Course name

Plant Molecular Markers

ECTS	*4*
Course status	*facultative*
Course final assessment /evaluation of c	*exam*
Prerequisite	*basic knowledge of molecular biology and genetics*

Main field of study:

Erasmus +

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

Prowadzący przedmiot:

Name of faculty offering the course	Faculty of Agricultural and Economics
of department offering the	Department of Plant Breeding, Physiology and Seed Science
Course coordinator	dr inż. Magdalena Wójcik-Jagła

Learning outcomes

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol
	KNOWLEDGE – student knows and understands:		
PMM_W1	what polymorphism is and how it translates into molecular markers		P,R
PMM_W2	basic molecular DNA, expression, and QTL markers		P,R
PMM_W3	uses of molecular markers in plant biology applications		P,R
	SKILLS – student is able to:		
PMM_U1	plan an experiment with the use of plant molecular markers		P,R
PMM_U2	perform a PCR analysis of selected basic plant DNA markers and interpret the results		P,R
PMM_U3	perform genome-wide association mapping (GWAS) and interpret its results		P,R
	SOCIAL COMPETENCIES – student is ready to:		
PMM_K1	individual work while respecting the work of others		P,R
PMM_K2	participate in discussions on the use of plant molecular markers for different applications		P,R

Teaching contents:

Lectures		**15**	**hours**
Topics	Definition and classification of plant moleular markers.		
	Plant molecular markers in comparison to biochemical and physiological markers		
	High-throughput DArT, DArTseq, SNP marker systems - genotyping		
	Quantitative trait markers (QTL and association mapping)		
	Use of plant molecular markers in different applications: plant breeding, phylogenetics, forensic science, bioconservation, ecology etc.		

Means of verification, rules and	*Exam - one-choice test (40% participation in the final mark)*

Classess		**20**	**hours**
Topics	DNA isolation from plant leaves		
	PCR with RAPD markers		
	Horizontal electrophoresis and interpretation of the results		
	Genome wide association mapping of selected abiotic stress tolerance quantitative trait		
Means of verification, rules and criteria of assessment	*Laboratory work report (30% participation in the final mark)*		

Seminar		**10**	**hours**
Topics	Presentations of students' final projects - plan of an experiment using plant molecular markers		
Means of verification, rules and	*Oral presentation of the final project (30% participation in the final mark)*		

References:

Basic	Genomes, Ed. A. T. Brown, Crc Pr Inc, 2023 Soriano, J.M. Molecular Marker Technology for Crop Improvement. Agronomy 2020, 10, 1462. https://doi.org/10.3390/agronomy10101462 Molecular Marker Techniques: A Potential Approach of Crop Improvement. Ed. Nitish Kumar, Springer, 2023
Supplementary	Wójcik-Jagła, M., Rapacz, M., Tyrka, M., Kościelniak, J., Crissy, K., & Żmuda, K. (2013). Comparative QTL analysis of early short-time drought tolerance in Polish fodder and malting spring barleys. Theoretical and applied genetics, 126(12), 3021-3034 Petrovičová, L., Gálová, Z., Balážová, Ž., Vivodík, M., Wójcik-Jagła, M., & Rapacz, M. (2021). Assess Fiust, A., Rapacz, M., Wójcik-Jagła, M., & Tyrka, M. (2015). Development of DArT-based PCR markers for selecting drought-tolerant spring barley. Journal of applied genetics, 56(3), 299-309.

Structure of learning outcomes

Area of academic study: agriculture and horticulture				2	ECTS**
Area of academic study: biological sciences				2	ECTS**
Structure of student activity					
Contact hours		48	hrs	1,9	ECTS**
Including	Lectures	15	hrs		
	classes and seminars	30	hrs		
	consultations	2	hrs		
	participation in research	…	hrs		
	obligatory traineeships	…	hrs		
	participation in examination	1	hrs		
e-learning		0	hrs	0	ECTS**
student own work		53	hrs	2,1	ECTS**