Course name: Plant and animal tissue cultures

ECTS	*5*
Course status	*facultative*
Course final assessment /evaluation of outcomes	*exam*
Prerequisite	*knowledge on plant and animal cell biology and basic knowledge on tissue cultures*

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	*winter*
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 Plant Biology and Biotechnology
Course coordinator	dr hab. Inż. Agnieszka Kiełkowska, 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:		
PAC_W1	concepts regarding structure and function of eukaryotic cells, cell totipotency, characterize different in vitro techniques	BIOT2_W03 BIOT2_W06	R, P
PAC_W2	defines terms related to plants and animal tissue cultures	BIOT2_W11	R, P
PAC_W3	the aims of in vitro techniques and its utilization for crop improvement and animal tissue engineering	BIOT2_W12	R, P
	SKILLS – student is able to		
PAC_U1	apply methods of in vitro cell culture, use an appropriate techniques to perform research tasks	BIOT2_U11 BIOT2_U12	R, P
PAC_U2	apply in vitro techniques to increase biodiversity in plants	BIOT2_U11 BIOT2_U15	R, P
	SOCIAL COMPETENCIES – student is ready to:		
PAC_K1	work in team, formulate objective opinions on the application of in vitro techniques in crop improvements	BIOT2_K07	R, P
PAC_K2	act in accordance with the principles of ethics in professional work with animal materials	BIOT2_K05	R,P

Teaching contents

Lectures	22 hours
Topics	1. Introduction, history, major concepts and importance 2. Types of plant in vitro cultures 3. Micropropagation 4. Meristem culture and pathogen-free plants 5. Haploid production 6. Somaclonal variation and in vitro selection 7. Interspecific hybridization 8. Physical aspects and safety considerations in cell culture laboratory 9. Main types of in vitro cultures, growth cycle of cultured cells 10. primary cell cultures, dispersion of tissues and cells isolation; monolayer and suspension cell culture technique

	11. Tissue and cell engineering, application of in vitro cultures methods
Accomplished learning outcomes	*PAC_W1-W3, PAC_K1-K2*
Means of verification, rules and criteria of assessment	*test (70% of share in final grade)*
Classes	24 hours
Topics	1. Laboratory facilities and equipment and plant media preparation 2. Morphogenesis in *Nicotiana tabacum* 3. Micropropagation 4. Meristem culture and pathogen-free plants in *Allium sativum* 5. Somaclonal variation and in vitro selection for salinity 6. Observations of established cultures and analysis of the results 7. Special equipment and organization of the laboratory for in vitro culture of animal cells and tissues 8. Subculture of adherent cell lines 9. Cell counting and viability testing methods 10. Staining of cell cultures and microscopic slide preparation, analysis of preparations under a light microscope 11. Isolation of primary culture of renal tubular cells 12. Isolation of mouse embryonic fibroblasts for stem cell culture
Accomplished learning outcomes	*PAC_U1-U2, PAC_K1-K2*
Means of verification, rules and criteria of assessment	*conducting the experiments and preparation of the report (30% of share in final grade)*

References:

Basic	*Biotechnologies for crop improvements. 2018. Gosal SS, Wani SH (Ed.). Springer* *Smith RH (Ed). 2012. Plant tissue culture: techniques and experiments 3rd ed. Amsterdam, Elsevier* *Davis J.M. 2001. Basic cell culture. Oxford University Press.* *Freshney R.I. 2021. Culture of Animal cells. A manual of basic techniques. 8th edition. Wiley-Liss.*
Supplementary	*Fundamental techniques in cell culture. A laboratory handbook. 2016. SIGMA.* https://link.springer.com/chapter/10.1007/978-1-4614-8830-9_12

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		55	hrs.	2.2	ECTS**
Including:	lectures	22	hrs.		
	classes and seminars	24	hrs.		
	consultations	5	hrs.		
	participation in research	…	hrs.		
	obligatory traineeships	…	hrs.		
	participation in examination	4	hrs.		
e-learning		…	hrs.	….	ECTS**
student own work		70	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