INFORMATION ABOUT THE COURSE

1. Basic information

Course name	**Plant physiology and micropropagation**
Field of study	Agriculture
Study level	First cycle
Study profile	Academic
Study form	Full time
Speciality	1. Agronomy and Agribusiness 2. Plant Protection 3. Environmental Management
Unit running the course	Faculty of Agriculture and Biotechnology, Department of Agricultural Biotechnology
Name(s) and scientific degree (title) of teacher(s)	dr hab. inż. Anna Figas, dr inż. Magdalena Tomaszewska-Sowa
Introductory courses	Botany, Organic chemistry
Prerequisites	Knowledge of basic principles and theories concerning botanical and chemical changes

2. Semester schedule of classes

Semester	Lectures	Classes	Laboratories	Project classes	Seminars	Field practice	ECTS
I	5		10				7

3. EDUCATIONAL OUTCOMES (acc. to National Qualification Framework)

No.	Description of the outcomes	Reference to the major specific outcomes of education	Reference to the area specific outcomes of education
KNOWLEDGE			
W1	Knows the basic physiological processes taking place in the plant. During the course, the student will acquire knowledge of the behavior of plant cells inoculated on nutrients, the possibility of determining their development path and obtaining specific effects in the form of callus tissue or regenerates.	K_W01 K_W09 K_W07	R1A_W01 R1A_W04 R1A_W05 R1A_W03 R1A_W05
W2	Knows the basic relationships between the organism and the environment around it. After completing the course, the student will be able to use the known research methods to assess the morphogenetic potential of explants isolated from cultivated plants and assess their suitability for conducting biotechnological experiments or the production of micro-seedlings of various plant species in in vitro cultures.	K_W01 K_W09 K_W16	R1A_W01 R1A_W04 R1A_W05
SKILLS			
U1	Evaluates and explains the factors and mechanisms involved in the regulation of basic physiological processes.	K_U12 K_U04 K_U01	R1A_U04 R1A_U05 R1A_U01

	He has the ability to plan a biotechnological experience using the knowledge of anatomy, botany and biotechnology acquired during his education, as well as knowledge of the use of modern technologies and electronic sources.	K_U20 K_U10	R1A_U06 R1A_U07 R1A_U03
U2	Recognizes the basic environmental requirements of plants. The student is able to effectively use laboratory equipment and perform all activities related to in vitro cultures.	K_U12 K_U04 K_U01 K_U15 K_U13	R1A_U04 R1A_U05 R1A_U01 R1A_U06
SOCIAL COMPETENCES			
K1	Learns to lead selected group work experience. After completing the course, the student is able to use the acquired knowledge and skills effectively in his professional life, showing creativity and responsibility.	K_K10 K_K07	R1A_K02 R1A_K04 R1A_K08 R1A_K05

4. TEACHING METHODS

multimedia lecture, laboratory exercises, demonstration, discussion

5. METHODS OF EXAMINATION

Laboratory exercises: report of experimental results. 1 tests (written). Test (2 possible corrections possible) must be completed in order to be admitted to the final examination
Lecture: written final exam

6. TEACHING CONTENTS

Lectures	Structure and physiology of plant cells. Water management of plants. Transpiration . Guttation. Water uptake and transport. Ecological types of plants. Mineral nutrition. Glycolysis, pentose phosphate pathway, anaerobic digestion, citric acid cycle, respiratory chain, Photosynthesis. Growth regulators (auxins,gibberellins, abscisic acid, brassinosteroids, cytokinins, ethylene, systemin, salicylic acid), growth inhibitors. Plant growth. Plant development Allelopathy. Plant movements (tropisms, nasties, taxa, autonomous movements). Basic plant reactions to abiotic stress factors. Adaptation and acclimatization. Physiology of transport. Plant biotechnology (definitions and introduction, traditional methods of plant breeding, in vitro plant cultures). Plant tissue laboratory and aseptic techniques. *In vitro* culture conditions – role of light, temperature, photoperiod and growth regulators. Preparation and composition of nutrient media. Mass micropropagation of healthy plants. Culture types. Callus and cell culture.
Labs	Structure and physiology of plant cells. Water management of plant cells. Water management of plants. Mineral plant economy. Chemical composition of plants. Respiration. Photosynthesis. Plant growth and development. Growth and plant development regulators. Plant movements. Media preparation. Explant isolation and sterilization. Culture initiation. Effects of plant hormones on regeneration and organogenesis. Induction and callus growth of carrot. Vegetative propagation of plants. Rooting and acclimatization of plants.

7. VALIDATION OF LEARNING OUTCOMES

Outcome	Evaluation form					
	Oral Exam	Written Exam	Colloquium	Project	Report	Test
W1		x			x	x
W2		x			x	x
U1		x			x	

U2		x			x	
K1					x	

8. LITERATURE

Basic literature	Lincoln Taiz, Eduardo Zeiger (2010): Plant Physiology. Fifth Edition. Sinauer Associates, Incorporated, 2010 - 782 pages Campbell, A. Malcolm; Paradise, Christopher J (2016). Plant Physiology. New York, Momentum Press. 2016, eBook Index Pierik R.L.M. 1997. *In vitro* culture of higher plants, Martinus Nijhoff Publishers, Dordrecht Loyola-Vargas V.M., Ochoa-Alejo N. (Eds) 2012. Plant cell culture protocols. Springer
Supplementary literature	Hans Mohr, Peter Schopfer (1995): Plant Physiology. Berlin Springer. 629 pages. Current scientific literature and internet sources

9. STUDENT'S WORK – BALANCE OF HOURS AND ECTS POINTS

Student's performance	Number of hours
Class attendance specified in p. 2	15
Involvement in classes	5
Study of literature	75
Others (preparation for exams, tests, engagement in projects etc.)	70
Student's total performance	10
Number of points proposed by NA	175
Final number of ECTS points (determined by the Educational Board)	7