

**Course name: Tissue cultures for crop improvement**

ECTS	5
Course status	<i>facultative</i>
Course final assessment /evaluation of outcomes	<i>exam</i>
Prerequisite	<i>knowledge on plant biology, middle school level and basic knowledge on plant tissue cultures</i>

**Main field of study:**

Agriculture and Horticulture, Biology and Biotechnology (Erasmus+)

Educational profile	<i>general academic</i>
Code of studies and education level	<i>bachelor/engineer (SI) or master of science (SM)</i>
Semester of studies	<i>winter or summer</i>
Language of instruction	<i>English</i>

**Course offered by:**

Name of faculty offering the course	Faculty of Biotechnology and Horticulture
Name of department offering the course	Department of Plant Biology and Biotechnology
Course coordinator	dr hab. inż. Agnieszka Kielkowska, prof. URK

**Learning outcomes:**

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands:			
TCCI_W1	cell totipotency, characterize different in vitro techniques	BIOT2_W03 BIOT2_W06	R, P
TCCI_W2	defines somatic and gametic embryogenesis, haploidisation, somatic hybridization and other related to plants tissue cultures	BIOT2_W11	R, P
TCCI_W3	aims of in vitro techniques and its utilization for crop improvement	BIOT2_W12	R, P
SKILLS – student is able to:			
TCCI_U1	work in tissue cultures lab, establish and maintain experiments	BIOT2_U11 BIOT2_U12	R, P
TCCI_U2	apply in vitro techniques to increase biodiversity in plants	BIOT2_U11 BIOT2_U15	R, P
SOCIAL COMPETENCIES – student is ready to:			
TCC_K1	work in team, formulate objective opinions on the application of in vitro techniques in crop improvements	BIOT2_K07	R, P

**Teaching contents**

Lectures	24 hours	
Topics	Introduction, history, Major concepts and importance Culture media and plant morphogenesis Micropropagation I Micropropagation II Meristem culture and pathogen-free plants Haploid production Somaclonal variation and in vitro selection Protoplast cultures and somatic hybridization Interspecific crossing and embryo-rescue Culture transfer and acclimatization Germplasm storage	
Accomplished learning outcomes	TCCI_W1-W3, TCCI_K1	

Means of verification, rules and criteria of assessment	test (70% of share in final grade)
Classes:	21 hours
Topics	Laboratory facilities and equipment and media preparation Morphogenesis in <i>Nicotiana tabacum</i> Micropropagation I Micropropagation II Meristem culture and pathogen-free plants in <i>Allium sativum</i> Haploid induction by androgenesis Haploid induction by gynogenesis Somaclonal variation and in vitro selection for salinity Protoplast cultures in <i>Brassica sp.</i> Observations of established cultures and analysis of the results
Accomplished learning outcomes	TCCI_U1-U2, TCCI_K1
Means of verification, rules and criteria of assessment	conducting the experiments and preparation of the report (30% of share in final grade)

### References:

Basic	Sathyanarayana BN. 2007. Plant Tissue Culture: Practices and New Experimental Protocols I. K. International Pvt Ltd Smith RH (Ed). 2012. Plant tissue culture: techniques and experiments 3rd ed. Amsterdam, Elsevier Biotechnologies for crop improvements. 2018. Gosal SS, Wani SH (Ed.). Springer
Supplementary	Maluszynski et al (Ed). 2003. Doubled haploid production in crop plants. Kluwer Academic Publ. <a href="https://link.springer.com/chapter/10.1007/978-1-4614-8830-9_12">https://link.springer.com/chapter/10.1007/978-1-4614-8830-9_12</a>

### Structure of learning outcomes

Area of academic study: agriculture and horticulture	2.5 ECTS**
Area of academic study: biological sciences	2.5 ECTS**

### Structure of student activity

Contact hours	54	hrs.	2.2	ECTS**
Including:	lectures	24	hrs.	
	classes and seminars	21	hrs.	
	consultations	5	hrs.	
	participation in research	...	hrs.	
	obligatory traineeships	...	hrs.	
	participation in examination	4	hrs.	
e-learning	...	hrs.	...	ECTS**
student own work	71	hrs.	2.8	ECTS**

\*areas of academic study in the fields of: P – biological sciences; R – agriculture and horticulture

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