University of Gdańsk

Subject card

Subject name and code	Basis of Biotechnology - Introduction Foundations (M01_B1), PG_00153653		
Field of study	Biotechnology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	undergraduate studies	Subject group	
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	3.0
Learning profile	academic	Assessment form	
Conducting unit			
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Stanisław Ołdziej	
	Teachers	dr hab. Stanisław Ołdziej dr Paweł Pijas	

Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	48.0	0.0	0.0	0.0	0.0	48
	E-learning hours included: 0.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	48	0.0	30.0	78

Subject objectives	The purpose of this course is to familiarize the student with the theoretical aspects of the philosophy of science and the art of critical (scientific) thinking, the history of scientific discovery in biotechnology and related fields, the idea and application of model organisms in scientific research with special emphasis on the application of model organisms in biotechnology, organization of the research laboratory, ethics of scientific research, methods of obtaining scientific information and basic (possible) career paths in biotechnology and life sciences after obtaining bachelor's, master's and doctoral degrees.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BIOTECHL3_W09] The graduate knows and understands the basic concepts and terminology used in biological and medical sciences as well as concepts from related scientific disciplines	Knows the history of scientific discovery in biotechnology and related fields	[SW4] test/exam - oral or written
	[BIOTECHL3_U08] The graduate is able to learn independently in a targeted manner	The student knows the possible career paths in biotechnology and life sciences after obtaining bachelor's, master's and doctoral degrees.	[SU4] test/exam - oral or written
	[BIOTECHL3_K04] The graduate is willing to understand the importance of work safety rules, in particular laboratory work; apply the principles of work safety; be responsible for his/her own safety and that of others; be able to act in emergency situations.	Has knowledge of the philosophy of science and the art of critical (scientific) thinking.	[SK4] test/exam - oral or written
	[BIOTECHL3_K01] The graduate is willing to know the limitations of his/her own knowledge and skills; constantly improve, update knowledge, and raise qualifications in biotechnology in the sicience and natural sciences, as well as medical sciences and health sciences	The student knows the possible career paths in biotechnology and life sciences after obtaining bachelor's, master's and doctoral degrees.	[SK4] test/exam - oral or written
	[BIOTECHL3_W08] The graduate knows and understands occupational health and safety regulations; the dangers of working in a laboratory; the dangers of working with infectious material, GMOs and GMMs	The student knows the organization of a research biotechnology laboratory	[SW4] test/exam - oral or written
	[BIOTECHL3_K03] The graduate is willing to understand risks and dilemmas, including ethical dilemmas related to conducting scientific research and introducing advanced technologies using the achievements of biotechnology; understand and appreciate the importance of intellectual property; behave ethically.	The student knows and understands the concept and application of model organisms in scientific research with special emphasis on the application of model organisms in biotechnology.	[SK4] test/exam - oral or written
	[BIOTECHL3_U04] The graduate is able to use scientific information, including English-language information, on biotechnology in the fields of exact and natural sciences, as well as medical sciences and health sciences; use electronic sources; use appropriate databases	The student knows the methods of obtaining scientific information	[SU4] test/exam - oral or written
	[BIOTECHL3_W10] The graduate knows and understands social sciences and humanities, helpful in entrepreneurship and effective functioning in society as a person, citizen, employee, employer, the basics of responsibility in conducting scientific research.	Has knowledge of the philosophy of science and the art of critical (scientific) thinking.	[SW4] test/exam - oral or written

Subject contents	F1. Philosophy of science including philosophy of life sciences 10hIncludes content: concept of science, problematic nature of induction, falsificationism (critical rationalism), scientific progress, scientific method, structure of scientific theories, hypothesis, observation, explanation, scientific paradigms and revolutions, physicalism, reductionism, limits of cognition, mystery of causalityF2. Art of critical thinking 8h The structure of speech, the form of speech - the way of formulating thoughts, - reasoning, - justification of an assertion, - structure of speech, - logical inferenceF3. Basic concepts of the scientific method 3hIncludes content: theory, observation, experiment, hypothesis, research questions, scientific method, falsification, reductionism, empiricism, logical positivism, controlled experiment, outcome, deductive reasoning, pseudoscience and the problem of demarcation, logical fallaciesF4. Ethics of scientific research 2h - Good research practice, - rules and regulations of good laboratory practice, - diligence and conscientiousness in conducting experiments, - dishonesty of scientific research, falsification of results, plagiarism, fabrication of data, - Belmont Report - legal document in the 1970s - [respect for participants, concern for welfare, justice, risk and benefit - as universal ethical assumptions], - animal welfare, - genetic modification and religious, spiritual and cultural values, - social evaluation of scientific research, - ethical aspects of tissue engineering [reversible and irreversible modifications], - patenting and commercialization of living organismsF5. Organization of a research laboratory 2h - principles of safe work (health and safety) in chemical and biological laboratory - laboratory safety classes - laboratories dedicated to plant breeding and research, quarantine microorganisms and microorganisms, and genetically modified organisms (GMM, GMO)F6. Basic classification of organisms 2h - Classification, cataloging and description of living organisms - phylogenetic tree (tree of life) - historical view and in 21st century science - Carol Lineus and binomial nomenclature (species name, generic name) - systematic categories of organisms - genetic methods of classification of organisms (house keeping genes, conserved proteins) F7. Milestones of scientific discovery 14h- DNA-replication, transposons, reverse transcription - microorganisms and antibiotics (penicillin) - cloning and genetic modification of organisms - fluorescent proteins - heat shock proteins and prions - cancer immunotherapy and personalized medicine.F8. Model organisms and their applications in science 2h - definition and examples - characteristics of model organisms - presentation of selected model organismsF9. Basic possible career paths in biotechnology and life sciences 1h - careers after bachelor's, master's and doctoral degrees - discussions with invited guests - interviewsF10. Methods of obtaining scientific information 4h- databases, - scientific publications, - types of publications, - conferences, - forms of presentation of research results, - peer review as an evaluation of scientific achievements and publications
Prerequisites and co-requisites	
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
Integration exam	50.0%	40.0%
Parts F3-F10	0.0%	35.0%
Parts F1, F2	0.0%	25.0%

Recommended reading	Basic literature	1. A. Bird, Philosophy of Science, Routledge 1998; 2. A. Rosenberg, Philosophy of Science. A Contemporary Introduction, Routledge 2000; 3. S. S. Carey, Beginners Guide to Scientific Method, 4th ed., Wadworth 2011 4. George W. Rainbolt, Sandra L. Dwyer, Critical Thinking. The Art of Argument, Wadsworth 2012 5. Źródła literaturowe podane w materiałach wykładowych. Samodzielnie wyszukana i wyselekcjonowane materiały dotyczące zajęć z wykorzystaniem zasobów bibliotecznych i elektronicznych źródeł informacj 6. Dz.U. 2015 poz. 266 Ustawa z dnia 15 stycznia 2015 r. o ochronie zwierząt wykorzystywanych do celów naukowych lub edukacyjnych 7. Dyrektywa 2010/63/UE w sprawie ochrony zwierząt wykorzystywanych w celach naukowych Opieka nad zwierzętami - dążenie do lepszego podejścia naukowego https:// publications.europa.eu/en/publication-detail/-/publication/ fca9ae7f-2554-11e9-8d04-01aa75ed71a1/language-pl 8. . Hannah B. Baker, John P. McQuilling Nancy M.P. King (2016) Ethical considerations in tissue engineering research: Case studies in translation, Methods 99; 135144 9. . Cracraft J., Donoghue M.J. Assembling the Tree of Life. Oxford University Press. 2004 10. S. Leonelli and R. A. Ankeny (2013). What makes a model organism? Endeavour 37; 209-212 (DOI: http://dx.doi.org/10.1016/ j.endeavour.2013.06.001)
	Supplementary literature	none
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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