

Course name:
Manipulations on plant protoplasts and cells

ECTS	3
Course status	<i>facultative</i>
Course final assessment /evaluation of outcomes	The grade based on Student's work
Prerequisite	<i>basic principles of plant biology</i>

Main field of study:

Agriculture and Horticulture, Biology and Biotechnology (Erasmus+)

Educational profile	General academic
Code of studies and education level	bachelor/engineer (SI) or master of science (SM)
Semester of studies	Summer semester
Language of instruction	English

Course offered by:

Name of faculty offering the course	Faculty of Biotechnology and Horticulture
Name of department offering the course	Department of Botany, Physiology and Plant Protection
Course coordinator	Dr. Sc. Alina Wiszniewska

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands			
MPC_W1	research techniques applied in experiments on plant protoplasts and cells	EPB2_W01	R, P
MPC_W2	unique features of plant protoplasts and cells and possibilities of their exploitation in biotechnology, experimental biology and plant breeding	EPB2_W02 EPB2_W04	R, P
SKILLS – student is able to			
MPC_U1	isolate protoplasts from plant organs and establish protoplast culture	EPB2_U01	R, P
MPC_U2	conduct microscopic observations and analyses of isolated protoplasts and on their basis evaluate morphogenic potential of studied structures	EPB2_U01 EPB2_U05	R, P
MPC_U3	conduct unassisted literature review to find relevant information for preparing own research note	EPB2_U03	R, P
SOCIAL COMPETENCIES – student is ready to:			
MPC_K1	organize collaborative work and comply with its rules with responsibility for collaborative tasks	EPB2_K02	R, P

Teaching contents

Lectures	15 hours
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Topics	<ol style="list-style-type: none"> 1. Plant protoplasts as „plant stem cells”. Procedures of protoplast isolation and cultivation. Strategies aimed at promoting protoplast development. 2. Cellular aspects of regeneration in protoplast cultures: regeneration of cell wall, reorganization of cytoskeletal elements 3. Manipulations on protoplasts: somatic hybrids, cybrids, protoplast transformation 4. Selection in protoplast culture – protoclonal variation. Protoplasts in plant breeding 5. Protoplasts as models in biological sciences
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Accomplished learning outcomes	MPC_W1-W2
Means of verification, rules and criteria of assessment	test (50%)
Classes:	15 hours

Topics	<ol style="list-style-type: none"> 1. Enzymatic isolation of protoplasts from plant materials. a) preparation of enzyme mixture, - b) incubation, c) observation of cell wall digestion 2. Purification of protoplasts. Determination of protoplast viability. Culture establishment. Chemical fusion of isolated protoplasts. 3. Determination of cell wall components during cell wall regeneration: detection of cellulose, callose and cell wall proteins. 4. Reaction of protoplasts on isolation stress
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Accomplished learning outcomes	MPC_U1-U3, MPC_K1
Means of verification, rules and criteria of assessment	report (50%)

References:

Basic	<i>Plant Protoplasts. 2018. Ed. Fowke L. Taylor and Francis</i> <i>Plant Tissue Concepts and Laboratory Exercises. 2018. Ed. Trigiano RR. Taylor and Francis</i>
Supplementary	<i>Plant Tissue Culture: An Introductory Text. 2013. Eds. Bhojwani S.S., Dantu P.K., Springer India.</i>

Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences	1,5 ECTS**
Area of academic study: T – technological sciences	1,5 ECTS**

Structure of student activity

Contact hours	34	hrs.	1,4 ECTS**
Including:			
lectures	15	hrs.	
classes and seminars	15	hrs.	
consultations	2	hrs.	
participation in research	...	hrs.	
obligatory traineeships	...	hrs.	
participation in examination	2	hrs.	
e-learning	...	hrs.	... ECTS**
student own work	41	hrs.	1,6 ECTS**

*Areas of academic study in the fields of: H- humanities; S - social studies; P – biological sciences; T – technological sciences; M- medical, sport and health sciences; R – Agricultural, forestry and veterinary sciences; A – the arts

** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25 - 30 hours of classes