

**Course name:**  
**Anatomical features of micropropagated plants**

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			
AMP_W1	features of plant cells and tissues facilitating their utilization in biotechnology, experimental biology and plant breeding	EPB2_W02	R, P
AMP_W2	developmental processes and their disturbances during plant material cultivation and methods of their identification	EPB2_W04	R, P
SKILLS – student is able to			
AMP_U1	prepare microscopic slides from different materials with the use of various reagents	EPB2_U01	R, P
AMP_U2	conduct microscopic observations of plant cells and on their basis describe cell structure and evaluate their morphogenic parameters	EPB2_U01 EPB2_U05	R, P
SOCIAL COMPETENCIES – student is ready to:			
AMP_K1	organize laboratory work with an emphasis on safety and responsibility for human health and laboratory equipment	EPB2_K05	R, P

**Teaching contents**

Lectures	15 hours
Topics	<ol style="list-style-type: none"> <li>1. Basic principles of in vitro development of plant organs</li> <li>2. Highlighting some aspects of developmental biology (development of axillary and adventitious meristems, reproductive organs) in tissue culture</li> <li>3. Phases of growth in tissue culture (juvenile/adult phase, rejuvenation, etiolation)</li> </ol>

	4. Hyperhydricity and other malformations of cultured plant material 5. Anatomical differences between in vitro and ex vitro derived organs
Accomplished learning outcomes	AMP_W1-W2
Means of verification, rules and criteria of assessment	essay on suggested topic (50%)
Classes:	15 hours
Topics	1. Adventitious meristems in <i>in vitro</i> culture of unorganized tissue. Sectioning and staining procedures for anatomical studies, introduction to microscopy; anatomical phases during adventitious organ formation 2. The anatomy of the root-to-shoot interface 3. The anatomy of adventitious buds and stems. 4. The structure of <i>in vitro</i> developed leaves (the mesophyll, epidermis and cuticle structure, the stomatal apparatus) 5. Anatomical features of reproductive organs developed <i>in vitro</i> 6. The anatomy of hyperhydric and malformed plant organs
Accomplished learning outcomes	AMP_U1-U2, AMP_K1
Means of verification, rules and criteria of assessment	report (50%)

#### References:

Basic	<i>Plant Microtechniques and Protocols. 2015. Eds. Yeung ECT, Stasolla C, Sumner MJ, Huang BQ. Springer</i>
Supplementary	<i>Anatomy and morphology of tissue cultured plants. [In]: Plant propagation by tissue culture. Volume 1. The background. 2008. George E.F., Hall M.A., de Klerk (Eds.), Springer, UK</i> <i>Teaching Plant Anatomy Through Creative Laboratory Exercises – chosen chapters</i>

#### Structure of learning outcomes

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