

Course Syllabus

I. General Information

Course name	GMO - profits and risks
Programme	Biotechnology
Level of studies (BA, BSc, MA, MSc, long-cycle MA)	MSc
Form of studies (full-time, part-time)	part-time
Discipline	Biological sciences
Language of instruction	English

Course coordinator/person responsible	dr hab. Agnieszka Kuźniar
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Type of class (<i>use only the types mentioned below</i>)	Number of teaching hours	Semester	ECTS Points
lecture	15	I	4
tutorial			
classes	15	I	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit			

Course pre-requisites	Knowledge of molecular genetics, especially genetic engineering
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II. Course Objectives

Presentation of methods for obtaining genetically modified organisms
Discussion of selected groups of genetically modified microorganisms (GMOs)
Introduction to basic legal acts concerning the production of GMOs

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	has advanced knowledge of biochemistry, microbiology and biology necessary for practical use in biotechnological processes used in various branches of industry	K_W02
W_02	has deepened knowledge of the benefits and risks associated with the use of GMOs	K_W06
W_01	has advanced knowledge of biochemistry, microbiology and biology necessary for practical use in biotechnological processes used in various branches of industry	K_W02
SKILLS		
U_01	proficiently uses literature in the field of GMO in the language as courses are provided and another modern language, shows knowledge in specialised vocabulary in the field of biotechnology, uses modern foreign language at level B2+	K_U02
U_02	is able to critically select the available information, including those from the electronic sources and based on them to formulate reasonable judgments	K_U03
U_03	can evaluate the environmental threats related with applied technology	K_U12
U_04	shows responsibility for the evaluation of threats arising from applied by himself research techniques in preparation GMO and the creation of conditions for the safely work in the laboratory	K_U15
U_05	regularly updates the knowledge in GMO and knows its practical application, understands the need to follow regularly the scientific literature as well as to familiarize himself with scientific journals to deepen his knowledge	K_U16
U_06	has deepened awareness of level of his knowledge and skills, understands the need for continuous personal and professional development and is open to modern technologies used in biotechnology and guides others in this regard	K_U17
SOCIAL COMPETENCIES		
K_01	is aware of the meaning, value, and need to analyse the environment	K_K01
K_02	understands the benefits and risks of the biotechnological products use	K_K02
K_03	is taking care on entrusted laboratory equipment, is able to gauge danger resulting from applied research methods, is ready to consult experts	K_K03
K_04	correctly identifies and resolves dilemmas associated with the profession (for example preparation GMO) and is aware of the need for ethical conduct during planning and carrying out research experiments, he is ready to critically evaluate his knowledge and received content	K_K04
K_05	is ready to think and act in an entrepreneurial manner on the market of biotechnology products and services	K_K06

IV. Course Content

Lecture: GMOs - definitions. History of GMOs. Legal acts regulating the receipt and use of GMOs. Transgenic microorganisms, plants and animals, methods of obtaining and selected examples. The use of transgenic plants and animals in agriculture, medicine and environmental protection. Presentation of the basic source of gene expression analysis (database Sequence Read Archive - SRA). Benefits and threats resulting from the use of GMOs. Controversies around foods containing GMOs. GMO food - promises and reality. Panel discussion.

Classes: The development of the *E. coli* scientific project - GMO on the creation of a genetically modified micro-organism using the basic tools of molecular biology. Implementation of the *E. coli* project - GMO. Laboratory analysis and observation of the resulting genetically modified microorganisms. New properties of GM plants as well as animals and methods of their preparation. Discussion about the benefits and threats resulting from the production of GMOs. The discussion on the above topics will be based on selected publications in the field of modern biotechnology and analysis of the differential expression of genes using a database Sequence Read Archive (SRA).

V. Didactic methods used and forms of assessment of learning outcomes

Symbol	Didactic methods (choose from the list)	Forms of assessment (choose from the list)	Documentation type (choose from the list)
KNOWLEDGE			
W_01	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
W_02	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
W_03	Laboratory analysis	Observation	Rating card / Report from observation
SKILLS			
U_01	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
U_02	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
U_03	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
U_04	Project method (Laboratory analysis)	Observation	project evaluated card
U_05	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
U_06	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test

SOCIAL COMPETENCIES			
K_01	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
K_02	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
K_03	Laboratory classes	Observation	Protocol / Print / Report file
K_04	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test
K_05	Conventional lecture discussion	Written exam Test	Written exam Completed and evaluated Test

VI. Grading criteria, weighting factors.....

Lecture: 100% - written exam

Classes: 80% - tests (3 tests), 10% - reports, 10% - active participation in the classes

Mark	Evaluation criteria	
very good (5)	the student realizes the assumed learning outcomes at a very good level	the student demonstrates knowledge of the education content at the level of 91-100%
overgood (4.5)	the student accomplishes the assumed learning outcomes an over good level	the student demonstrates knowledge of the education content at the level of 86-90 %
good (4)	the student accomplishes the assumed learning outcomes at a good level	the student demonstrates knowledge of the education content at the level of 71-85%
quite good (3.5)	the student accomplishes the assumed learning outcomes at a quite good level	the student demonstrates knowledge of the education content at the level of 66-76%
sufficient (3)	the student accomplishes the assumed learning outcomes at a sufficient level	the student demonstrates knowledge of the education content at the level of 51-75%
insufficient (2)	the student accomplishes the assumed learning outcomes at an insufficient level	the student demonstrates knowledge of the education content below the level of 51%

VII. Student workload

Form of activity	Number of hours
Number of contact hours (with the teacher)	30
Number of hours of individual student work	70

VIII. Literature

Basic literature
Selected scientific publications in the field of GMOs