagonistic fungi. Breeding. Development and production of biopreparations. 4. Beneficial nematodes. Breeding. Development and production of biopreparations. 5. Beneficial arachnids. Breeding. Development and production of biopreparations. 6. Beneficial insects. Breeding. Development and production of biopreparations. 7. Substances of plant origin. Acquisition. Development and production of biopreparations.
Achieved learning outcomes	*IPP_U1, IPP_U2, IPP_U3; IPP_K1, IPP_K2*
Methods of verification and principles and criteria of evaluation	Grade from the final test + evaluation of activity in classes + observation of individual and team behaviour (in terms of social competences). To pass, you must obtain at least 50% of the points in the test. Final grade of classes = 0.5 x grade from lectures + 0.5 x grade from lab exercises

Literature

Basic	1. Formulation of Microbial Biopesticides Beneficial microorganisms, nematodes and seed treatments 1998. Editors: H. D. Burges 2. Advances in Plant Biopesticides Dwijendra Singh (2014) https://link.springer.com/book/10.1007/978-81-322-2006-0 3. Basic and Applied Aspects of Biopesticides K. Sahayaraj (2014). https://link.springer.com/book/10.1007/978-81-322-1877-7
Supplementary	1. Plant protection. D. Ropek. Chapter in monograph Agroecology (101-116). 2014. ISBN 978-83-64758-06-5 2. Krysa A., Ropek D. Pathogenicity of selected strains of insecticide fungus Metharizium anisopliae used to control Colorado potato beetle (Leptinotarsa decemlineata). Proceedings of ECOpole.

	3. Ropek D., Kulikowski E. 2009. Potential of Hydrogel Application for Plant Protection. Ecological Chemistry and Engineering A. 16(9), 1191-1198.

Structure of learning outcomes:					
Discipline: agriculture and gardening (RR)				4.5	ECTS*
Discipline: economics and finance (SE)				0.5	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

1.8

Subject: **Multifunctional development of rural areas**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	1
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Business Management and Economics
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
MRD_W1	* concepts related to the institutional conditions of the functioning of rural areas in the EU;	IBS_W1	RR; SE
MRD_W2	* factors determining the development and functioning of rural areas in the EU and the issues of entrepreneurship development in rural areas	IBS_W06	RR; SE
MRD_W3	* issues of changes in the socio-economic structure in the context of rural development	IBS_W09	RR; SE
SKILLS – can:			
MRD_U1	* jointly prepare a written and oral analysis of the resources provided and data found and formulate conclusions	IBS_U12	RR; SE
MRD_U2	* carry out a socio-economic analysis of the phenomena of rural development projects	IBS_U09	RR; SE
MRD_U3	* use internet resources and applications with regard to the needs of agricultural and social sciences in relation to agricultural development and entrepreneurship	IBS_U13	RR; SE
MRD_U4	* communicate in English in the field of specialisation	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			

MRD_K1	* coordinate teamwork and define goals, priorities and methods of implementing specific tasks as part of planning the development of the farm	IBS_K01	RR; SE
MRD_K2	* engage in reflection on the role and responsibility of rural farms	IBS_K02	RR; SE
MRD_K3	* share knowledge about environmental and socio-economic problems, including climate change and directions of socio-economic development	IBS_K03	RR; SE

Teaching content:	
Lectures	**30 h**
Topics of classes	1. Agriculture - Basic data; 2. EU agriculture - employment, share of GDP, farm structure; 3. Rural areas in transition; 4. Common Agricultural Policy, Who benefits? 5. EU priorities in the field of rural development 6. Agriculture and rural development in the EU budget; 7. Selected agricultural markets; 8. Food markets and demographic changes/household structure; 9. Agricultural market information system; 10. Institutional support for rural development; 11. Household income, non-agricultural income; 12. Diversification of farms in the EU; 13. Co-operatives and their role in rural development; 14. Agriculture in the EU: opportunities and challenges; 15. Sources of information on agriculture and the food sector in the EU.
Achieved learning outcomes	*MRD_W1, MRD_W2, MRD_W3*
Methods of verification and principles and criteria of evaluation	Written assessment (descriptive questions) + participation in the discussion and student activity. The condition for taking the exam is to obtain a positive grade in completing the exercise part. At least 50% of correct answers must be given for a positive mark. Final grade of classes = 0.6 x grade from lectures + 0.4 x grade from exercises. - Assessment (2.0) Does not know the basic data and characteristics of the most important economic, social and environmental relations and processes. It does not identify key sources of information and basic EU institutions shaping agricultural and rural policy. - Grade E (3.0) Selectively knows only some data, superficially characterises some issues. - Rating D (3.5) Correctly characterises most issues, knows some data, some sources of information; knows some of the required data. It correctly, but superficially, characterises the trends in the development of rural areas in the EU. - Grade C (4.0) Characterises the most important issues, trends in the development of rural areas, knows the required data; lists and describes the most important institutions playing a key role in the development of rural areas and describes the most important institutions playing a key role in the development of rural areas. - Rating B (4.5) Sufficiently characterises the required issues and trends, knows the required data, knows and explains the ongoing processes, knows reliable sources of information. - Grade A (5.0) Fully characterises the required issues, trends, data, knows and explains the ongoing processes, knows the arguments of supporters and

	opponents of modern rural development. Knows the arguments of supporters and opponents of the current rural development policy and controversial issues.

Exercises	**30 h**
Topics of classes	1. Agriculture in the EU countries; 2. Employment in agriculture, farm structure, regions; 3. Rural areas in transition and today; 4. Common agricultural policy, who benefits? 5. The scope of rural development with regard to the new EU priorities; 6. Agriculture in the EU budget; 7. Selected agricultural markets and global problems; 8. Demographic changes/household structure; 9. Agricultural market information system; 10. Institutional support for rural development, opportunities for farm development; 11. Household income, non-farm income, theory and reality, entrepreneurial activities and food production on farms; 12. Diversification of farms in the EU, changes related to EU priorities; 13. Co-operatives and their role in rural development, mental changes needed for co-operation; 14. Agriculture in the EU and the development of rural entrepreneurship; 15. Information sources on agriculture and the food sector in the EU.
Achieved learning outcomes	*MRD_U1, MRD_U2, MRD_U3, MRD_U4, MRD_K1, MRD_K2, MRD_K3*
Methods of verification and principles and criteria of evaluation	* Assessment of the quality of class and homework * Quality of presentation of the selected topic * Final grade: 60% lecture part, 40% exercises.

Literature

Basic	W. van Eekelen, 2020, Rural Development in Practice Evolving Challenges and Opportunities, Routledge, ISBN 9781138575363 Anna Nieto Masot, 2021, Sustainable Rural Development, Strategies, Good Practices and Opportunities, MDPI AG, ISBN: 3036516425
Supplementary	Thomas Elmqvist, Michail Fragkias, Julie Goodness, Burak Güneralp, 2013, Urbanization, Biodiversity and Ecosystem Services: Challenges and Opportunities, Springer, ISBN: 9400770871 EU Agricultural outlook, for markets, income and environmental 2022 - 2032, 2022, European Union, ISBN 978-92-76-58589-3

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				2.0	ECTS*
Discipline: economics and finance (SE)				3.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				

	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

2.1

Subject: **Organisation and economics of industrial production in the bioeconomy**	
ECTS	4
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Bioprocess Engineering, Energy and Automation
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
OEIP_W1	* the economic conditions for the rational management of production resources and the organisation of production in the bioeconomy, as well as the design of the production process and production structure.	IBS_W13 IBS_W14	RR; SE
OEIP_W2	* the importance of scientific methods in the effective utilisation of production factors in the bioeconomy and the creation of optimal relationships between them.	IBS_W05 IBS_ W06	SE
SKILLS – can:			
OEIP_U1	* carry out an evaluation and critical analysis of the company's interaction with the environment in the bioeconomy and the organisation, including production processes and production structures, and select appropriate methods and tools to solve organisational problems	IBS_U10 IBS_U11	RR, SE
OEIP_U2	* carry out an evaluation and critical analysis of the use of production resources and the production effects achieved in the area of production processes and production structure.	IBS_U10 IBS_U11	RR; SE
OEIP_U3	* communicate in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
OEIP_K1	* fulfil social obligations by thinking and taking action in an entrepreneurial way, taking into account the principles of rational management within the idea of sustainable development	IBS_K02 IBS_K09	RR; SE

Teaching content:	

Lectures	**25 h**
Topics of classes	1. The concept and models of the production system 2. Principles of design and implementation methods of modern production systems 3. Methods of assessing the production system 4. Implementing the project and starting the production process 5. Production resource planning 6. Economics of fixed and current asset management 7. Cost analysis and assessment of production efficiency
Achieved learning outcomes	*OEIP_W1; OEIP_W2*
Methods of verification and principles and criteria of evaluation	Written exam (descriptive and/or test) Rating 3.0 Knowledge and practical skills 51-60% Rating 3.5 Knowledge and practical skills 61-70% Rating 4.0 Knowledge and practical skills 71-80 Rating 4.5 Knowledge and practical skills 81-90% Rating 5.0 Knowledge and practical skills >90% Participation in the final assessment 75%

Project exercises	**25 h**
Topics of classes	1. Analysis of costs and production results 2. Assessment of production efficiency and profitability 3. Analysis of the use of enterprise resources 4. Design and modernisation of the product and production process 5. Research and measurement of employment 6. Designing the production structure 7. Designing schedules in production processes
Achieved learning outcomes	*OEIP_U1; OEIP_U2; OEIP_U3; OEIP_K1*
Methods of verification and principles and criteria of evaluation	Preparation and completion of projects and reports. Rating of reports based on: • Compliance with requirements: Assess whether the report meets all requirements specified by the instructor, including format, length, sources, etc. • Understanding the topic • Project/report structure • Creativity/originality of proposals • Style and language Share in the final assessment: 25%
Achieved learning outcomes	
Methods of verification and principles and criteria of evaluation	Mandatory presence

Literature

Basic	1. Riggs, J.L. (1987). Production systems: Planning, analysis, and control (Wiley series in production/operations management). John Wiley & Sons vol. 4 2. Matowa T.V. (2020). Management of Enterprises and Organizations Under the Conditions of Sustainable Development. International Journal of Management, 11 (4), pp. 151-159, 2020.
Supplementary	Kumar S. Anil; Suresh N. (2008). Production and Operations Management. New Age International (P) Ltd.; 2nd Ed.

Structure of learning outcomes:					
Discipline: agriculture and gardening (RR)				1.0	ECTS*
Discipline: economics and finance (SE)				3.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		55	h	2.2	ECTS*
Incl.	Lectures	25	h		
	Exercises and seminars	25	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		45	h	1.8	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

2.2.

Subject: **Agricultural chemistry and plant nutrition**	
ECTS	4
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Agricultural Chemistry
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
ACH_W1	* general issues about the foundations and interactions of lithospheric chemistry	IBS_W01	RR
ACH_W2	* general issues about the role of nutrients in plants	IBS_W02	RR
ACH_W3	* main sources of ingredients in the soil and their forms of occurrence soil properties in terms of nutrient content	IBS_W09 IBS_W02	RR; SE
ACH_W4	* legal regulations related to the use of fertilisers and their circulation	IBS_W04 IBS_W06	RR
ACH_W5	* environmental protection issues in the context of social needs	IBS_W07	RR; SE
ACH_W6	* principles of carrying out research on environmental phenomena	IBS_W18	RR, SE
SKILLS – can:			
ACH_U1	* correctly assess the physicochemical properties of the soil, including soil acidity and sorption capacity	IBS_U01 IBS_U03	RR; SE

ACH_U2	* assess the level of available nutrients in the soil	IBS_U02	RR; SE
ACH_U3	* determine the doses of fertilisers in terms of the nutritional requirements of plants	IBS_U04	RR
ACH_U4	* select appropriate methods for assessing and identifying chemical threats to the environment	IBS_U05	RR; SE
ACH_U5	* analyse the state and prepare a plan to mitigate or eliminate chemical natural hazards and anthropogenic environmental contamination	IBS_U07	SE
ACH_U6	* communicate in the subject area in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
ACH_K1	* work as part of a team and organise activities in a small team with a goal	IBS_K01	RR
ACH_K2	* perform a laboratory experiment,	IBS_K02	RR; SE
ACH_K3	* make decisions regarding plant fertilisation so that they are compatible with good agricultural practice, comply with the principles of environmental care on a global and local scale and provide education in this area	IBS_K05 IBS_K06 IBS_K09	RR; SE

Teaching content:	
Lectures	**20 h**
Topics of classes	Educational goal: to provide knowledge about the circulation of nutrients in the environment, plant nutrition, assessment of soil sorption capacity and liming needs, chemical composition of various materials, properties and use of organic and mineral fertilisers, impact of fertilisers on plants and the environment, assessment of soil fertility and abundance in nutrients, chemical pollution and global changes on Earth 1. Structure and chemistry of the terrestrial environment, importance of organic matter and soil colloids. 2. Soil fertility, its reaction and transformations of nutrients in the soil. 3. Soil acidity and the need to regulate pH, sorption capacity, buffering capacity of the soil. 4. Nitrogen transformations in the environment, its uptake by plants and circulation in the environment. 5. Macroelements in the environment, their uptake by plants, mobility and digestibility. 6. Trace elements - their role in the mineral nutrition of plants. 7. Legal regulations regarding the use of fertilisers and waste. 8. Basic fertiliser rights. Fertilisation as a way of balancing the balance of nutrients. Nutrient requirements of plants and fertiliser needs. Fertiliser classification. 9. Properties and use of mineral fertilisers (single-component and micro-element) and their impact on the environment. 10. Properties of natural and organic fertilisers and their impact on the environment in the bioeconomy. 11. Natural recycling of waste and its processing possibilities into fertiliser products. 12. Innovations in fertilisation. 13. Carbon dioxide and other greenhouse gases, and global chemical changes on Earth. Forecasts of environmental chemical changes.
Achieved learning outcomes	*ACH_W1, ACH_W2, ACH_W3, ACH_W4, ACH_W5, ACH_W6, ACH_W7, ACH_K2, ACH_K3*
Methods of verification and principles and criteria of evaluation	Passing the lectures: written exam - test and computational tasks or problem questions A percentage scale for assessing learning outcomes was adopted, defined as follows:

	1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the applicable effects for a given component in at least one of the three components (W, U or K) of the subject learning outcomes. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K) of the learning outcomes. 3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U or K) of learning outcomes (average 61-70%). 4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 - average 81-90%) and very good (5.0 - average >90%). Final grade = 0.4 x exam grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student's activity during classes. NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject, based on his/her own teaching experience and observations, formulates an assessment using the formal criteria given above.
Lab exercises	**30 h**
Topics of classes	1. Determination of soil pH and hydrolytic acidity to calculate the dose of calcium fertiliser. 2. Determination of cationic sorption capacity in soil. 3. Determination of the organic carbon content in the soil. 4. Determination of the content of available phosphorus and potassium in the soil using the Egner-Riehm method. 5. Determination of the total content of trace elements and their mobile forms in the soil. 6. Determination of the content of macro and microelements in plant material. 7. Determination of nitrates (V) in plants. 8. Qualitative analysis of nitrogen fertilisers and determination of nitrogen using the formalin method. 9. Determination of the content of water-soluble phosphorus in phosphorus fertilisers. 10. Determination of potassium in potassium and multi-component fertilisers. 11. Determination of the total nitrogen and ammonium content in natural fertilisers. 12. Determination of nitrate(V) content in groundwater. 13. Calculation of the load of trace elements in fertilisers and waste materials. 14. Fertiliser balance for the farm.
Achieved learning outcomes	*ACH_U1, ACH_U2, ACH_U3, ACH_U4, ACH_U5, ACH_U6; ACH_K1*
Methods of verification and principles and criteria of evaluation	The basis for passing the laboratory exercises is: passing each written and oral exercise designated by the instructor; the correctness of the exercises, the correctness of the calculations and the interpretation of the obtained results are assessed. A percentage scale for assessing learning outcomes was adopted, defined as follows: 1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the applicable effects for a given component in at least one of the three components (W, U or K) of the subject learning outcomes. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K) of the learning outcomes. 3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U or K) of learning outcomes (average 61-70%). 4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 - average 81-90%) and very good (5.0 - average >90%). Final grade = 0.4 x exam grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student's activity during classes.

Literature

Basic	1. Antonkiewicz Jacek (red.). 2021. Przewodnik do ćwiczeń z chemii rolnej. Wydawnictwo Uniwersytetu Rolniczego im Hugona Kołłątaja w Krakowie, pp. 288, ISBN 978-83-66602-17-5 2. Lal R. (edit.) 2022. Soil and Fertilizers. Managing the Environmental Footprint. Published by CRC Press, 372. ISBN: 9780429471049. DOI: https://doi.org/10.1201/9780429471049
Supplementary	

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				3.0	ECTS*
Discipline: economics and finance (SE)				1.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		55	h	2.2	ECTS*
Incl.	Lectures	20	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment		h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		2	h	1.8	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

2.3

Subject: **Biotechnology and industrial processes in the bioeconomy**	
ECTS	4
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Microbiology and Biomonitoring
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
BIPB_W1	* concepts and problems in the field of applied biotechnology	IBS_W01	RR
BIPB_W2	* biotechnological processes used in the bioeconomy	IBS_W02, IBS_W08	RR
BIPB_W3	* structure, functions and division of viruses, bacteria, fungi, algae, nematodes, insects and plants used in biotechnology	IBS_W03	RR
BIPB_W4	* biotechnological processes related to the processing of biomass and bioproducts	IBS_W04	RR
SKILLS – can:			
BIPB_U1	* interpret the results of experiments in the field of microorganism cultivation	IBS_U01	RR; SE
BIPB_U2	* produce bioplastic, biogas	IBS_U02	RR; SE
BIPB_U3	* assess the characteristics of selected biomaterials	IBS_U04	RR
BIPB_U4	* use online databases and search engines for scientific publications in the field of biotechnology	IBS_U13	RR; SE

BIPB_U5	* communicate in the subject area in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
BIPB_K1	* engage in further training in a targeted way and organise the learning process and transfer of objective knowledge in the field of biotechnology	IBS_K01	RR
BIPB_K2	* coordinate teamwork and define goals, priorities and methods of implementing specific tasks in laboratory work	IBS_K02	RR; SE
BIPB_K3	* engage in creative cooperation with other people	IBS_K04	RR; SE
BIPB_K4	* function in a world of information overload and * critically evaluate the information acquired	IBS_K08	RR; SE

Teaching content:	
Lectures	**25 h**
Topics of classes	1. A short history of biotechnology, milestones in the development of biotechnology. 2. The importance of biotechnology today - division of biotechnology, benefits, ethical controversies. 3. Viruses - characteristics, importance, diagnostics. 4. Bacteriophages as a specific group of viruses. 5. Bacteria - systematics, morphology, metabolism, model bacteria. 6. Biotechnologies based on bacteria used in the bioeconomy: bacteria supporting plant growth, biofertilisers, biological plant protection products, fermentation and its importance in the bioeconomy, biogas, bioplastics, use of bacteria in food production. 7. Microorganisms - theoretical basis of diagnostics. 8. Fungi - systematics, morphology, metabolism, model species. 9. Mushroom biotechnology: mycorrhizal fungi, Trichoderma, entomopathogenic fungi, industrial processes, antibiotics and other pharmaceuticals, mycotoxins. 10. Yeast in science and bioeconomy. 11. Microalgae in the bioeconomy. 12. Nematodes - characteristics, importance, diagnostics. Caenorhabditis elegans. 13. Insects - characteristics, importance, diagnostics. Insects as a new/old source of food for people and animals. 14. Model plants. 15. Bioeconomy and biotechnology - technologies influencing the development of the bioeconomy on examples, summary.
Achieved learning outcomes	*BIPB_W1, BIPB_W2, BIPB_W3, BIPB_W4, BIPB_K1*
Methods of verification and principles and criteria of evaluation	Written exam, active participation in lectures. The share of lecture evaluation in the final grade is 60%
Lab exercises	**25 h**
Topics of classes	1. Bacterial isolation, laboratory culture, methods, media, materials, equipment. Disk test for bacterial resistance to antibiotics. Bacterial diagnostics - manual methods, cells, colonies, Gram staining, endospores. 2. Bacterial diagnostics - molecular methods. 3. Laboratory cultivation of mushrooms. Isolation, media, inoculation, assessment of sporulation, germination. 4. Cultivation of microalgae in laboratory conditions. 5. Biogas production. 6. Production of polyhydroxyalkanoates. 7. Methods of extracting nematodes from soil and plant material. 8. Laboratory breeding of the mealworm.

	9. Laboratory methods for assessing the physiological state of plants.
Achieved learning outcomes	*BIPB_U1, BIPB_U2, BIPB_U3, BIPB_U4, BIPB_U5; BIPB_K2, BIPB_K3, BIPB_K4*
Methods of verification and principles and criteria of evaluation	Assessment of reports from laboratory experiments performed in groups. The share of exercise assessment in the final assessment is 40%

Literature

Basic	Kreuzer H., Massey A. 2008. Molecular Biology and Biotechnology: A Guide for Students, Third Edition. ASM Press Sivasubramanian V. 2018. Bioprocess Engineering for a Green Environment. CRC Press
Supplementary	Ankeny, R., Leonelli, S. 2021. Model Organisms (Elements in the Philosophy of Biology). Cambridge: Cambridge University Press Kuddus M., Roohi 2021. Bioplastics for Sustainable Development,. Springer Singapore Wellinger A., Murphy J., Baxter D. 2013. The Biogas Handbook. Science, Production and Applications. Woodhead Publishing

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				3.0	ECTS*
Discipline: economics and finance (SE)				1.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		55	h	2.2	ECTS*
Incl.	Lectures	25	h		
	Exercises and seminars	25	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		45	h	1.8	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

2.4

Subject: **Commodity science and quality of bioeconomy products**	
ECTS	4
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Agroecology and Plant Production
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
CS_W1	* basic concepts related to agri-food commodity science, especially related to bioproducts	IBS_W01 IBS_W15	RR, SE
CS_W2	* processing methods, methods of caring for and storing plant and animal raw materials and other bio-products	IBS_W02 IBS_W04	RR, SE
CS_W3	* threats resulting from pollution, contamination of plant and animal raw materials and other bioproducts	IBS_W04	RR, SE
CS_W4	* meaning and functions of packaging	IBS_W04	RR, SE
CS_W5	* the need to improve/adapt quality assessment, standardisation and certification methods for the needs of the bioeconomy	IBS_W07	RR, SE
SKILLS – can:			
CS_U1	* assess the importance and quality of goods and packaging in the economy/bioeconomy	IBS_U04	RR, SE
CS_U2	* carry out the certification process for ecological raw materials	IBS_U06	RR, SE

CS_U3	* assess the impact of the production process of plant raw materials on the environment	IBS_U05	RR, SE
CS_U4	* formulate logical conclusions resulting from the assessment of processing technology of basic plant raw materials	IBS_U03	RR, SE
CS_U5	* communicate in the subject area in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
CS_K1	* perform commodity assessment of raw materials and finished products, expanding knowledge in the field of natural and economic sciences on this basis	IBS_K01	RR, SE
CS_K2	* assess the environmental impact of processes occurring in the economy/bioeconomy	IBS_K07	RR, SE
CS_K3	* cooperate and work in a group to perform a specific task	IBS_K02	RR, SE

Teaching content:	
Lectures	**20 h**
Topics of classes	1. Introduction, basic definitions, evaluation methods and classification of raw materials and finished products. Transformation of food and consumer expectations. 2. The importance of the quality of industrial goods, food raw materials and innovative biomaterials in the economy/bioeconomy. 3. Storage of plant raw materials and their processing from the point of view of the circular economy. 4. Packaging in the economy/bioeconomy.
Achieved learning outcomes	*CS_W1, CS_W2, CS_W3, CS_W4, CS_W5*
Methods of verification and principles and criteria of evaluation	Passing the lectures: written exam - test and computational tasks or problem questions A percentage scale for assessing learning outcomes was adopted, defined as follows: 1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the applicable effects for a given component in at least one of the three components (W, U or K) of the subject learning outcomes. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K) of the learning outcomes. 3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U or K) of learning outcomes (average 61-70%). 4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 - average 81-90%) and very good (5.0 - average >90%). Final grade = 0.4 x exam grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student's activity during classes. NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject, based on his/her own teaching experience and observations, formulates an assessment using the formal criteria given above.
Lab exercises	**30 h**
Topics of classes	1. Commodity and organoleptic evaluation of plant and animal raw materials and finished products. 2. Assessment of adulteration of finished products and raw materials. 3. Analysis of selected certification and standardisation processes used in the economy/bioeconomy. 4. Assessment of packaging used in the economy/bioeconomy.
Achieved learning outcomes	*CS_U1, CS_U2, CS_U3, CS_U4, CS_U5; CS_K1, CS_K2, CS_K3*

Methods of verification and principles and criteria of evaluation	Assessment of the exercises: written assessment - test and computational tasks or problem questions A percentage scale for assessing learning outcomes was adopted, defined as follows: 1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the applicable effects for a given component in at least one of the three components (W, U or K) of the subject learning outcomes. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K) of the learning outcomes. 3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U or K) of learning outcomes (average 61-70%). 4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 - average 81-90%) and very good (5.0 - average >90%). Final grade = 0.4 x exam grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student's activity during classes. NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject, based on his/her own teaching experience and observations, formulates an assessment using the formal criteria given above.

Literature

Basic	1. Food Science and Technology, 2nd Edition, Geoffrey Campbell-Platt (Editor), ISBN: 978-0-470-67342-3 November 2017 Wiley-Blackwell. 2. Fischer R.A., Byerlee D. and Edmeades G.O. 2014. Crop yields and global food security: will yield increase continue to feed the world? ACIAR Monograph No. 158. Australian Centre for International Agricultural Research: Canberra
Supplementary	

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				2.0	ECTS*
Discipline: economics and finance (SE)				2.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		55	h	2.2	ECTS*
Incl.	Lectures	20	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		45	h	1.8	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

2.5

Subject: **Design Thinking**	
ECTS	4
Status	Obligatory
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Management and Business Economics
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
DTW_W1	* principles of using the design thinking method in an institutional environment, with particular emphasis on bioeconomy stakeholders	IBS_W14 IBS_W16	RR; SE
DTW_W2	* principles of group cooperation and values underlying the design thinking method	IBS_W19	SE
SKILLS – can:			
DTW_U1	* define the problem and propose solutions to problems based on the method used	IBS_U03 IBS_U09	RR; SE
DTW_U2	* conduct a design thinking session independently for your own needs or for external entities	IBS_U03 IBS_U12	RR; SE
DTW_U3	* communicate in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
DTW_K1	* take on different roles in the team and cooperation	IBS_K04 IBS_K02	RR; SE
DTW_K2	* think critically and creatively	IBS_K06	RR; SE
DTW_K3	* plan future projects	IBS_K11	RR; SE

Teaching content:	
Lectures	**5 h**
Topics of classes	1. Principles of using the design thinking method in the institutional environment, with particular emphasis on bioeconomy stakeholders 2. Principles of group cooperation and values underlying the design thinking method
Achieved learning outcomes	*DTW_W1, DTW_W2*
Methods of verification and principles and criteria of evaluation	Knowledge of theoretical principles will be verified in the context of the presented project.
Project exercises	**45 h**
Topics of classes	1. Introduction to the subject 2. What is creativity and why is it a key competence in the context of sustainable development 3. Design Thinking process and its application in business development, in particular related to the circular economy 4. Metaplan and Future design as methods for solving key global problems 5. In search of creative inspiration: barriers to a creative approach to problem solving 6. Development and motivation in the creative process: Specificity of the idea generation phase in the creative process 7. Not just brainstorming: a wealth of heuristic techniques supporting the creative process 8. Designing solutions to identified social/economic problems - teamwork 9. Presentation of solutions developed in the design thinking process
Achieved learning outcomes	*DTW_U1, DTW_U2, DTW_U3; DTW_K1, DTW_K2*
Methods of verification and principles and criteria of evaluation	The student receives credit for the course based on the grade obtained during the course and the prepared project. 1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the applicable effects for a given component in at least one of the three components (W, U or K) of the subject learning outcomes. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K) of the learning outcomes. 3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U or K) of learning outcomes (average 61-70%). 4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 - average 81-90%) and very good (5.0 - average >90%). The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject and based on his/her own teaching experience, formulates an assessment using the formal criteria given above.

Literature

Basic	1. Lewerick M., Link P., Leifer L., The Design Thinking Toolbox. A guide to mastering the most popular and valuable innovation methods, John Wiley & Sons, Inc. Hoboken, New Jersey, 2020 2. Belsky S., *Make ideas happen,* Penguin Books, London 2010
Supplementary	Tim Brown ,Change by Design: How Design Thinking Transforms Organisations and Inspires Innovation.

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)	1.0	ECTS*

Discipline: economics and finance (SE)				3.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		55	h	2.2	ECTS*
Incl.	Lectures	5	h		
	Exercises and seminars	45	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		45	h	1.8	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

2.6

Subject: **Soil quality, resources and protection**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Soil Science and Agrophysics
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
QRPS_W1	* the role of the soil and the processes occurring between it and other components of the natural environment	IBS_W01	RR
QRPS_W2	* the impact of anthropopressure on the transformation of soil cover	IBS_W02	RR
QRPS_W3	* the issue of the use and non-reproduction of soil resources	IBS_W17	RR
QRPS_W4	* principles of land valuation classification and separation of soil and agricultural complexes	IBS_W01 IBS_W05	RR
QRPS_W5	* principles for assessing the quality and suitability of soil for production	IBS_W05	RR
QRPS_W6	* environmental protection issues in the context of bioeconomy and social needs	IBS_W18	RR; SE
SKILLS – can:			
QRPS_U1	* obtain scientific information from various reliable sources, including the Internet, use scientific literature, * read and understand scientific texts in English	IBS_U01 IBS_U05	RR; SE

QRPS_U2	* use programs supporting the collection, processing and presentation of data	IBS_U13 IBS_U14	RR; SE
QRPS_U3	* perform valuation and agroecological classification of land	IBS_U14	RR; SE
QRPS_U4	* assess the impact of anthropopressure on the condition of the soil environment	IBS_U05 IBS_U08	RR; SE
QRPS_U5	* communicate in the subject area in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
QRPS_K1	* cooperate and work in a group and participate in discussions	IBS_K01 IBS_K04	RR; SE
QRPS_K2	* deepen their own sensitivity to the preservation of natural environmental resources while providing skilful advice in obtaining food and raw materials	IBS_K05 IBS_K07	SE
QRPS_K3	* responsible decision-making within professional activities, including responsibility for the quality of the soil environment and its proper development	IBS_K08 IBS_K09	RR; SE

Teaching content:	
Lectures	**30 h**
Topics of classes	1. Soil definition. Soil functions 2. The role of soil in the environment 3. Soil resources as a basic component of the environment 4. Various ways of using soil in Poland and in the world 5. Development of soil classification systems, global and national soil classifications 6. Soil as an environment for the growth of crops 7. Agroecological classification of land 8. Processes that degrade soil resources 9. Physical degradation of soil 10. Chemical degradation of soil 11. Biological degradation of soil 12. The issue of recultivation of areas degraded and devastated as a result of human activity 13. Soil quality indicators 14. ISO standards used in assessing the quality and health of arable soils 15. Advantages and disadvantages of using various soil quality indicators
Achieved learning outcomes	*QRPS_W01, QRPS_W02, QRPS_W03, QRPS_W04, QRPS_U01, QRPS_K02*
Methods of verification and principles and criteria of evaluation	Written test assessment: To pass, one must answer at least 60% of the questions correctly. The share of lecture evaluation in the final grade is 50%.
Exercises	**15 h**
Topics of classes	1. Soil formation. Soil-forming factors 2. Construction of the soil profile 3. Soil as a living organism 4. Basics of soil classification 5. Principles of soil classification according to USDA Soil Taxonomy 6. Principles of soil classification according to WRB 7. Comparison of national soil classification systems

Achieved learning outcomes	*QRPS_W4, QRPS_W5, QRPS_W6 QRPS_U1, QPRS_U5*
Methods of verification and principles and criteria of evaluation	Assessment of individual projects, colloquium and participation in discussions. The share of lecture evaluation in the final grade is 20%.

Lab exercises	**15 h**
Topics of classes	1. Methods for determining basic soil properties 2. Soil recognition 3. Principles of soil valuation and determining soil-agricultural complexes. Determining the affiliation of soils to appropriate complexes on model profiles 4. Assessment of soil quality in the field 5. Assessment of soil quality based on physical parameters 6. Assessment of soil quality based on chemical parameters 7. Assessment of soil quality based on biological parameters
Achieved learning outcomes	QRPS_W4, QRPS_W5, QRPS_U1, QRPS_U2, QRPS_U3, QRPS_U4, QPRS_U5; QRPS_K1, QRPS_K2, QRPS_K3
Methods of verification and principles and criteria of evaluation	Assessment of individual projects and participation in discussions. The share of lecture evaluation in the final grade is 20%.

Field trip	**15 h**
Topics of classes	1. Assessment of the quality of soils transformed by humans 2. Assessment of soil quality in agricultural space
Achieved learning outcomes	QRPS_W2, QRPS_W5, QRPS_U3, QRPS_U4, QRPS_K1, QRPS_K2, QRPS_K3,
Methods of verification and principles and criteria of evaluation	Report on field exercises. The share of the assessment of field activities in the final assessment is 10%

Literature

Basic	1. Bünemann et al. 2018, Soil quality – A critical review, Soil Biology and Biochemistry 120 (2018) 105–125 2. Osman 2014, Soil Degradation, Conservation and Remediation, Springer Dordrecht, pp. 237 3. Charzyński P., Kabała C., Bednarek R. WRB – World Reference Database of Soil Resources 2014 - International soil classification system, update 2015. Polish Soil Science Society, 2015 4. Soil Survey Staff. 2014. Keys to Soil Taxonomy, 12th ed. USDA-Natural Resources Conservation Service, Washington, DC. 5. Food and agriculture organization of the united nations, Rome. 2006. Guidelines for soil description 6. Hillel, Daniel. Soil in the environment: crucible of terrestrial life. Elsevier, 2007.
Supplementary	1. Nielsen M.N. Winding A. Binnerup S. Microorganisms as indicators of soil health. Denmark: National Environmental Search institute, 2002. 2. Current publications recommended by the teacher

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				4.0	ECTS*
Discipline: economics and finance (SE)				1.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		80	h	3.2	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	45	h		
	Consultations	3	h		

	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		40	h	1.8	ECTS*

2.7

Subject: ISO quality auditor	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Agricultural and Environmental Chemistry
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
AJI_W1	* quality management system requirements in accordance with the guidelines of the ISO 9001:2015 standard * ideological assumptions and requirements of ISO 59000 standards (circular economy standards) * assumptions and requirements of sustainable biomass certification systems (REDcert and KZR INIG)	IBS_W07	RR, SE
AJI_W2	* goals of creating quality management systems and business benefits from improving the effectiveness of quality management systems * goals of creating a management system in closed-loop product manufacturing processes * basics of process design in a closed economy	IBS_W05 IBS_W13	RR, SE
AJI_W3	* functioning of the Deming cycle in production and auxiliary processes	IBS_W14	RR, SE
AJI_W4	* the role and responsibilities of the auditor in planning, conducting, reporting and continuing the internal audit, in accordance with the ISO 19011 standard	IBS_W14	RR, SE
AJI_W5	* the importance of risk analysis in shaping the quality management system and the role of risk analysis in the process of optimisation of system excellence	IBS_W16	RR, SE

AJI_W6	* competence requirements for people involved in the creation, administration and continuous improvement of the quality management system	IBS_W16	RR, SE
AJI_W7	* values underlying social and economic development and the conditions shaping them	IBS_W16	RR, SE
	SKILLS – can:		
AJI_U1	* create a process map for any organisation	IBS_U02 IBS_U03	RR, SE
AJI_U2	* define the organisational context and development-oriented quality policy	IBS_U03 IBS_U10	RR, SE
AJI_U3	* conduct risk analysis in accordance with the ISO 31000:2018 Standard and develop system documents (procedures, risk analysis forms) * define strategic process areas in the context of the possibility of implementing elements of the circular economy * conduct a risk analysis for system modification related to the implementation of elements of the circular economy	IBS_U09	RR, SE
AJI_U4	* develop an audit plan, audit objectives, audit criteria and * conduct an audit of the quality management system (conduct opening and closing meetings)	IBS_U08	RR, SE
AJI_U5	* define nonconformances in the context of checkpoints	IBS_U10	RR, SE
AJI_U6	* create post-audit documentation and plan corrective actions	IBS_U10	RR, SE
AJI_U7	* communicate in the subject area in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
AJI_K1	* create the organisational context and quality policy taking into account the following aspects: economic, sustainable development,	IBS_K01	RR, SE
AJI_K2	* uphold respect for human rights, animal rights and environmental and do climate protection work in the area of conducting audits and inspections	IBS_K03	RR, SE
AJI_K3	* conduct processes in quality management systems while maintaining the ethical principles of equal treatment regardless of nationality, gender, social status, religion or sexual orientation	IBS_K09	RR, SE
AJI_K4	* carry out an objective assessment of compliance of processes with specific requirements of legal and normative documents	IBS_K04	RR, SE
AJI_K5	* conduct audits using techniques adapted to the cultural, religious and social conditions, intellectual level and specific expectations of the audited party	IBS_K07	RR, SE
AJI_K6	* identify and solve problems related to the quality of products and services organising work in a small team to perform the exercise	IBS_K02	RR, SE

Teaching content:	
Lectures	**30 h**
Topics of classes	• The concept of quality - the evolution of the concept in historical terms. Factors shaping quality requirements in the production of products and services. • The language of the standard and the approach to the issue of interpretation of provisions in normative documents.

	• Establishment of the 9001:2015 standard regarding the creation and administration of a quality management system. • Basics of the circular economy system from the perspective of quality management. Methodology for determining the system boundary and documentation needs. • Assumptions and general requirements of the ISO 59000 family of standards • Discussion of individual chapters of the ISO 9001:2015 standard. • Objectives, structure and benefits related to the implementation of a quality management system in the area of production and services. • Risk analysis as a quality management tool. Basics of creating a risk analysis. • Competency requirements for process owners and auditors, management of staff implementing processes. • Auditing methods, methodology for obtaining, archiving and interpreting audit evidence. • Basics of non-conformity management. • Ethics in quality management and auditing processes.
Achieved learning outcomes	*AJI_W1, AJI_W2, AJI_W3, AJI_W4, AJI_W5, AJI_W6, AJI_W7*
Methods of verification and principles and criteria of evaluation	Lectures - oral assessment with grade (open questions) A percentage scale of educational outcomes was adopted, defined as follows: 1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 55% of the applicable effects for a given component in at least one of the three components (W, U, K) of the subject learning outcomes. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 55% of the applicable effects for a given component in each of the three components (W, U, K) of the subject learning outcomes. 3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U, K) of learning outcomes (average 61-70%). 4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 average 81-90%) and very good (5.0 - average >90%). NOTE: The teacher formulates a grade based on the student's degree of mastery of the applicable curriculum content of a given subject, using the formal criteria given above.
Exercises	**30 h**
Topics of classes	1. Methodology for mapping processes in the organisation. 2. Creating the organisational context. 3. Risk assessment methods in quality management systems (QMS). 4. Methodology for designing processes in the circular economy. 5. Methods for assessing the effectiveness of implementing the circular economy (LCA Life cycle assessment). 6. Risk analyses as an assessment of the impact of uncertainty on goals - case studies. 7. Methodology for creating procedures. 8. Methodology for creating forms and other procedural documents. 9. Planning audits, creating pre-audit documents. 10. Methods of creating checklists for internal audits. 11. Auditing techniques - effective acquisition of objective audit evidence. 12. Methods of archiving audit evidence. 13. Interpretation of evidence in the context of achieving audit objectives. 14. Formulating non-compliances, preparing post-audit documents. 15. Audit in practice, exercises - workshops.
Achieved learning outcomes	*AJI_U1, AJI_U2, AJI_U3, AJI_U4, AJI_U5, AJI_U6, AJI_U7, AJI_K1, AJI_K2, AJI_K3, AJI_K4, AJI_K5, AJI_K6*

Methods of verification and principles and criteria of evaluation	Completion of each task based on an assessment test: - performing computational tasks solved individually, - ability to interpret the obtained results. Final grade from exercises: average of partial grades from individual tests A percentage scale for assessing learning outcomes was adopted, defined as follows: 1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the applicable effects for a given component in at least one of the three components (W, U or K) of the subject learning outcomes. 2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K) of the learning outcomes. 3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U or K) of learning outcomes (average 61-70%). 4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 - average 81-90%) and very good (5.0 - average >90%). NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject, formulates an assessment using the formal criteria given above.

Literature

Basic	1. PN-EN ISO 9001:2015 Quality management systems — Requirements 2. ISO/DIS 59010 Circular Economy — Guidance on the transition of business models and value networks 3. ISO 19011:2018 Guidelines for auditing management systems 4. ISO 31000: 2018 Risk management 5. Elezue P. 2022 Quality Management System Handbook: Basic Handbook on Quality Assurance/Quality Control, Inspection, Management System and Evolution of ISO 9000 6. Gray I., Manson S., Crawford L. 2019. The Audit Process. Principles, Practice and Cases. Published by Cengage Learning EMEA
Supplementary	1. Hewitt D. 2018. Quality Management Systems A guide to ISO 9001: 2015 Implementation and Problem Solving: Revised - 2nd edition June 2018. Published by Lightning Source Inc. 2. Pieternel A. Luning and Willem J. 2020. Food quality management technological and managerial principles and practices. Wageningen Academic Publishers. eISBN: 978-90-8686-899 3. Niemiec M., Komorowska M., Szeląg-Sikora A., Sikora J, Kuboń M., Gródek-Szostak Z. Kapusta-Duch J. 2019. Risk assessment for social practices in small vegetable farms in Poland as a tool for the optimization of quality management systems. Sustainability, vol. 11(14,): 1-10. 4. Dhanasekharan N. 2017. ISO 9001 Quality management systems. Springer-Verlag GmbH, ISBN: 3319543822 5. Pyzdek T., Keller P. 2013. Handbook for Quality Management, Second Edition: A Complete Guide to Operational Excellence. Published by McGraw-Hill Education

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				2.5	ECTS*
Discipline: economics and finance (SE)				2.5	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				

	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

2.8

Subject: **Marketing and management on an organic farm**	
ECTS	5
Status	Elective
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Business Management and Economics
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
MiZ_W1	* basic principles of decision-making and management of an organic farm marketing instruments on an organic farm regarding product development,	IBS_W16	RR; SE
MiZ_W2	* providing services, setting prices and communicating the farm with the market	IBS_W06	RR, SE
MiZ_W3	* consumer behaviour on the organic products market	IBS_W15 IBS_W16	RR; SE
SKILLS – can:			
MiZ_U1	* propose marketing activities for an organic farm	IBS_U08	RR; SE
MiZ_U2	* use basic indicators for assessing the efficiency of organic farm management	IBS_U05	RR; SE
MiZ_U3	* plan, organise and carry out individual or teamwork	IBS_U14	RR; SE

MiZ_U4	* communicate in the subject area in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
MiZ_K1	* cooperate towards achieving common goals	IBS_K04	RR; SE
MiZ_K2	* expand knowledge in the area of marketing and management on an organic farm	IBS_K01 IBS_K11	RR; SE

Teaching content:	
Lectures	**30 h**
Topics of classes	Marketing and management – the specificity of an ecological farm Management of organic farm resources Consumer on the ecological products market Ecological products as marketing products Price formation on the ecological products market Specificity of promotion of ecological products Specificity of the distribution of ecological products
Achieved learning outcomes	*MiZ_W1; MiZ_W2; MiZ_W3*
Methods of verification and principles and criteria of evaluation	*Written assessment in a mixed form (single-choice test questions, true, false and open questions)* *The condition for passing the exam is obtaining a positive grade for completing the practical part.* *At least 50% of correct answers must be given for a positive mark.* *Final grade of classes = 0.5 x grade from lectures + 0.5 x grade from exercises*
Project exercises	**30 h**
Topics of classes	Conditions for the operation of organic farms - identification of opportunities and threats arising from the environment Tools supporting organic farm management Basic indicators for assessing the efficiency of organic farm management Product strategies on organic farms Distribution channels of ecological products Basic methods of shaping the prices of ecological products System for promoting ecological products Final colloquium
Achieved learning outcomes	*MiZ_U1; MiZ_U2; MiZ_U3; MiZ_U4; MiZ_K1; MiZ_K2*
Methods of verification and principles and criteria of evaluation	Grade from the final test + grade from the prepared speech + evaluation of activity in classes + observation of individual and team behaviour (in terms of social competences). To pass, you must obtain at least 50% of the points in the final test. Final grade of classes = 0.5 x grade from lectures + 0.5 x grade from exercises.

Literature	
Basic	Podstawy ekonomiki i organizacji gospodarstw rolniczych. Wyd. SGGW, Warszawa. Gębska M, Filipiak T, 2006. Marketing ekologicznych produktów żywnościowych. Nestorowicz R., Pilarczyk B., 2010 Wirtualne pole – realne produkty. Innowacyjne rozwiązania rynkowe dla rolników i konsumentów. Czekaj M., Jędrszczyk E.S., Musiał W., Patoła G., Piecuch J., Puchała J., Puła J. 2022

Supplementary	Ekonomika handlu żywnością i produktami rolnymi. Urban S., Olszańska A. (red.). 2015. https://www.gov.pl/web/kowr Rola małych gospodarstw rolnych. Diagnoza i perspektywy na przyszłość na przykładzie podregionu rzeszowskiego. Czekaj M., Szafrańska M., Żmija K., Satoła Ł., Płonka A., Żmija D., Tyran E., Puchała J., 2020.

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				1.0	ECTS*
Discipline: economics and finance (SE)				4.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

2.9

Subject: **Sustainable innovation in the modern world**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Economics and Food Economy
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
SIC_W1	* has basic knowledge of the knowledge-based bioeconomy, knows its structure and goals as well as the determinants of its development;	IBS_W05 IBS_W10 IBS_W18	RR; SE
SIC_W2	* recognises the threats and risks arising from the functioning of the knowledge-based bioeconomy, with a particular focus on ongoing start-up activities	IBS_W11	SE
SIC_W3	* changes in the socio-economic structure resulting from the adopted management paradigm and the implementation of the structures of the knowledge-based bioeconomy, as well as the relationships between the economy and society and the creation of knowledge resources; economic and institutional conditions of the knowledge-based bioeconomy, especially from a regional perspective, taking into account the impact of processes taking place in the national and global economy	IBS_W13	SE
SKILLS – can:			
SIC_U1	* assess the social and economic impact of startup production systems and products	IBS_U05	SE
SIC_U2	* make a socio-economic analysis of creating and running a startup in the area of knowledge-based bioeconomy	IBS_U09	SE
SIC_U3	* plan a market strategy for biomass and bio-based products	IBS_U11	RR; SE

SIC_U4	* use online databases and search engines for scientific publications in the field of social sciences	IBS_U13	SE
SIC_U5	* prepare a project, including a business model for a startup offering products from biomass and bio-based products	IBS_U14	SE
SIC_U6	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
SIC_K1	* engage in further training in a targeted way and organise the learning process and transfer of objective knowledge about the creation and operation of startups that offer bio-based products	IBS_K01	RR; SE
SIC_K2	* coordinate teamwork and organise project work, during which they determine the goals and priorities of the next stages of startup creation	IBS_K02	RR; SE
SIC_K3	* engage in creative cooperation with other entities of startup ecosystems in the context of the knowledge-based bioeconomy	IBS_K04	RR; SE
SIC_K4	* speak publicly on biomass and bio-based products and for constructive discussion on topics related to the functioning of startup enterprises closely related to the knowledge-based bioeconomy	IBS_K05	RR; SE
SIC_K5	* provide knowledge about socio-economic problems, including threats to the functioning of startups in conditions of extreme uncertainty, dynamic changes on the market, taking into account the development of new technologies, using substantive argumentation	IBS_K07	SE
SIC_K6	* anticipate socio-economic needs and planning business solutions	IBS_K11	RR, SE

Teaching content:	
Lectures	**30 h**
Topics of classes	1. The essence of the knowledge-based bioeconomy and methods of its measurement 2. Development mechanisms, strategies for creating and implementing a knowledge-based bioeconomy 3. The knowledge-based bioeconomy and regional innovation and competitiveness 4. The process of creating the foundations of a knowledge-based bioeconomy in Europe and around the world 5. The future of the knowledge-based bioeconomy 6. The state of advancement of the knowledge-based bioeconomy in the European Union countries and other regions of the world
Achieved learning outcomes	*SIC_W1; SIC_W2, SIC_W3*
Methods of verification and principles and criteria of evaluation	A written form of knowledge testing - multiple choice test consisting of 25 questions 50%-60% 3.0 61%-70% 3.5 71%-80% 4.0 81%-90% 4.5 91%-100% 5.0
Exercises	**30 h**
Topics of classes	1. Startups and startup ecosystems – introduction to basic issues 2. Startups in the knowledge-based bioeconomy - biomass and bio-based products 3. Methods of creating projects in the bioeconomy 4. How to use the lean canvas tool

	5. Prototyping 6. Persona - characteristics of the target group 7. Startup speech and business presentations
Achieved learning outcomes	*SIC_U1; SIC_U2; SIC_U3; SIC_U4; SIC_U5; SIC_U6; SIC_K1; SIC_K2; SIC_K3, SIC_K4, SIC_K5; SIC_K6*
Methods of verification and principles and criteria of evaluation	The assessment is based on a prepared group project consisting of elements such as: lean canvas for the startup being created, profiling of the target group, product prototype and startup speech.

Literature

Basic	1. Dirk Lanzerath, Ulrich Schurr, Christina Pinsdorf, Mandy Stake (2022) Bioeconomy and Sustainability, Springer Nature Switzerland AG 2. Mika Sillanpää (2017) A Sustainable Bioeconomy, Springer-Verlag GmbH 3. Iris Lewandowski (2018) Bioeconomy, Springer Nature Switzerland AG 4. Steve Blank, Bob Dorf (2013) Startup Handbook. Building a great company step by step. 5. Eric Ries (2017) The Lean Startup method. Use innovative tools and create a company that will conquer the market.
Supplementary	1. Pyka A., Prettner K., 2018, Economic Growth, Development, and Innovation: The Transformation Towards a Knowledge-Based Bioeconomy, in: Lewandowski I, 2018, Bioeconomy. Shaping the Transition to a Sustainable, Biobased Economy, Springer, s. 331-342 2. Thran D., Bezama A., 2017, The knowledge-based bioeconomy and its impact in our working field, Waste Management & Research 2017, vol. 35(7), s. 689–690 3. Virgin I., Fielding M., Fones Sundell M., Hoff H., Granit J., 2017, Benefits and Challenges of a New Knowledge Based Bioeconomy, in: Virgin I., Morris E.J. (red.), 2017, Creating Sustainable Bioeconomies: The bioscience revolution in Europe and Africa, Routledge Studies in Ecological Economics

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				1.0	ECTS*
Discipline: economics and finance (SE)				4.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

2.10

Subject: **Global raw material security**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	2
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Soil Science and Agrophysics
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
BSP_W1	* phenomena related to the formation of deposits of non-renewable raw materials and processes leading to the replenishment of renewable raw material resources	IBS_W02	RR; SE
BSP_W2	* environmental threats arising from the extraction and processing of raw materials and the consequences associated with the depletion of their resources	IBS_W05	RR; SE
BSP_W3	* economic and institutional conditions related to renewable raw material and energy resources in a global context	IBS_W13	RR; SE
SKILLS – can:			
BSP_U1	* assess the environmental, social and economic impacts related to the exploitation of environmental resources	IBS_U05	RR; SE
BSP_U2	* make a critical analysis of the functioning of existing solutions for raw materials and energy management	IBS_U08	RR; SE
BSP_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
BSP_K1	* communicate knowledge about the problems of commodity security in a global perspective and about the directions of socio-economic development, using sound reasoning	IBS_K07	IBS_K07

BSP_K2	* function in a world of information overload and critically evaluate the information acquired	IBS_K08	IBS_K08
BSP_K3	* consciously implement and apply the idea of sustainable development in relation to raw materials and energy management	IBS_K09	IBS_K09

Teaching content:	
Lectures	**30 h**
Topics of classes	1. Introduction to the geological structure of the Earth, Part I AND 2. Introduction to the geological structure of the Earth, Part II 3. Hydrosphere and atmosphere as a source of raw materials 4. Geology of deposits, definition of a deposit, categorisation of deposits, methods of investigation, determination of the quality and richness of a deposit and the extraction of raw materials 5. Legal provisions on the exploitation of minerals and other geological work 6. Energy sources, Part I: Coal and peat deposits 7. Energy sources, Part II: Oil and gas deposits 8. Metallic raw materials, Part I: Introduction, iron ore deposits 9. Metallic raw materials, Part II: Non-ferrous metal ore deposits 10. Metallic raw materials, Part III: Resources of rare metal ores 11. Resources of chemical, building and road construction materials for the cement industry and agriculture 12. Resources of raw materials for the glass, ceramics and refractory industries, for environmental protection and for medicinal and thermal water 13. Agriculture as a source of raw materials and energy 14. Renewable sources of raw materials and energy, development prospects, financing and threats 15. Sustainable use of raw materials, balance of raw material management
Achieved learning outcomes	*BSP_W1, BSP_W2, BSP_W3*
Methods of verification and principles and criteria of evaluation	A written form of checking student's knowledge - selection and completion test. The condition for obtaining a positive grade is to provide at least 50% correct answers. Satisfactory grade (3.0): is awarded if the student obtains at least 50-60% of the required number of points, satisfactory plus (3.5) 61-70%, good (4.0) 71-80%, good plus (4, 5) 81-90% and very good (5.0) for >90% of points. The share of lecture grades in the final grade: 60%. Note: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject and engagement in classes, based on his/her own teaching experience, formulates an assessment using the formal criteria given above.
Project exercises	**15 h**
Topics of classes	1-5. Case study: Raw material resources in Europe and Asia, analysis and discussion based on available materials 6-10. Case study: Raw material resources of Africa, Australia and Oceania and Antarctica, analysis and discussion based on available materials 11-15. Case study: Raw material resources of North America and South America, analysis and discussion based on available materials
Achieved learning outcomes	*BSP_U1, BSP_U2, BSP_U3; BSP_K1, BSP_K2, BSP_K3*
Methods of verification and principles and criteria of evaluation	Assessment of individual work and involvement in the discussion. The share of the grade from the auditorium exercises in the final grade: 20%.
Field trips	**15 h**

Topics of classes	1. Field trip part I: Determining the impact of former extraction of raw materials on the landscape of the southern regions of Krakow, development of post-mining areas, reconstruction of water relations. 2. Field trip part II: Bus trip, Krakow area. Getting to know the specificity and regional diversity of the area covered by the trip. Presentation of the characteristic features of the natural and anthropogenic environment related to raw material management and obtaining energy from renewable sources.
Achieved learning outcomes	BSP_U1, BSP_U2, BSP_U3; BSP_K1, BSP_K2, BSP_K3
Methods of verification and principles and criteria of evaluation	Mandatory presence and active participation in field exercises. Keeping documentation (including photographic documentation), recognising cause and effect relationships. Preparing a report including a description of the sites visited and defending the report. The share of the grade from field exercises in the final grade: 20%.

Literature

Basic	1. Chernoburova O., Chagnes A. 2023. Mining and Processing Residues: future's source of critical raw materials, Elsevier 2. Bustillo Revuelta M. 2017. Mineral Resources: from exploration to sustainability assessment, Springer 3. Bolewski A., Gruszczyk H., Gruszczyk E. 1990. Zarys gospodarki surowcami mineralnymi, Wyd. Geolog. Warszawa
Supplementary	1. Brożek S., Błońska E., Lasota J., Pacanowski P. Zwydak M., Gruba P., Wanic T., Gąsiorek M., Mazurek R., Nicia P., Zadrożny P., Zaleski T. 2013. Gleby w środowisku przyrodniczym i krajobrazach Europy. Wydawnictwo Uniwersytetu Rolniczego w Krakowie 2. Piwocki M., Przeniosło S. 2004. Mineral raw materials and commodities of Poland. Przegląd Geologiczny, 52(8/2), 744-752

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				3.0	ECTS*
Discipline: economics and finance (SE)				2.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

3.1

Subject: **Economics of sustainable development and natural resources**	
ECTS	5
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Economics and Food Economy
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
EZN_W1	* the process of developing the economic system towards a sustainable economy	IBS_W11	RR; SE
EZN_W2	* the concept of the circular economy, the sustainable, circular bioeconomy, the social economy and associated with this	IBS_W10	RR; SE
EZN_W3	* a framework for sustainable development that forms the basis of life	IBS_W12 IBS_W19	RR; SE
EZN_W4	* examples of the adaptation of the principles of sustainable development in economic practise	IBS_W14 IBS_ W16	RR; SE
EZN_W5	* the importance of economic entities in the circular economy, the bioeconomy and the social economy	IBS_W12	RR; SE
EZN_W6	* the nature and role of natural resources in the economy	IBS_W06	RR; SE
EZN_W7	* principles of sustainable management and valuation of natural resources	IBS_W07 IBS_W13	RR; SE

SKILLS – can:			
EZN_U1	* determine the level of natural resources and characterise them according to their types, also in a geographical context	IBS_U09	SE
EZN_U2	* describe a model for managing the use of the world's natural resources to ensure their availability into the future	IBS_U07 IBS_U11	SE
EZN_U3	* design a service/product that fits into the circular bioeconomy model	IBS_U07 IBS_U03	RR; SE
EZN_U4	* analyse the supply chain and product life cycle in the context of a sustainable development economy model (e.g. circular economy)	IBS_U07 IBS_U09	SE
EZN_U5	* interpret and analyse the effects of economic decisions in the environmental, economic and social context	IBS_U08 IBS_U09	SE
EZN _U6	* formulate arguments and discuss issues in the context of the assumptions of sustainable development economics	IBS_U12 IBS_U14	RR; SE
EZN_U7	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
EZN _K1	* engage in innovative thinking and team cooperation	IBS_K02 IBS_K04	RR; SE
EZN _K2	* engage in critical reflection on the responsibility, risk and economic, social and environmental effects of the circular bioeconomy and 'business as usual'	IBS_K06	RR; SE
EZN _K3	* learn about and develop an understanding of the economic process in the context of constant change	IBS_K01	RR; SE

Teaching content:	
Lectures	**30 h**
Topics of classes	1. Evolution of economic thinking - from a fossil fuel- based economy to a circular bioeconomy 2. General equilibrium models. Economic growth, pollution and consumption of natural resources 3. Supply of natural resources, demand and distribution of the Earth's natural resources 4. Static partial equilibrium (external effects, public goods, Coase theorem, Pigou tax) 5. Static partial equilibrium on the market - estimation of the value of natural resources 6. Dynamic partial equilibrium models - non-renewable resources 7. Dynamic partial equilibrium models - renewable resources 8. Sustainable development as a framework for the functioning of the economy 9. Assumptions, principles and instruments of the circular economy 10. Assumptions, principles and instruments of the bioeconomy 11. Assumptions, principles and instruments of the social economy 12. Institutional environment and its role in sustainable development
Achieved learning outcomes	EZN_W1, EZN_W2, EZN_W3, EZN_W4, EZN_W5, EZN_W6, EZN_W7
Methods of verification and principles and criteria of evaluation	Lectures: written or oral exam. For the written exam: 10 essay questions. For each you can get from 0-3 points. To pass, you must have at least 16 points.

	16-18 dst (satisfactory) 19-21 dst+ (satisfactory plus) 22-24 db (good) 25-27 db+ (good plus) 28-30 bdb (very good) In relation to the oral exam - the student answers 3 complex questions. Each is rated individually on a conventional scale of unsatisfactory (ndst) to very good (bdb). Then the arithmetic mean is taken. The exam grade is 50% of the course grade
Exercises	**30 h**
Topics of classes	1. Economy and environment – relationships, challenges and problems. 2. Supply, demand and allocation of the Earth's natural resources. 3. Methods of valuation of the value of natural resources. 4. Non-renewable resources - Hotelling's rule. 5. Renewable resources - maximum sustainable income, forestry, fishing. 6. Renewable energy sources. 7. Sustainable cities. 8. Sustainable food. 9. Sustainable fashion. 10. Sustainable energy.
Achieved learning outcomes	*EZN_U1, EZN_U2, EZN_U3, EZN_U4, EZN_U5, EZN_U6, EZN_U7; EZN_K1, EZN_K2, EZN_K3*
Methods of verification and principles and criteria of evaluation	Final colloquium. Rating 2.0: less than 50% correct answers. Rating 3.0: <50-60% correct answers Rating 3.5: <60-70% correct answers Rating 4.0: <70-80% correct answers Rating 4.5: <80-90% correct answers Rating 5.0: 90% and more correct answers And a presentation/project made by groups of students assessed based on the criteria: • Substantive content • Form and technique of content presentation • Degree of audience involvement The grade for the test and presentation/project is an arithmetic average. The grade for the exercises constitutes 50% of the grade for the course.90%

Literature

Basic	Sachs J.D., 2015, The Age of Sustainable Development, Columbia University Press. Tietenberg T., Lewis L., 2018, Natural and Environmental Resource Economics, Routledge.
Supplementary	Kopina H., Poldner K., 2022, Circular Economy. Challenges and Opportunities for Ethical and Sustainable Business, Routledge. Karp L. (2017) Natural Resources as Capital, The MIT Press Wheetman C., 2021, A circular economy handbook, 2nd Edition, Kogan Page Potter C., 2021, Welcome to the circular economy, An Hachette UK Company. Anderson D.A., 2019, Environmental Economics and Natural Resource Management, 5th Edition, Routledge.

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)	1.0	ECTS*
Discipline: economics and finance (SE)	4.0	ECTS*

Structure of student activity

Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

3.2

Subject: **Biofuels and biorefining**	
ECTS	5
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Bioprocess Engineering, Energy and Automation
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
BIB_W1	* phenomena and processes occurring in the biosphere, related to biological and chemical processes	IBS_W02 IBS_W03	RR; SE
BIB_W2	* facts about the biology of bio-fuel raw materials useful for solving problems related to renewable energy sources and waste management	IBS_W04 IBS_W08 IBS_W17	RR; SE
SKILLS – can:			
BIB_U1	* plan and conduct experiments (under the supervision of a supervisor)	IBS_U01 IBS_U02 IBS_U10	RR; SE
BIB_U2	* perform measurements, interpret the obtained results related to the production of liquid, solid and gaseous biofuels, measure the obtained fuel, interpret the obtained results and draw conclusions	IBS_U04 IBS_U08	RR; SE
BIB_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
BIB_K1	* think and act in an entrepreneurial way	IBS_K02 IBS_K10	RR; SE

Teaching content:	
Lectures	**30 h**
Topics of classes	1. Basic concepts in the field of bioenergy (energy units, heat of combustion, calorific value, energy efficiency, energy efficiency). 2. Forecasts of the production volume of biofuel raw materials and biofuels in the country and in the world (comparison with other renewable energy sources and conventional fuels). 3. General characteristics of biofuel raw materials of plant and animal origin (energy plantations, waste biomass) and biofuels (need to apply the physico-chemical parameters of biofuels to the operational parameters of technical combustion equipment - boilers, engines). 4. Waste biomass as a biofuel raw material (waste from animal production and agri-food processing). Bread, grain, straw - general physical and chemical characteristics. 5. Industrial technologies for producing solid biofuels. Technical devices in technological lines. Basic operational parameters of technological lines. 6. Comparison of design and operational parameters of devices for burning biomass and biofuels and burning conventional fuels. 7. Legal and organisational conditions for generating electricity from biomass (green certificates). 8. Industrial technologies for producing biogas and producer gas. Technical devices in technological lines. Basic operational parameters of technological lines. 9. Industrial technologies for producing liquid biofuels. 10. Technical devices in technological lines. 11. Industrial technologies for producing solid biofuels. Technical devices in technological lines. Basic operational parameters of technological lines.
Achieved learning outcomes	*BIB_W1, BIB_W2*
Methods of verification and principles and criteria of evaluation	Written and/or test examination. Assessment based on the following criteria: 51-60% dst (satisfactory) 61-70% dst+ (satisfactory plus) 71-80% db (good) 81-90% db+ (good plus) 91-100% bdb (very good) The exam grade constitutes 50% of the final course grade
Project exercises	**30 h**
Topics of classes	1. Design of a technological line for the production of biofuel 2. Assumed amount of biofuel (daily/annual) 3. Device performance 4. Energy expenditure 5. Area for the technological line 6. Warehouse space 7. Production costs 8. Energy efficiency
Achieved learning outcomes	*BIB_U1, BIB_U2, BIB_U3; BIB_K1*
Methods of verification and principles and criteria of evaluation	Written test, assessment based on the following criteria: 51-60% dst (satisfactory) 61-70% dst+ (satisfactory plus) 71-80% db (good) 81-90% db+ (good plus) 91-100% bdb (very good) The grade from the final test constitutes 50% of the final grade for the course

Literature

Basic	CIGR Handbook of Agricultural Engineering 1999 Energy and Biomass Engineering American Society of Agricultural Engineers All Rights Reserved, USA Antonio-Gutierrez C., Castro F.G. Biofuels and Biorefining. Elsevier 2022. Tomes D., Lakshmanan P., Songstad D. Biofuels. Springer 2011 Lewandowski W. M., Ryms M. 2013 Biopaliwa. Proekologiczne odnawialne źródła energii Wyd. WNT., Warszawa
Supplementary	Kumar S., Sani R. K. Biorefining of Biomass to Biofuels. Springer 2018 Clark J., Lugue R. Handbook of Biofuels Production. Woodhead Publishing 2010

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				3.0	ECTS*
Discipline: economics and finance (SE)				2.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

3.3

Subject: **Innovative bio-based materials**	
ECTS	5
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Bioprocess Engineering, Energy and Automation
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
IBM_W1	* phenomena and processes occurring in the biosphere, related to biological and chemical processes	IBS_W02 IBS_W03 IBS_W08	RR; SE
IBM_W2	* raw materials and processes behind bio-based materials	IBS_W04	RR; SE
IBM_W3	* the place of bio-based materials in the circular economy	IBS_W10	RR; SE
SKILLS – can:			
IBM_U1	* plan and conduct simple experiments	IBS_U01 IBS_U03 IBS_U07	RR; SE
IBM_U2	* perform measurements, interpret the obtained results related to the production of bio-based materials (mainly biopolymers), * interpret the obtained results and draw conclusions	IBS_U02 IBS_U03 IBS_U07	RR; SE
IBM_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
IBM_K1	* think and act in an entrepreneurial way	IBS_K02	RR; SE

		IBS_K03	
IBM_K2	* implement circularity assumptions	IBS_K10	RR; SE

Teaching content:	

Lectures	**30 h**
Topics of classes	Biopolymers – history Starch: sources, types, granules, technology, starch derivatives Cellulose – its structure, properties, derivatives, pull technology Hyaluronic acid – basic properties, biogenesis, technology, hyaluronan derivatisation Chitin and chitosan – basic properties, biogenesis, extraction technology Collagen: properties and applications Other proteins: creatine, elastin, casein, insulin Latex and rubber – structural units, biogenesis, production, vulcanisation, application Pectin – extraction, properties, toxicity Polyhydroxyalkanoates – properties, ecological and economic effects Beta-glucans Bio-/non-Bio – polyethylene glycol, polylactic acid, polyglycolic acid Separation of biopolymers Molecular evolution
Achieved learning outcomes	*IBM_W1, IBM_W2, IBM_W3*
Methods of verification and principles and criteria of evaluation	Written and/or test examination. Assessment based on the following criteria: 51-60% dst (satisfactory) 61-70% dst+ (satisfactory plus) 71-80% db (good)

Lab exercises	**30 h**
Topics of classes	The topics of the classes correspond to the thematic areas of the lecture. Nomenclature, structure, isomerism, classification of polymers, methods of obtaining polymers, exemplary reactions of polyaddition, polycondensation, copolymerisation and polymerisation, chemical reactions of polymers, methods of obtaining selected monomers used in polymerisation reactions.
Achieved learning outcomes	*IBM_U1, IBM_U2, IBM_U3; IBM_K1, IBM_K2*
Methods of verification and principles and criteria of evaluation	Written test, assessment based on the following criteria: 51-60% dst (satisfactory) 61-70% dst+ (satisfactory plus) 71-80% db (good) 81-90% db+ (good plus) 91-100% bdb (very good) The grade from the final test constitutes 50% of the final grade for the course

Literature

Basic	Ebnesajjad S. Handbook of Biopolymers and Biodegradable Plastics. Elsevier 2012 Abe A., Dusek K., Kobayashi S. Biopolymers. Springer, 2012
Supplementary	Sabu T., Gopi S. Biopolymers and Their Industrial Applications: From Plant, Animal, and Marine Sources, to Functional Products. Elsevier 2020 Park J., Lakes R.S. Biomaterials – An Introduction. Springer 2007

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				4.0	ECTS*
Discipline: economics and finance (SE)				1.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

3.4

Subject: **Waste management**	
ECTS	5
Status	Obligatory
Form of final assessment	Exam
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Agricultural and Environmental Chemistry
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
ZO_W1	* general issues pertaining to waste and sources of generation	IBS_W01 IBS_W04	RR; SE
ZO_W2	* segregation of recycling and natural management	IBS_W07 IBS_W10	RR; SE
ZO_W3	* general issues pertaining to legal regulations in the field of waste management	IBS_W10 IBS_W15	RR; SE
ZO_W4	* legal regulations related to the use of fertilisers and waste and their trade	IBS_W15 IBS_W17	RR; SE
SKILLS – can:			
ZO_U1	* assess the level of contaminants and ingredients in waste	IBS_U01	RR; SE
ZO_U2	* correctly assess the fertilising value of waste	IBS_U02	RR; SE

ZO_U3	* determine the doses of waste in terms of the nutritional requirements of plants	IBS_U04	RR; SE
ZO_U4	* select waste for appropriate recycling and management	IBS_U05	RR; SE
ZO_U5	* analyse the condition of the area in the context of waste management	IBS_U11	RR; SE
ZO_U6	* communicate in the subject area in English	IBS_U12	RR; SE
	SOCIAL COMPETENCES - is ready to:		
ZO_K1	* work as part of a team and organise activities in a small team in order to perform a computational experiment	IBS_K02 IBS_K03	RR; SE
ZO_K2	* make decisions regarding the use of waste	IBS_K04 IBS_K09	RR; SE
ZO_K3	* comply with the principles of environmental care on a global and local scale and provide education in this area.	IBS_K10	RR; SE

Teaching content:	
Lectures	**15 h**
Topics of classes	Educational aim: To provide knowledge of waste management in the environment, including reclamation and revitalisation of post-industrial areas, landfill reclamation, soil remediation, waste as a potential raw material for nutrients, and processing waste into new products as part of the circular economy. 1. Principles of waste management 2. Basics of waste separation 3. Legal provisions on the use of waste fertilisers and waste 4. Soil standards related to the use of waste 5. Recycling of waste materials 6. Bottom ash as a raw material for the production of fertilisers 7. Organic waste, composts as raw materials for the production of fertilisers 8. Natural management of sewage sludge 9. Utilisation of waste to produce biomass for energy purposes 10. Recultivation of landfill sites 11. Recultivation of post-industrial areas 12. Phytoremediation of post-industrial areas 13. Municipal waste management 14. Revitalisation of post-industrial areas 15. Summary and evaluation
Achieved learning outcomes	*ZO_W1, ZO_W2, ZO_W3, ZO_W4*
Methods of verification and principles and criteria of evaluation	*Passing the lectures: written exam - test and computational tasks or problem questions* *A percentage scale for assessing learning outcomes was adopted, defined as follows:* *1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the applicable effects for a given component in at least one of the three components (W, U or K) of the subject learning outcomes.*

	2. Satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K) of the learning outcomes. *3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U or K) of learning outcomes (average 61-70%).* *4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 - average 81-90%) and very good (5.0 - average >90%).* *Final grade = 0.4 x exam grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student's activity during classes.* *NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject, based on his/her own teaching experience and observations, formulates an assessment using the formal criteria given above.*
Project exercises	**40 h**
Topics of classes	1. Waste sorting 2. Identifying hazardous waste at home 3. Assessment of plastics in the context of their biodegradation 4. Assessment of fertiliser products from waste - durability, contaminant content 5. Determination of basic soil parameters in the context of waste utilisation 6. Calculation of the amount of heavy metals with the dose of sewage sludge 7. Calculation of the phytoextraction capacity of energy plants for the remediation of chemically polluted land 8. Solvay – as an example of recultivation and revitalisation of a post-industrial area 9. Bednarski Park in Krakow - as an example of limestone and quarry waste management 10. Bonarka – as an example of the revitalisation of an industrial area 11. Summary and assessment
Achieved learning outcomes	*ZO_U1, ZO_U2, ZO_U3, ZO_U4, ZO_U5, ZO_6; ZO_K1, ZO_K2, ZO_K3*
Methods of verification and principles and criteria of evaluation	The basis for passing the auditorium exercises is: passing each written and oral exercise designated by the instructor; the correctness of the exercises, the correctness of the calculations and the interpretation of the obtained results are assessed. A percentage scale for assessing learning outcomes was adopted, defined as follows: 1. Unsatisfactory grade (2.0): is awarded if the student achieves less than 50% of the applicable effects for a given component in at least one of the three components (W, U or K) of the subject learning outcomes. 2. A satisfactory grade (3.0): is awarded if the student achieves at least 50% of the applicable effects for a given component in each of the three components (W, U or K) of the learning outcomes. 3. Satisfactory Plus grade (3.5): is awarded on the basis of the arithmetic mean of three components (W, U or K) of learning outcomes (average 61-70%). 4. A similar method of calculating grades as presented in point 3 was adopted for the grades of good (4.0 - average 71-80%), good plus (4.5 - average 81-90%) and very good (5.0 - average >90%). Final grade = 0.4 x exam grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student's activity during classes. NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject and based on his/her own teaching experience, formulates an assessment using the formal criteria given above.

Literature

Basic	1. Rosik-Dulewska C. 2022. Podstawy gospodarki odpadami. Wyd. Nauk. PWN, Warszawa, pp. 390. ISBN 9788301180744 2. Łabętowicz J., Stępień W. /Red/. 2020. Nawozy z odpadów jako źródło składników pokarmowych w nawożeniu roślin uprawnych. Rolnicze wykorzystanie odpadów i produktów ubocznych jako ogniwo gospodarki obiegu zamkniętego. Wyd. SGGW & Fundacja „Pro Civis", Warszawa - Kielce 2020. pp. 340. ISBN: 978-83-958274-0-2
Supplementary	1. Jędrczak A. 2007. Biologiczne przetwarzanie odpadów. Wyd. Nauk. PWN, Warszawa, pp. 456. ISBN: 978-83-01-15166-9 2. Antonkiewicz J., Gworek B. 2023. Remediacja zanieczyszczonych gleb i ziem. Wydawnictwo Naukowe PWN, pp. 204. ISBN: 978-83-01-22827-1. DOI: https://doi.org/10.53271/2022.138 In English: Antonkiewicz J., Gworek B. 2023. Remediation of contaminated soils and lands. Scientific publishing PWN, pp. 204. ISBN: 978-83-01-22827-1. DOI: https://doi.org/10.53271/2022.138

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				3.0	ECTS*
Discipline: economics and finance (SE)				2.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	15	h		
	Exercises and seminars	45	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

3.5

Subject: **Dietary supplements of plant origin**	
ECTS	5
Elective	Obligatory
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Horticulture
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
PBDS _W1	* the composition of dietary supplements, with particular emphasis on plant raw materials used in their production	IBS_W04	RR
PBDS _W2	* the impact of the use of plant supplements on the human body and the mechanisms of their action/reaction.	IBS_W03 IBS_W16	RR
PBDS _W3	* lists of horticultural plant species used in the production programme of pharmaceuticals and dietary supplements and active substances obtained from them	IBS_W04	RR
PBDS _W4	* the basics of a balanced diet	IBS_W03	RR, SE
PBDS _W5	* basic legal regulations regarding the trade in dietary supplements and the basics of law regarding the cosmetics market in the European Union.	IBS_W13 IBS_W15	RR, SE
SKILLS – can:			
PBDS _U1	* select and modify the elements of a balanced diet and the content of supplements	IBS_U01 IBS_U02	RR

PBDS_U2	* develop agrotechnics for growing more important species in order to use the product in the preparation of a dietary supplement	IBS_U06	RR
PBDS_U3	* prepare selected dietary supplements of plant origin	IBS_U02	RR
PBDS _U4	* determine the suitability of a given active plant ingredient for supplementation purposes	IBS_U04	RR
PBDS_U5	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
PBDS_K1	* determine priorities for the proper selection and preparation of plant raw materials for use in dietary supplements	IBS_K10	RR
PBDS_K2	* conduct an assessment of the risk to the human body resulting from the improper use of plant dietary supplements.	IBS_K03	RR

Teaching content:	
Lectures	**30 h**
Topics of classes	1. History of the production of dietary supplements. 2. Mechanisms of action of supplements and other medicinal products. 3. Differences between cosmeceuticals and medicines and dietary supplements. 4. Supplements in sports. 5. Supplements for skin diseases. 6. Supplements the digestive and nervous systems. 7. Supplements for the problem of obesity. 8. Supplements that influence the body's immunity. 9. Basics of law regarding the production, marketing and sale of dietary supplements in the European Union. 10. Development of instructions regarding the selection of species, preparation and use of the preparation.
Achieved learning outcomes	*PBDS _W1, PBDS _W2, PBDS _W3, PBDS_W4, PBDS_W5, PBDS_W6*
Methods of verification and principles and criteria of evaluation	*Passing the lectures: written exam - test and computational tasks or problem questions* *A percentage scale for assessing learning outcomes was adopted, defined as follows:* *The assessment is based on test questions. To obtain a positive mark, at least 51% of the answers must be correct. Contribution to the final grade for the subject – 65%.* *51-60% dst (satisfactory)* *61-70% dst+ (satisfactory plus)* *71-80% db (good)* *81-90% db+ (good plus)* *91-100% bdb (very good)* *NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject, based on his/her own teaching experience and observations, formulates an assessment using the formal criteria given above.*
Lab exercises	**30 h**
Topics of classes	1. Visit to a company producing dietary supplements based on plant products. 2. Production of dietary supplements.

	3. Presentation of the production method, use and effectiveness of the dietary supplements they produce.
Achieved learning outcomes	*PBDS _U1, PBDS _U2, PBDS _U3, PBDS _U4, PBDS_U5; PBDS _K1, PBDS _K2*
Methods of verification and principles and criteria of evaluation	The assessment is based on: - individual reports from laboratory classes, contribution to the final grade from classes - 15%; - two tests on laboratory topics (at least 51% of correct answers to obtain a positive grade), contribution to the final grade on the course - 20%. NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject and based on his/her own teaching experience, formulates an assessment using the formal criteria given above.

Literature

Basic	Balch, P. A. (2006). Prescription for nutritional healing. Penguin. Greenwood, M., Cooke, M. B., Ziegenfuss, T., Kalman, D. S., & Antonio, J. (Eds.). (2015). Nutritional supplements in sports and exercise. Humana Press.
Supplementary	Hennekens C.H., et al., Lack of effect of long-term supplementation with beta carotene on the incidence of malignant neoplasms and cardiovascular disease, New England Journal of Medicine, 334.18 (1996): 1145-114 Maret W., Sandstead H.H., Zinc requirements and the risks and benefits of zinc supplementation, Journal of Trace Elements in Medicine and Biology, 20.1 (2006): 3-18 Poortmans J.R., Francaux M., Adverse effects of creatine supplementation, Sports Medicine, 30.3 (2000): 55-170 Vanhatalo A., et al., Acute and chronic effects of dietary nitrate supplementation on blood pressure and the physiological responses to moderate-intensity and incremental exercise, American Journal of Physiology-Regulatory, Integrative and Comparative Physiology, 299.4 (2010): R1121-R1131

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				4.0	ECTS*
Discipline: economics and finance (SE)				1.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

3.6

Subject: **Basics of production of bio-based cosmetics**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	WBiO, Department of Horticulture
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
BBCP_W1	* principles for determining the composition of cosmetics, with particular emphasis on the plant raw materials used in their production	IBS_W04	RR
BBCP_W2	* the impact of cosmetics on the skin and the mechanisms of their action	IBS_W03	RR
BBCP_W3	* species of horticultural plants used in cosmetics and cosmetology and active substances obtained from them	IBS_W04	RR
BBCP_W4	* the history of cosmetology	IBS_W13	RR, SE
BBCP_W5	* the impact of cosmetics on the human body	IBS_W16	RR
BBCP_W6	* the basics of law regarding the cosmetics market in the European Union	IBS_W13 IBS_W15	RR, SE
SKILLS – can:			

BBCP_U1	* select and modify methods of preparing plant raw materials for cosmetic purposes communicate in the subject area in English	IBS_U01	RR
BBCP_U2	* develop agrotechnics for growing more important species in order to use the product in cosmetics	IBS_U06	RR
BBCP_U3	* prepare selected cosmetics of plant origin	IBS_U02	RR
BBCP_U4	* determine the suitability of a given active plant ingredient for cosmetic purposes	IBS_U04	RR
BBCP_U5	* communicate in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
BBCP_K1	determine priorities in the proper selection and preparation of cosmetic products, also in the area of social impact	IBS_K03	RR

Teaching content:	
Lectures	**30 h**
Topics of classes	1. History of cosmetology - the use of cosmetic products from ancient times to the present day. 2. Mechanisms of action of cosmetics and other body care products. Differences between cosmetics, cosmeceuticals and medicines and dietary supplements. 3. Anatomical and physiological structure and functions of skin, hair and nails. 4. Classification of cosmetics according to their action and specific purpose. 5. Products of natural origin used in the cosmetics industry, in particular products of plant origin and their effect on the human body. 6. Cosmetics of natural origin. Active substances contained in particular plant species used in cosmetics - their action and application. 7. Basics of law regarding the production, marketing and sale of cosmetic products in the European Union. 8. Development of instructions regarding the selection of the species, preparation and use of the preparation.
Achieved learning outcomes	*BBCP_W1, BBCP_W2, BBCP_W3, BBCP_W4, BBCP_W5; BBCP_W6*
Methods of verification and principles and criteria of evaluation	Passing the lectures: test and computational tasks or problem questions A percentage scale for assessing learning outcomes was adopted, defined as follows: The assessment is based on test questions. To obtain a positive mark, at least 51% of the answers must be correct. Contribution to the final grade for the subject – 65%. 51-60% dst (satisfactory) 61-70% dst+ (satisfactory plus) 71-80% db (good) 81-90% db+ (good plus) 91-100% bdb (very good) NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject, based on his/her own teaching experience and observations, formulates an assessment using the formal criteria given above.

Lab exercises		**30 h**
Topics of classes	1. Obtaining plant material for the production of cosmetics (oils, decoctions, extracts, infusions, dry matter, crushed product, etc.) 2. Principles of proper cultivation of plants with emphasis on obtaining the greatest possible efficiency of using plant material for the production of cosmetics 3. Establishment of in vitro cultivation of plants with cosmetic and medicinal properties 4. Production of cosmetics with cleaning, care, fragrance, moisturising properties, etc. 5. Presentation of the production method, use and effectiveness of the plant-based cosmetic product they produce	
Achieved learning outcomes	*BBCP_U1, BBCP_U2, BBCP_U3, BBCP_U4, BBCP_U5; BBCP_K1*	
Methods of verification and principles and criteria of evaluation	The assessment is based on: - individual reports from laboratory classes, contribution to the final grade from classes - 15%; - two tests on laboratory topics (at least 51% of correct answers to obtain a positive grade), contribution to the final grade on the course - 20%. NOTE: The teacher, based on the student's degree of mastery of the applicable curriculum content of a given subject and based on his/her own teaching experience, formulates an assessment using the formal criteria given above.	

Literature

Basic	Dweck, A. C. (2011). Formulating natural cosmetics. Allured Business Media. Dayan, N. (2008). Skin aging handbook: an integrated approach to biochemistry and product development. William Andrew.
Supplementary	Iwata, H., & Shimada, K. (2012). Formulas, ingredients and production of cosmetics: technology of skin-and hair-care products in Japan. Springer Science & Business Media. Verrill, A. H. (2013). Perfumes and Spices: Including an Account of Soaps and Cosmetics-The Story of the History, Source, Preparation, And Use of the Spices, Perfumes, Soaps, And Cosmetics Which Are in Everyday Use. Read Books Ltd.

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				4.0	ECTS*
Discipline: economics and finance (SE)				1.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

3.7

Subject: **Insects as an element of the bioeconomy**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Microbiology and Biomonitoring
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
OEB_W1	* the possibilities of using insects as a source of protein and other products for the bioeconomy	IBS_W03	RR
OEB_W2	* the problems and challenges related to the use of insects in the bioeconomy	IBS_W05	RR
SKILLS – can:			
OEB_U1	* assess the possibilities of using insects for bioeconomy purposes	IBS_U05	RR
OEB_U2	* plan insect breeding for bioeconomy purposes	IBS_U02	RR
OEB_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
OEB_K1	* assess the risks associated with breeding insects for bioeconomy purposes	IBS_K06	RR
OEB_K2	* train others and transfer objective knowledge about the use of insects in the bioeconomy	IBS_K01	RR

Teaching content:	

Lectures	30h
Topics of classes	1. General information about insects. Systematics and biology of insects. 2. The importance of insects in human life 3. Legal regulations related to the use of insects in the bioeconomy 4. The use of insects in waste management 5. Insects as food 6. Insects as animal feed 7. Insects as a source of valuable products (chitin, fertilisers) 8. Insects as bioindicators of the state of the environment 9. The use of insects in forensics 10. Safety in the breeding, processing and use of insects in the bioeconomy. The impact of insect breeding on the environment 11. Market of products derived from insects - prospects, challenges and threats
Achieved learning outcomes	*OEB_W1, OEB_W2*
Methods of verification and principles and criteria of evaluation	*Written assessment in the form of a test (single-choice questions) + participation in the discussion and student activity.* *The condition for taking the test is to obtain a positive grade in the training part. At least 50% of correct answers must be given for a positive mark.* *Final grade of classes = 0.5 x grade from lectures + 0.5 x grade from laboratory exercises.*

Lab exercises	30 h
Topics of classes	1. Systematic review of insects, diagnostic features. 2. Overview of insects used for waste disposal, production of food, feed, fertilisers and other products. 3. Basics of insect breeding. 4. Principles of mass breeding of insects on an industrial scale. 5. Waste disposal – practical solutions. 6. Breeding insects for food and feed purposes - practical solutions. 7. Methods of processing insects for food and feed purposes. 8. Development of a project for breeding insects for food, feed, waste disposal and fertiliser production.
Achieved learning outcomes	*OEB_U1, OEB_U2, OEB_U3; OEB_K1, OEB_K2*
Methods of verification and principles and criteria of evaluation	Grade from the final test (ability to plan insect breeding for bioeconomy purposes) + assessment of activity during classes + observation of individual and team behaviour (in terms of social competences). To pass, you must obtain at least 50% of the points in the test. Final grade of classes = 0.5 x grade from lectures + 0.5 x grade from laboratory exercises.

Literature

Basic	Belluco S.; Losasso C.; Maggioletti M.; [et.al]. (2013). Edible Insects in a Food Safety and Nutritional Perspective: A Critical Review. Comprehensive Reviews in Food Science and Food Safety 12: 296-313. Rumpold B. A.; Schlüter O.K. (2013). Nutritional Composition and Safety aspects of Edible Insects. Molecular Nutrition & Food Research 57: 802-823. Van Huis, A.; Van Itterbeeck, J.; Klunder, H.; [et.al]. (2013). Edible Insects: Future Prospects for Food and Feed Security. FAO Forestry Paper 171. Food and Agriculture Organization of the United Nations, Rome and Wageningen University and Research Centre, The Netherlands.

Supplementary	Huynh MP, Shelby KS, Coudron TA. Recent Advances in Insect Rearing Methodology to Promote Scientific Research and Mass Production. Insects. 2021 Oct 22;12(11):961. doi: 10.3390/insects12110961. PMID: 34821762; PMCID: PMC8623656. A. Jantzen da Silva Lucas, L. Menegon de Oliveira, M. da Rocha, C. Prentice Edible insects: an alternative of nutritional, functional and bioactive compounds Food Chem., 311 (2020), 10.1016/J.FOODCHEM.2019.126022

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				4.0	ECTS*
Discipline: economics and finance (SE)				1.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

3.8

Subject: **Information in ecosystems**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Agroecology and Plant Production
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
IE_W1	* the complexity of natural phenomena and natural processes occurring and used in the bioeconomy, as well as the characteristics of competitive advantages based on natural capital in economies	IBS_W02	RR; SE
IE_W2	* principles of functioning of living organisms at various levels of organisation, information transfer in the ecosystem and the possibilities of its use in the bioeconomy.	IBS_W03	RR; SE
IE_W3	* concepts and problems related to building a modern knowledge-based economy, with particular emphasis on the circular bioeconomy, as well as the issue of information ecology	IBS_W10	RR; SE
SKILLS – can:			
IE_U1	* correctly determine the cause-effect processes in information transmission channels in ecosystems at different levels of natural organisation	IBS_U01	RR; SE
IE_U2	* give examples of the application of mechanisms observed in nature in different branches of the bioeconomy	IBS_U03	RR; SE
IE_U3	* characterise the functions of ecosystems for the bioeconomy	IBS_U04	RR; SE
IE_U4	* use online databases and search engines for scientific publications in the field of agricultural and social sciences	IBS_U13	RR; SE

IE_U5	* prepare written papers and presentations on specific bioeconomy topics using appropriate theoretical approaches based on information from various sources	IBS_U14	RR; SE
IE_U6	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
IE_K1	* coordinate teamwork and define goals, priorities and methods of implementing specific tasks	IBS_K01	RR; SE
IE_K2	* engage in further training in a targeted way and organise the learning process based on creative techniques and methods and transfer of objective knowledge in the area of bioeconomy and natural environment	IBS_K02	RR; SE
IE_K3	* speak publicly about the bioeconomy and constructively discuss issues related to it	IBS_K05	RR; SE
IE_K4	* function in a world of information overload and critically evaluate the information acquired	IBS_K08	RR; SE

Teaching content:	
Lectures	**15 h**
Topics of classes	1-2. Basics of information theory. 3-4. Organisation and functioning of ecosystems. 5-6. Ecosystem functions and services in the bioeconomy. 7-8. Competitive advantages based on natural capital. Polish natural capital. Examples of good solutions from Poland, Europe and the world. 9-10. Building a bioeconomy – bionics. The most important discoveries. Knowledge-based economy. 11-12. Information ecology – examples of national and global information ecosystems. 13-15. Discussion classes on a topic selected by students.
Achieved learning outcomes	*IE_W1, IE_W2, IE_W3*
Methods of verification and principles and criteria of evaluation	Lectures: written assessment – in the form of test questions (10 multiple choice questions with one correct answer) and 4 open questions.
Exercises	**45 h**
Topics of classes	1-3. Information and meta-information. Individual and group tasks prepared by the teacher. Discussion. 4-6. Ecosystem structure and information transmission channels in the ecosystem at various levels of nature organisation. Individual and group work based on materials prepared by the teacher and Internet sources. 7-9. Supply and regulatory functions of ecosystems. Case study and group work based on SWOT analysis and individual work based on the decision tree method. 10-12. Supportive functions of ecosystems and mobility of organisms between ecosystems. Case study and individual work. Discussion. 13-15. Cultural and information functions of ecosystems. Case study and work in three-person teams based on the mind map method and the Phillips method. 16-18. Bionics in industry. Individual and group work based on materials prepared by the teacher and Internet sources. 19-21. Bionics in architecture and construction. Individual and group work based on materials prepared by the teacher and Internet sources. 22-24. Bionics in automotive and transport. Individual and group work based on materials prepared by the teacher and Internet sources. 25-27. Bionics in medicine and cosmetics. Individual and group work based on materials prepared by the teacher and Internet sources.

	28-30. Bionics in communication and business. Individual and group work based on materials prepared by the teacher and Internet sources. 31-45. Student presentations on topics related to the content covered during lectures and classes.
Achieved learning outcomes	*IE_U1, IE_U2, IE_U3, IE_U4, IE_U5; IE_U6; , IE_K1, IE_K2, IE_K3, IE_K4*
Methods of verification and principles and criteria of evaluation	In the first part of the exercises, students perform tasks on their own or in groups related to problems covered by the curriculum. In the second part of the exercises, students present an individually prepared topic from the pool of topics provided by the instructor or their own topic after consultation with the instructor. Credit for the exercises is based on the average of the grades obtained during the semester. Completion of the course (Final grade) = 0.6 x grade for the course (exercises) + 0.4 x exam mark (lectures)

Literature

Basic	1. A. Michałowski. (2011) Information Theory in Ecosystems. *J Bioecon* 13, 125–137. https://doi.org/10.1007/s10818-011-9105-1 2. Naeem, S., Bunker, D. E., Hector, A., Loreau, M., & Perrings, C. (Eds.). (2009). Biodiversity, ecosystem functioning, and human wellbeing: an ecological and economic perspective. OUP Oxford. Internet sources indicated by the teacher relating to the scope of the material.
Supplementary	1. Biomimicry Institute Report. (2020). The Nature of Fashion. https://biomimicry.org/wp-content/uploads/2021/11/The-Nature-of-Fashion_2021.pdf 2. V. Shyam, M. Eggermont, A. Hepp (2022).Biomimicry for Materials, Design and Habitats, Elsevier Science Publishing Co Inc. 3. Kliszcz A, Danel A, Puła J, Barabasz-Krasny B, Możdżeń K. (2021) Fleeting Beauty—The World of Plant Fragrances and Their Application. Molecules 26(9):2473. https://doi.org/10.3390/molecules26092473

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				2.5	ECTS*
Discipline: economics and finance (SE)				2.5	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	15	h		
	Exercises and seminars	45	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

3.9

Subject: **Economic and environmental ethics**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	3
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Economics and Food Economy
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
EEE_W1	* concepts and phenomena related to axiological and ethical issues of the economic world and the natural environment	IBS_W10 IBS_W16	RR; SE
EEE_W2	* moral dilemmas of management in a social and environmental context	IBS_W19	SE
EEE_W3	* the importance of the responsibility of economic entities in the social and environmental areas	IBS_W18	RR; SE
SKILLS – can:			
EEE_U1	* notice and interpret moral dilemmas and ethical phenomena in the economy	IBS_U08 IBS_U09	SE
EEE_U2	* construct a simple tool/plan that implements the assumptions of corporate social and environmental responsibility	IBS_U14 IBS_U11	RR; SE
EEE_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
EEE_K1	* communicate with others, presenting one's moral judgments	IBS_K03	RR; SE

EEE_K2	* evaluate phenomena in the economy	IBS_K06	RR; SE
EEE_K3	* demonstrate an awareness of the idea of ethical conduct in sustainable development and implement it in practice	IBS_K09	RR; SE

Teaching content:	
Lectures	**30 h**
Topics of classes	1. Why economic and environmental ethics? Financial and environmental crises as a result of the elimination of ethical values in economic life 2. Ethics - terminology and a brief history of values in the Western world 3. Market economy and its values - from the Industrial Revolution to the present day 4. Culture and cultural relativism in the economic world 5. A fair economic system - what is it? 6. Corporate Social Responsibility and business ethics 2.0, 3.0, 4.0 7. Moral aspects of human interaction with the natural environment and the philosophy of ecology 8. Animal rights 9. Planetary boundaries as a subject of ethical considerations 10. Economic ethics and environmental ethics: consumption and intergenerational solidarity
Achieved learning outcomes	*EEE_W1, EEE_W2, EEE_W3*
Methods of verification and principles and criteria of evaluation	Assessment in the form of a test (30 questions) or an oral examination, based on the answer to 3 problem questions. Each question is assessed individually and an arithmetic average is calculated. A percentage scale has been chosen for the assessment of learning outcomes, which is defined as follows: 1. Unsatisfactory (2.0): is awarded if the student achieves less than 50% of the effects applicable to a particular component in terms of knowledge outcomes. 2. Satisfactory grade (3.0): is awarded if the student has achieved at least 50% of the applicable outcomes for a particular component in relation to the knowledge outcomes. 3. Satisfactory Plus grade (3.5): is awarded if the student has achieved an average of 61-70% of the knowledge outcomes. 4. For the grades "good" (4.0 - average 71-80%), "good plus" (4.5 - average 81-90%) and "very good" (5.0 - average >90%), a similar method of calculating the grades as described under point 3 was chosen. Final grade = 0.4 x examination grade (lectures) + 0.4 x summative grade (exercises) + 0.2 x student activity during class. NOTE: The teacher formulates a grade based on the student's level of mastery of the applicable curriculum content of a given subject, based on his/her own teaching experiences and observations, using the above formal criteria.
Exercises	**30 h**
Topics of classes	1. Why Economic Ethics? 2. Financial and environmental crises as a result of the elimination of ethical values in economic life: Analysis of materials discussing / presenting the events of 2008 and materials relating to the crossing of planetary boundaries. 3. Ethics - terminology and a brief history of values in the Western world: What values are close to us? Discussion 4. Market economy and its values - from the Industrial Revolution to the present day: Normative economics - case studies 5. Socrates cafe on economic ethics in the bioeconomy 6. Culture and cultural relativism in the economic world: Presentations of selected business culture models 7. A fair economic system - what is it? Discussion of the case of equality 8. Oxford debate "Is ethics in business possible?"

	9. Socrates walk - discussion on the ethical production and use of bio-based products 10. Ethical principles of teamwork in practice 11. Criterion poker - society, environment, economy, business
Achieved learning outcomes	*EEE_U1, EEE_U2, EEE_U3; EEE_K1, EEE_K2, EEE_K3*
Methods of verification and principles and criteria of evaluation	Team task on a given topic and evaluation of work during exercises/workshops/discussions

Literature

Basic	• Ferrell, O. C., & Fraedrich, J. (2021). Business ethics: Ethical decision making and cases. Cengage learning. • Bassham G., (2021) Environmental Ethics. The Central Issues, Hackett Publishing Co, Inc.
Supplementary	• Rossouw, Deon. (2017) Business ethics. • Trevino, L. K., & Nelson, K. A. (2021). Managing business ethics: Straight talk about how to do it right. John Wiley & Sons. • Ferrell, O. C., Harrison, D. E., Ferrell, L., & Hair, J. F. (2019). Business ethics, corporate social responsibility, and brand attitudes: An exploratory study. Journal of Business Research, 95, 491-501

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				1.0	ECTS*
Discipline: economics and finance (SE)				4.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures	30	h		
	Exercises and seminars	30	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

4.1

Subject: **Master's seminar**	
ECTS	6
Status	Obligatory
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	4
Language of instruction	English

Subject teacher

Coordinator's unit	WR-E, other units of the University
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
PR_W1	* the extended scope of the research process in the agricultural and social sciences	IBS_W08 IBS_W01	RR, SE
PR_W2	* with an extended scope, the principles of creating scientific works in a formal context	IBS_W19 IBS_W20	RR, SE
PR_W3	* the extended scope of issues and principles related to the principles of protection of intellectual property and industrial property	IBS_W20	RR, SE
SKILLS – can:			
PR_U1	* prepare a master's thesis in English	IBS_U12 IBS_U10 IBS_U14	RR; SE
PR_U2	* carry out the planned research process	IBS_U01	RR; SE
PR_U3	* analyse and discuss the problems of the bioeconomy in relation to the production and social context	IBS_U08 IBS_U09	RR; SE
PR_U4	* research scientific publications independently	IBS_U13	RR, SE

PR_U5	* engage in constructive scientific discourse in the process of preparing a thesis	IBS_U12	RR, SE
	SOCIAL COMPETENCES - is ready to:		
PR_K1	* organise their learning process and activities undertaken during the creation of their master's thesis	IBS_K01	RR; SE
PR_K2	* reflect on the meaning of their work and their tasks and place in the economic and social system in the context of involvement in the area of bioeconomy	IBS_K03 IBS_K08	RR; SE
PR_K3	implementation of the adopted plan	IBS_K11	RR, SE

Teaching content:	
Seminar	**60 h**
Topics of classes	1. Verification of the work plan 2. Verification of questions, goals and research hypotheses 3. Determining the work methodology 4. Conducting research 5. The process of writing a thesis 6. Presentations of fragments of the work and the entire work

Literature

Basic	Texts indicated by individual academic supervisors
Supplementary	Texts indicated by individual academic supervisors

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				4.0	ECTS*
Discipline: economics and finance (SE)				2.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		65	h	2.6	ECTS*
Incl.	Lectures		h		
	Exercises and seminars	60	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		60	h	2.4	ECTS*

4.2

Subject: **Seminar in the humanities: Economic history**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	4
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Economics and Food Economy
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
HG_W1	* directions of development of the world economy from a historical perspective	IBS_W19	SE, RR
HG_W2	* the basics of economic development in the Western world, including Poland	IBS_W19	SE, RR
SKILLS – can:			
HG_U1	* analyse and summarise changes in the economic reality of the world	IBS_U08	SE, RR
HG_U2	* see the sources of barriers to economic progress	IBS_U08	SE, RR
HG_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
HG_K1	* plan self-improvement of their research	IBS_K01	SE, RR
HG_K2	* engage in discussions regarding the political and cultural environment	IBS_K08	SE

Teaching content:

Seminar	**45 h**
Topics of classes	• Introduction to economic history. The ancient world. • The socio-economic structure of medieval Europe. Feudalism. • Dualism in the development of Europe's agriculture. • Great geographical discoveries and the roots of colonialism. The problem of slavery. • Reformation and mercantilist policy. • Colonial rivalry in the 18th century. • Industrial Revolution. • The second industrial revolution. • Economic and social aspects of World War I. War economy. • The world economy in the 1920s and 1930s. • Economy of Germany and the Soviet Union. • The Second World War. • The world business cycle after World War II. Cold War. • Soviet economy and policy in 1945-1991. • History of European integration.
Achieved learning outcomes	*HG_W1, HG_W2, HG_U1, HG_U2, HG_U3; HG_K1, HG_K2*
Methods of verification and principles and criteria of evaluation	*Conversations are based on participation in discussions on assigned problem texts. Students' activity in the discussion and the level of substantiveness of their statements will be taken into account. Activity will be assessed at each meeting and will constitute 50% of the course grade. The condition for participating in the discussion is knowledge of the texts. At the beginning of each meeting, you will be required to complete a short knowledge test of the given issues. These tests will constitute 50% of the assessment basis. They will be assessed in the following bands: 50-60% dst (satisfactory), 61-70% dst+ (satisfactory plus), 71-80% db (good), 81-90% db+ (good plus), 91-100% bdb (very good). The remaining 50% of the final grade is based on the final statement/discussion.*

Literature

Basic	Łukasz Dwilewicz, Economic History – Introduction and Lectures, Warszawa 2015 Global Economic History: A Very Short Introduction, Oxford 2011
Supplementary	Rondo Cameron and Larry Neal, A Concise Economic History of the World: From Paleolithic Times to the Present, Oxford 1991 David Landes, The Wealth and Poverty of Nations: Why Some are So Rich and Some So Poor, London 1999

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)			1.0	ECTS*
Discipline: economics and finance (SE)			4.0	ECTS*
Structure of student activity				
Classes carried out with the direct participation of the teacher	50	h	2.0	ECTS*
Incl. Lectures				
Exercises and seminars	45	h		
Consultations	3	h		
Participation in research				
Mandatory apprenticeships and internships		h		

	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		75	h	3.0	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

4.3

Subject: **Seminar: Culture and postmodernism**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	4
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Economics and Food Economy
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
KIN_W1	* concepts related to the cultural environment	IBS_W10	SE
KIN_W2	* processes of modernity and postmodernity	IBS_W19	SE
SKILLS – can:			
KIN_U1	* formulate critical conclusions	IBS_U12	SE, RR
KIN_U2	* analyse literature and electronic sources	IBS_U13	SE, RR
KIN_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
KIN_K1	* substantive discussion based on facts	IBS_K03	SE, RR
KIN_K2	* sharing ones knowledge and defining areas of knowledge gap	IBS_K07	SE, RR

Teaching content:

Seminar		**45 h**
Topics of classes	1. The birth of civilisations and cultures 2. Cultural relativism 3. Intercultural communication 4. Modern culture 5. Postmodernism	
Achieved learning outcomes	*KIN_W1, KIN_W2, KIN_U1_KIN_U2, KIN_K1, KIN_K_2*	
Methods of verification and principles and criteria of evaluation	Conversations are based on participation in discussions on assigned problem texts. Students' activity in the discussion and the level of substantiveness of their statements will be taken into account. Activity will be assessed at each meeting and will constitute 50% of the course grade. The condition for participating in the discussion is knowledge of the texts. At the beginning of each meeting, you will be required to complete a short knowledge test of the given issues. These tests will constitute 50% of the assessment basis. They will be assessed in the following bands: 50-60% dst (satisfactory), 61-70% dst+ (satisfactory plus), 71-80% db (good), 81-90% db+ (good plus), 91-100% bdb (very good). The remaining 50% of the final grade is based on the final statement/discussion.	

Literature

Basic	1. Western Civilization: A Concise History is written by Christopher Brooks. This work is an Open Educational Resource (OER) published under a CC BY-NC-SA Licence. Published in 2019, with updates in 2020.https://pressbooks.nscc.ca/worldhistory/chapter/chapter-1-the-origins-of-civilization/ 2. R. Boyd, P.J. Richerson, The Origin and Evolution of Cultures, Oxford University Press, 2005. 3. James Rachels and Stuart Rachels, 2019, The Challenge of Cultural Relativism by chapter 2 of The Elements of Moral Philosophy, ninth edition. 4. Hofstede G., Cultures and Organizations: Software of the Mind, Third Edition 3rd Edition, 2010 5. James W. Neuliep, 2020, Intercultural Communication. A Contextual Approach EIGHTH EDITION. 6. McNamee, Gregory. "Shame vs. Guilt." Virginia Quarterly Review, vol. 91 no. 1, 2015, p. 197-197. Project MUSE muse.jhu.edu/article/567032. 7. Chris Barker, Emma A. 2016, Jane Cultural Studies. Theory and Practice. FIFTH EDITION, Sage.
Supplementary	Selection of the current publications

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				1.0	ECTS*
Discipline: economics and finance (SE)				4.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		50	h	2.0	ECTS*
Incl.	Lectures		h		
	Exercises and seminars	45	h		
	Consultations	3	h		

	Participation in research				
	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		75	h	3.0	ECTS*

4.4

Subject: **Seminar: Changes in work processes**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	4
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Economics and Food Economy
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
PP_W1	* the complexity of market and job development and their relationships with the environment, economy and society	IBS_W14 IBS_W19	SE, RR
PP_W2	* to an advanced level, the principles, tools and directions of development of implementing the concept of sustainable development in economic entities and the impact of this phenomenon on jobs	IBS_W14 IBS_W19 IBS_W16	SE, RR
PP_W3	* changing values underlying social and economic development and the conditions shaping them	IBS_W19	SE, RR
SKILLS – can:			
PP_U1	* determine and assess the impact of the economic paradigm on the development of the labour market	IBS_U08	SE, RR
PP_U2	* conduct research on internet sources	IBS_U13	SE, RR
PP_U3	* prepare presentations in a given thematic area	IBS_U14	SE, RR
PP_U4	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			

PP_K1	* take on roles (leader/executor) in the execution of tasks.	IBS_K04 IBS_K02	SE, RR
PP_K2	* engage in creative cooperation with other people.	IBS_K04	SE, RR
PP_K3	* reflect on the meaning and place of work in the life of a modern person	IBS_K06	SE, RR

Teaching content:	
Seminar	**45 h**
Topics of classes	Introduction to the seminar Contemporary trends in the labour market Diversity as an element of sustainable development of economic entities A social experiment in combating inequality in the labour market Competencies and attitudes of the future, i.e. who has a chance to work Topics reported by students during classes Project presentation
Achieved learning outcomes	*PP_W1, PP_W2,PP_W3, PP_U1,PP_U2, PP_U3, PP_U4; PP_K1, PP_K2, PP_K3*
Methods of verification and principles and criteria of evaluation	Conversations are based on participation in discussions on assigned problem texts. Students' activity in the discussion and the level of substantiveness of their statements will be taken into account (30%). The evaluation will also include the project assessed in the following bands: 1. Substantive value (1-10 points) 2. Communication about the project (1-10 points). Score for the project: 10-11 points dst (satisfactory), 12-13 points dst+ (satisfactory plus), 14-15 db (good), 16-17 db+ (good plus), 18-20 bdb (very good).

Literature

Basic	1. Sen, Amartya. Poverty and famines., 1981 Oxford, ISBN 0-19-828426-8. PDF: https://www.prismaweb.org/nl/wp-content/uploads/2017/06/Poverty-and-famines%E2%94%82Amartya-Sen%E2%94%821981.pdf 2. Hopkins, Rob. "From what is to what if. Unleashing the power of imagination to create the future we want" , 2019, Chelsea Green Publishing 3. Goldin, Claudia, 2023, "Why women won", NBR working paper series, available online, National Bureau of Economic Research 4. Hochschild, Arlie Russell. "The Managed Heart. Commercialization of Human Feeling", 2012, University if California
Supplementary	1. Jean Twenge, iGen: Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy--and Completely Unprepared for Adulthood--and What That Means for the Rest of Us, Atria Books, 2018 2. Deloitte, 2021, "The future of work is here", report (available online)

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				1.0	ECTS*
Discipline: economics and finance (SE)				4.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		50	h	2.0	ECTS*
Incl.	Lectures		h		
	Exercises and seminars	45	h		
	Consultations	3	h		

	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		75	h	3.0	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

4.5

Subject: **Seminar: Philosophy of nature and natural sciences basics**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	4
Language of instruction	English

Subject teacher

Coordinator's unit	
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
FP_W1	* the question of man's place in nature in more detail	IBS_W18	RR, SE
FP_W2	* values that characterise the relationship between humans and the environment, and the importance of the environment in the human hierarchy of values	IBS_W19	RR, SE
SKILLS – can:			
FP_U1	* conduct a theoretical argument in the discussed area	IBS_U12	RR, SE
FP_U2	* prepare a written work on philosophy/natural sciences and * present the topic to a wider audience	IBS_U14	RR, SE
FP_U3	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			
FP_K1	* share knowledge and discuss the relationship between man and nature	IBS_K07	RR, SE
FP_K2	* critically select information in a world of information overload	IBS_K08	RR, SE

Teaching content:

Seminar		**45 h**
Topics of classes	1. Natural philosophy and its concepts 2. The order of the world and the concept of nature according to Greek philosophy 3. Symbolism of the natural world in medieval philosophy (Augustine) 4. Philosophy of nature and philosophy of science 5. Induction and deduction - scientific methods in learning about nature 6. Elements of cosmology 7. The atomistic model of the natural world and the problem of elementarity 8. Time and space 9. Theory of evolution	
Achieved learning outcomes	*FP_W1, FP_W2, FP_U1, FP_U2, FP_U3; FP_K1, FP_K2*	
Methods of verification and principles and criteria of evaluation	*Conversations are based on participation in discussions on assigned problem texts. Students' activity in the discussion and the level of substantiveness of their statements will be taken into account. Activity will be assessed at each meeting and will constitute 50% of the course grade. The condition for participating in the discussion is knowledge of the texts. At the beginning of each meeting, you will be required to complete a short knowledge test of the given issues. These tests will constitute 50% of the assessment basis. They will be assessed in the following bands: 50-60% dst (satisfactory), 61-70% dst+ (satisfactory plus), 71-80% db (good), 81-90% db+ (good plus), 91-100% bdb (very good).*	

Literature

Basic	Basti, G., 2012, Philosophy of Nature and of Science, Rome, Lateran University Press Maritain J., 1951, Philosophy of Nature, Philosophical Library, NY, USA. Feyerabend P., 2016, Philosophy of Nature, USA.
Supplementary	1. W. Tatarkiewicz, "Historia filozofii" 2. M. Heller, "Filozofia przyrody" 3. Mutschler Hans-Dieter. „Wprowadzenie do filozofii przyrody" WAM 2005 4. Hajduk Z. „Filozofia przyrody, filozofia przyrodoznawstwa, Metakosmologia" KUL 2004 5. M. Heller and T. Pabjan, "Elementy filozofii przyrody" Chosen text appropriate for current subjects of conversation

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				3.0	ECTS*
Discipline: economics and finance (SE)				2.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		50	h	2.0	ECTS*
Incl.	Lectures		h		
	Exercises and seminars	45	h		
	Consultations	3	h		
	Participation in research				
	Mandatory apprenticeships and internships		h		
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		75	h	3.0	ECTS*

NARODOWA AGENCJA WYMIANY AKADEMICKIEJ

4.6

Subject: **Seminar: Socio-economic dilemmas of the modern world**	
ECTS	5
Status	Elective
Form of final assessment	Graded credits
Preliminary requirements	

Study field

Interdisciplinary Bioeconomy Studies

Study profile	general academic
Code of the form of study and level of study	SM
Study semester	4
Language of instruction	English

Subject teacher

Coordinator's unit	Department of Economics and Food Economy
Coordinator	

Learning outcomes

Description component code	Description	Description component code	
		Study field effect	Discipline
KNOWLEDGE - knows and understands:			
SE_W1	* the socio-economic structure of selected countries and the relations between the environment, economy and society (21st century)	IBS_W09	SE, RR
SE_W2	* problems of modern economies and socio-economic challenges facing societies	IBS_W10	SE, RR
SE_W3	* values underlying social and economic development and the conditions shaping them	IBS_W19	SE, RR
SKILLS – can:			
SE_U1	* determine and assess the effects of economic activities and their external effects	IBS_U08	SE, RR
SE_U2	* use online databases and search engines for scientific publications	IBS_U13	SE, RR
SE_U3	* prepare presentations on the discussed issues using appropriate theoretical approaches	IBS_U13	SE, RR
SE_U4	* communicate in the subject area in English	IBS_U12	RR; SE
SOCIAL COMPETENCES - is ready to:			

SE_K1	* coordinate teamwork and define goals, priorities and methods of implementing specific tasks.	IBS_K02	SE, RR
SE_K2	* engage in creative cooperation with other people.	IBS_K04	SE, RR
SE_K3	* engage in critical reflection on risk responsibility and the economic, social and environmental impacts of the circular economy.	IBS_K06	SE, RR

Teaching content:	
Seminar	**45 h**
Topics of classes	1. Introduction to the seminar 2. Globalisation processes in the modern world 3. Economic and social consequences of armed conflicts 4. Fighting climate change – necessity or business? 5. Economic and social consequences of the demographic crisis - Europe towards economic migration from Africa and Asia 6. Or other conversation topics proposed and selected by students during the first class 7. Project presentation
Achieved learning outcomes	*SE_W1, SE_W2, SE_W3, SE_U1; SE_U2; SE_U3; SE_U4; SE_K1, SE_K2, SE_K3*
Methods of verification and principles and criteria of evaluation	Project for assessment, activity in classes

Literature

Basic	- Tim Marshall, Prisoners of Geography, Elliott & Thompson Limited, 2016 - Naomi Klein, The Shock Doctrine, Penguin Books, 2008 - Arlie Russell Hochschild, Strangers in Their Own Land, The New Press, 2018 - Svetlana Alexievich, Second-hand Time: The Last of the Soviets, Fitzcarraldo Editions, 2021
Supplementary	- Oxfam, INEQUALITY INC. How corporate power divides our world and the need for a new era of public action, Oxfam International January 2024, https://oi-files-d8-prod.s3.eu-west-2.amazonaws.com/s3fs-public/2024-01/Davos%202024%20Report-%20English.pdf - Jean Twenge, iGen: Why Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy--and Completely Unprepared for Adulthood--and What That Means for the Rest of Us, Atria Books, 2018 - The World Bank, Exploring Universal Basic Income, Washington, 2020, https://documents1.worldbank.org/curated/en/993911574784667955/pdf/Exploring-Universal-Basic-Income-A-Guide-to-Navigating-Concepts-Evidence-and-Practices.pdf

Structure of learning outcomes:

Discipline: agriculture and gardening (RR)				1.0	ECTS*
Discipline: economics and finance (SE)				4.0	ECTS*
Structure of student activity					
Classes carried out with the direct participation of the teacher		50	h	2.0	ECTS*
Incl.	Lectures		h		
	Exercises and seminars	45	h		
	Consultations	3	h		
	Participation in research				

	Mandatory apprenticeships and internships				
	Participation in the exam and assessment	2	h		
Classes carried out using distance learning methods and techniques					ECTS*
Own work		75	h	3.0	ECTS*

1. COMPLEMENTARY ELEMENTS OF THE PROGRAMME

Conditions for carrying out specialist classes	
Scope and form of the diploma examination	The conditions for admission to the diploma examination at the University of Agriculture, the form of the examination and its scope are specified in the Study Regulations. The subject of the master's oral diploma examination is the presentation of the master's thesis and verification of the student's achievement of learning outcomes appropriate for this level of study. The details of the individual diploma stages and the rules for preparing a diploma thesis are specified in the Diploma Procedure and the Procedure for preparing diploma theses by students of the Faculty of Agriculture and Economics (WR-E) of the University of Agriculture in Krakow. For the Master's diploma examination, the student receives 2 ECTS. Achieved learning outcomes: IBS_U12; IBS_U14; IBS_K05; IBS_K06; IBS_K07.
Scope and form of the diploma thesis	In second-cycle studies in the field of Interdisciplinary bioeconomy studies, the diploma thesis is a master's thesis. For submitting and obtaining a positive grade for the master's thesis, the student receives 7 ECTS. The principles of diploma thesis are presented in the Study Regulations in the section "Diploma thesis", which generally defines the types of diploma theses, the rules for determining and approving the topics of these theses, the persons authorised to supervise theses, the rules for assessing theses and checking them using an anti-plagiarism programme. and applicable deadlines. The details of the individual diploma stages and the rules for preparing a diploma thesis are specified in the Diploma Procedure and the Procedure for preparing diploma theses by students of the Faculty of Agriculture and Economics (WR-E) of the University of Agriculture in Krakow. Achieved learning outcomes: IBS_U12; IBS_U13; IBS_U14; IBS_K01; IBS_K04; IBS_K08; IBS_K11.

5. ECTS balance sheet

ECTS balance sheet							
Study field:		**Interdisciplinary Bioeconomy Studies**					
Study cycle:		Second					
Study profile:		General academic					
Study semester							**1**
No.	Course	ECTS	Incl.				Classes* related to scientific activities conducted at the University
			In a discipline (code)			In direct contact	
			RR[3]	SE[4]	…		
Obligatory							
1.	Sustainable primary production of biological resources	5	4	1		2.6	5
2.	Ecosystem protection	5	3	2		3	5
3.	Project management in the bioeconomy	5	1	4		2.6	5
4.	Proseminar	3	1.5	1.5		2	3
5.	Foreign language	2	1	1		1	0
A	**Obligatory, total**	**20**	**10.5**	**9.5**	**0**	**11.2**	**18**
Optional							
1.	Course 1	5	3	2		2.6	5
2.	Course 2	5	3	2		2.6	5
B	**Optional, total*** **	**10**	**6**	**4**	**0**	**5.2**	**10**
C	**In one semester, total (A+B)**	**30**	**16.5**	**13.5**	**0**	**16.4**	**28**
Study semester							**2**

[3] Agricultural sciences
[4] Social sciences

No.	Course	ECTS	Incl.				Classes* related to scientific activities conducted at the University
			In a discipline (code)			In direct contact	
			RR	SE	…		
Obligatory							
1.	Organisation and economics of industrial production in the bioeconomy	4	1	3		2.2	4
2.	Agricultural chemistry and plant nutrition	4	3	1		2.2	4
3.	Biotechnology and industrial processes in the bioeconomy	4	3	1		2.2	4
4.	Commodity science and product quality in the bioeconomy	4	2	2		2.2	4
5.	Design Thinking Workshop	4	1	3		2.2	0
A	**Obligatory, total**	**20**	**10**	**10**	**0**	**11**	**16**
Optional							
1.	Course 1	5	3	2		2.6	5
2.	Course 2	5	3	2		2.6	5
B	**Optional, total*** **	**10**	**6**	**4**	**0**	**5.2**	**10**
C	**In one semester, total (A+B)**	**30**	**16**	**14**	**0**	**16.2**	**26**
Study semester							**3**
No.	Course	ECTS	Incl.				Classes* related to scientific activities conducted at the University
			In a discipline (code)			In direct contact	
			RR	SE	…		
Obligatory							

1.	Sustainable development and natural resources economics	5	1	4		2.6	5
2.	Biofuels and biorefining	5	3	2		2.6	5
3.	Innovative bio-based materials	5	4	1		2.6	5
4.	Waste management	5	3	2		2.6	5
A	**Obligatory, total**	**20**	**11**	**9**	**0**	**10.4**	**20**
Optional							
1.	Course 1	5	3	2		2.6	5
2.	Course 2	5	3	2		2.6	5
B	**Optional, total*** **	**10**	**6**	**4**	**0**	**5.2**	**10**
C	**In one semester, total (A+B)**	**30**	**17**	**13**	**0**	**15.6**	**30**
Study semester							**4**
No.	Course	ECTS	Incl.				Classes* related to scientific activities conducted at the University
			In a discipline (code)			In direct contact	
			RR	SE	…		
Obligatory							
1.	Seminar	6	4	2		2.6	6
2.	Thesis	7	6	1		3	7
3.	Master Thesis Diploma Exam	2	2	0		2	2
A	**Obligatory, total**	**15**	**12**	**3**	**0**	**7.6**	**15**
Optional							
1.	Course 1	5	1.5	3.5		2.0	2.5
2.	Course 2	5	1.5	3.5		2.0	2.5
3.	Course 3	5	1.5	3.5		2.0	2.5
B	**Optional, total*** **	**15**	**4.5**	**10.5**	**0**	**6**	**7.5**

C	**In one semester, total (A+B)**	**30**	**16.5**	**13.5**	**0**	**13.6**	**22.5**

Total for the study cycle							
No.	Specification	ECTS	Incl.				Classes* related to scientific activities conducted at the University
			discipline (code)			In direct contact	
			RR	SE	…		
A	**Total for the study cycle**	**120**	**66**	**54**	**0**	**61.8**	**106.5**
B	**Classes related to scientific activities conducted at the University [%]**						**89%**
C	**Classes in direct contact [%]**						**51%**
D	**ECTS structure by discipline [%]**		**55%**	**45%**			

)*	For the practical education profile - "developing practical skills", and for the general academic profile - "related to the scientific activities conducted at the University"
)**	Awarded based on the extent of completion by the student
)***	Awarded based on the extent of completion by the student. It does not apply to fields of study that are assigned to disciplines within the fields of social sciences or humanities

6. Staffing

Staff				
No.	Course	Coordinator	Other teachers	Faculty / Department
Semester 1				
	Sustainable primary production of biological resources	Dr hab. inż. Agnieszka Klimek-Kopyra, prof. URK		Faculty of Agriculture and Economics, Department of Agroecology and Plant Production
	Ecosystem protection	Dr hab. inż. Anna Gorczyca, prof. URK		Faculty of Agriculture and Economics, Department of Microbiology and Biomonitoring
	Project management in the bioeconomy	Dr Barbara Kiełbasa	Mgr. Katarzyna Piecuch, Mgr. Wojciech Przywała	Faculty of Agriculture and Economics, Department of Management and Business Economics
	Anthropopressure	Dr hab. inż. Anna Gorczyca, prof. URK		Faculty of Agriculture and Economics, Department of Microbiology and Biomonitoring
	Animal breeding and animal production in the bioeconomy	Prof. dr hab. Joanna Makulska	Dr inż. Marcin Kopyra	Faculty of Animal Breeding and Biology, Department of Genetics, Animal Breeding and Ethology
	Innovative biopreparations in plant protection	Dr inż. Marcin Kopyra		Faculty of Agriculture and Economics, Department of Management and Business Economics
	Multifunctional development of rural areas	Dr hab. inż. Dariusz Ropek, prof. URK		Faculty of Agriculture and Economics, Department of Microbiology and Biomonitoring
Semester 2				
	Organisation and economics of industrial production in the bioeconomy	Dr inż. Maciej Gliniak prof. URK	Dr Piotr Wałąg	Faculty of Production and Energy Engineering, Department of Bioprocess Engineering, Energy and Automation
	Agricultural chemistry and plant nutrition	Prof. Dr hab. inż. Jacek Antonkiewicz		Faculty of Agriculture and Economics, Department of Agricultural Chemistry
	Biotechnology and industrial processes in the bioeconomy	Dr hab. inż. Anna Gorczyca, prof. URK	Dr hab. inż. Maria Chmiel, prof. URK	Faculty of Agriculture and Economics, Department of Microbiology and Biomonitoring
	Commodity science and product quality in the bioeconomy	Dr hab. inż. Robert Witkowicz, prof. URK		Faculty of Agriculture and Economics, Department of

				Agroecology and Plant Production
	Design Thinking Workshop	Dr hab. Jakub Piecuch, prof. URK	Mgr. Katarzyna Piecuch	Faculty of Agriculture and Economics, Department of Economics and Food Economy
	Soil quality, resources and protection	Dr hab. inż. Agnieszka Józefowska, prof. URK		Faculty of Agriculture and Economics, Department of Soil Science and Agrophysics
	ISO quality auditor	Dr inż. Marta Czekaj, prof. URK		Faculty of Agriculture and Economics, Department of Management and Business Economics
	Marketing of an organic farm	Dr hab. inż. Marcin Niemiec, prof. URK		Faculty of Agriculture and Economics, Department of Agricultural Chemistry
	Sustainable innovation in the modern world	Dr Joanna Szarek		Faculty of Agriculture and Economics, Department of Economics and Food Economy
	Global raw material security	Dr hab. inż. Michał Gąsiorek, prof. URK	Dr hab. inż. Tomasz Zaleski, prof. URK	Faculty of Agriculture and Economics, Department of Soil Science and Agrophysics
Semester 3				
	Sustainable development and natural resources economics	Dr Małgorzata Pink	Dr Beata Pater	Faculty of Agriculture and Economics, Department of Economics and Food Economy
	Biofuels and biorefining	Dr inż. Maciej Gliniak prof. URK		Faculty of Production and Energy Engineering, Department of Bioprocess Engineering, Energy and Automation
	Innovative bio-based materials	Dr inż. Maciej Gliniak prof. URK		Faculty of Production and Energy Engineering, Department of Bioprocess Engineering, Energy and Automation
	Waste management	Prof. Dr hab. inż. Jacek Antonkiewicz		Faculty of Agriculture and Economics, Department of Agricultural Chemistry
	Dietary supplements of plant origin	Dr inż. Barbara Domagała		Faculty of Horticulture and Biotechnology, Department of Horticulture
	Basics of production of bio-based cosmetics	Dr inż. Barbara Domagała		Faculty of Horticulture and Biotechnology, Department of Horticulture

	Insects as an element of the bioeconomy	Dr hab. inż. Dariusz Ropek, prof. URK		Faculty of Agriculture and Economics, Department of Microbiology and Biomonitoring
	Information in ecosystems	Dr Angelika Kliszcz		Faculty of Agriculture and Economics, Department of Agroecology and Plant Production
	Ethics of the economy and environment	Dr Małgorzata Pink	Dr Joanna Szarek	Faculty of Agriculture and Economics, Department of Economics and Food Economy
Semester 4				
	Seminar in the humanities: Economic history	Dr Wanda Łuczak		Faculty of Agriculture and Economics, Department of Economics and Food Economy
	Seminar: Culture and postmodernism	Dr Małgorzata Pink		Faculty of Agriculture and Economics, Department of Economics and Food Economy
	Seminar: Changes in work processes	Dr hab. Jakub Piecuch, prof. URK	Mgr. Katarzyna Piecuch	Faculty of Agriculture and Economics, Department of Economics and Food Economy
	Philosophy of the nature and basics of the natural sciences	Dr hab. inż. Agnieszka Klimek-Kopyra, prof. URK		Faculty of Agriculture and Economics, Department of Agroecology and Plant Production
	Seminar: Socio-economic dilemmas of the modern world	Dr hab. Jakub Piecuch, prof. URK		Faculty of Agriculture and Economics, Department of Economics and Food Economy