Course Syllabus

I. General Information

Course name	Plant biotechnology
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 Ewa Dziadczyk

Type of class *(use only the types mentioned below)*	Number of teaching hours	Semester	ECTS Points
lecture	15	I	5
tutorial			
classes	26	I	
laboratory classes			
workshops			
seminar			
introductory seminar			
foreign language classes			
practical placement			
field work			
diploma laboratory			
translation classes			
study visit	4	I	

Course pre-requisites	Knowledge in the field of plant physiology, plant cell biology and genetics. Basic knowledge in the field of plant tissue culture. Knowledge of basic *in vitro* culture techniques. Ability to work in a laboratory of plant tissue cultures, in sterile conditions.

II. Course Objectives

To familiarize students with developmental processes in *in vitro* culture and techniques that enable the control of the cell metabolism and the direction of morphogenetic processes in *in vitro* culture.
Presentation of various methods of *in vitro* plant tissue cultures and the possibilities of their practical application.
Discussion of the methods of plant transformation and methods of verification of the transformation process.
To acquaint students with the procedures of obtaining clonal plants (micropropagation) and artificial seeds in *in vitro* culture.

III. Course learning outcomes with reference to programme learning outcomes

Symbol	Description of course learning outcome	Reference to programme learning outcome
KNOWLEDGE		
W_01	The student can list and characterize the types of plant tissue cultures, knows their application in agriculture and industry. The student knows the principles of health and safety at work in the tissue culture laboratory.	K_W07, K_W01, K_W02
W_02	Student understands the genetic processes underlying the variability and mechanisms of controlling cellular metabolism in plants.	K_W01
W_03	Student characterizes the methods of creating gene constructions and methods of their introduction into plant organisms.	K_W01 , K_W02
W_04	The student knows the methods of molecular diagnostics of plants and the methods of identification of genetically modified plants. He knows the rules for breeding genetically modified plants.	K_W01 , K_W02
SKILLS		
U_01	Student is able to isolate explants and establish tissue cultures *in vitro*, selects culture conditions to initiate various developmental processes in *in vitro* culture , can obtain artificial seeds from various plant material in culture.	K_U01, K_U07, K_U09
U_02	The student is able to choose the appropriate methods of plant transformation and selection of genetically modified plants depending on the intended effects, assesses the environmental risks associated with the techniques used.	K_U01, K_U07, K_U11, K_U12, K_U15
U_03	The student plans and performs a research task regarding tissue cultures, is able to present the results obtained in the form of a report.	K_U07, K_U14
U_04	The student can read and understand scientific literature, also in English, understands the need for continuous deepening of knowledge.	K_U02, K_U16
SOCIAL COMPETENCIES		
K_01	Student shows care for entrusted research equipment, understands threats resulting from applied research techniques, is ready to consult experts, he has worked habits in sterile conditions, he is ready to critically evaluate his knowledge and received content. He follows the principles of health and safety at work.	K_K03, K_K04, K_K05
K_02	The student understands the benefits and threats resulting from the use of genetically transformed plants in cultivation and products obtained from them. Is aware of the need to analyze the state of the environment and the impact on the environment of crops transformed plants.	K_K01, K_K02

IV. Course Content

Practical application of plant tissue cultures. Morphogenetic processes and their regulation in in *vitro* cultures. Regeneration and reproduction of plants in *in vitro* cultures. Micropropagation. Artificial seeds. Obtaining transgenic plants using genetic engineering methods. Methods of gene isolation and creation of gene constructs, methods of introducing DNA into plant cells and strategies for identifying transgenic plants. Molecular diagnostics of plants. Transgenic varieties in gardening and agriculture.

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, Conversational lecture	Exam / Written test	Protocol
W_02	Conventional lecture, Conversational lecture	Exam / Written test	Protocol
W_03	Conventional lecture, Conversational lecture	Exam / Written test	Protocol
W_04	Conventional lecture, Conversational lecture	Exam / Written test	Protocol
SKILLS			
U_01	Laboratory classes	Report	Printout/ report file
U_02	Laboratory classes	Report	Printout/ report file
U_03	Laboratory classes	Report	Printout/ report file
U_04	Laboratory classes	Paper/Presentation	paper printout/ paper file, presentation rating card
SOCIAL COMPETENCIES			
K_01	Laboratory classes	Report	Report file
K_02	Laboratory classes	Report	Report file

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

The marks from the written test, colloquium as well as reports and observations are taken into account. The indicated level of knowledge applies to each assessed element.

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 66-70%
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 51-65%
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)	45
Number of hours of individual student work	80

VIII. Literature

Basic literature
Davis J.M., Basic Cell Culture. Oxford University Press, 2002 Doyle A., Griffiths J.B. Cell and Tissue Culture- Laboratory Procedures in Biotechnology. Wiley, 1998
Additional literature
Alberts, Bray, Hopkin, Johnson, Lewis, Raff, Roberts, Walter, Essential cell biology. Fourth edition, Garland Science, 2014.