SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Plantish - The Language of Plants

Educational subject description sheet

Basic information

Field of study Course Offer for exchange students - second cycle studies, including uniform master studies (MA programmes) **Speciality** - **Organizational unit** Course Offer for exchange students **Study level** second cycle studies, including uniform master studies (MA programmes) **Study form** full-time studies **Education profile** General academic	**Didactic cycle** 2024/25 **Subject code** PWMPWM2S_D.B100000P.06440.24 **Lecture languages** english **Mandatory** Elective subjects **Block** Basic subjects **Disciplines**

Coordinator	Mohamed Kalaji
Teacher	Mohamed Kalaji

Period	**Examination**	**Number of ECTS points**
Winter semester	Pass with grade **Activities and hours** Lecture: 30 Laboratory exercises: 30 Field exercises: 15	10

Goals

Code	Goal
C1	This course is based on Oxford and Cambridge's one-on-one teaching model (Tutorial System), which promotes liberal education and the development of critical thinking among students. The Oxford tutoring system is a face-to-face meeting between tutor and student. Essays are usually submitted weekly and form the basis of tutorial discussions. Grades are based on the essays, discussions, and presentations. The objective of this course is to provide students with a comprehensive knowledge of the use of state-of-the-art sensors and instruments in the field of plant science. This includes understanding the physiological state of plants, applying artificial neural networks and machine learning to develop future devices to predict coming changes before they are visible to the naked eye or other, usually destructive, methods. Students will also learn how we can communicate with plants to understand and inform them about their needs. Finally, the student will be open to developing a biological feedback system that allows plants to control their growing environment.
C2	introducing students: - transfer of knowledge in the field plant physiology; - making students aware of the ways to communicate with plants and understanding their needs; - familiarisation of students with non invasive methods to measure various plants growth and performance parameters; - developing skills related to thinking independently; - acquisition of skills related to plant phenotyping.

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	Main development trends in the field/discipline.		Report, Presentation
W2	The methodology of scientific research in the field/discipline of research, including programs for data analysis.		Report, Presentation
Skills – Student can:			
U1	Develop research methodology and creatively use research methods, techniques and tools, characteristic of the field/discipline.		Report, Presentation
U2	Use didactic skills and professional qualifications related to the methodology and technique of conducting didactic classes, including modern methods and techniques of conducting classes.		Report, Presentation
Social competences – Student is ready to:			
K1	Representing one's position during substantive discussions, also of an interdisciplinary nature.		Report, Presentation
K2	Recognition of knowledge in solving cognitive and practical problems specific to the research area (field/discipline) and in an interdisciplinary approach.		Report, Presentation

Study content

No.	Course content	Subject's learning outcomes	Activities
1.	Speak plantish language: how to communicate with plants Understand the real needs of a plant Plants Neurobiology Plants response to external and internal factors Measuring physiological state of plants Plants movement Plants memory Training plants to be a “spy” Plants mechanisms for survival and adaptation Plants communication Remote Sensing Modelling and Artificial Neural Networks (ANN) Phenotyping systems mobile phones applications for biology and agricultural researches Artificial Intelligence (AI)	W1, W2, U1, U2, K1, K2	Lecture
2.	Providing students with hands-on training and knowledge related to the employment of advanced instrumentations to predict and detect the effects of stressors on plant growth. The aim of this part is to provide students with comprehensive knowledge related to the employment of most advanced instrumentations in the field of plant science including: agronomy, horticulture, biology, botany, crop sciences, forestry, ecology, soil science, meteorology and plant physiology.	W1, W2, U1, U2, K1, K2	Laboratory exercises
3.	The field classes include conducting some experiments under controlled and/or semi-controlled conditions (growth chambers, green house) and the use of some filed measurements in possible visits to some Polish scientific institutes such as SGGW greenhouse, Skierniewice Experimental Station of SGGW, ITP, IHAR, IBL, IUNG, INHORT and WU Botanical garden. Some visit will be addressed to private companies and producer where IA is applied in horticultural and agricultural systems.	W1, W2, U1, U2, K1, K2	Field exercises

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture, Conversation lecture, Discussion, Brainstorm, Presentation, Problem solving, Analysis of source materials, Teamwork
Laboratory exercises	Laboratory (experiment), learning by experiment
Field exercises	Field measurements

Activities	Examination method	Percentage
Lecture	Presentation	70%
Laboratory exercises	Presentation	15%
Field exercises	Report	15%

Activities	Credit conditions
Lecture	Assessment of students' preparation (student lectures), students' reports and presentations (exercises) and their activity during classes.
Laboratory exercises	Students make measurements in the laboratory and analyze the results obtained.
Field exercises	Students perform measurements in field conditions and analyze the results obtained.

Literature

Obligatory

1. Kalaji H.M., Goltsev V.N., Żuk-Gołaszewska K., Zivcak M., Brestic M. (2017) Chlorophyll Fluorescence: Understanding Crop Performance — Basics and Applications. CRC Press, ISBN 978-14-9876-449-0
2. https://scholar.google.com/scholar?hl=pl&as_sdt=0%2C5&q=artificial+intelligence+plant&btnG= https://www.youtube.com/results?search_query=artificial+intelligence+plant
3. www.flippedclass.com www.jonbergmann.com https://www.schoology.com/blog/flipped-classroom

Optional

1. Instruments: https://www.lemnatec.com/ http://www.hansatech-instruments.com/ http://ppsystems.com/ http://www.bbe-moldaenke.de/en/ http://psi.cz/

Calculation of ECTS points

Activity form	Activity hours*
Lecture	30
Laboratory exercises	30
Field exercises	15
Self-study on the content covered in class	100
Preparation of a paper	100
Student workload	**Hours** 275
Number of ECTS points	**ECTS** 10

* hour means 45 minutes