DESCRIPTION OF THE SAFE_02 MODULE IMPLEMENTED AS PART OF THE INTENSIVE FORM OF EDUCATION (IFoE)

Module Name	*Application of drones in precision agriculture*			
Language of Instruction	english			
Module Purpose	The aim of the module is to familiarize students with the practical applications of drones in precision agriculture, including crop condition monitoring, multispectral data analysis, and the execution of agrotechnical operations using spraying drones. The classes have a demonstrative and analytical character, enabling students to become acquainted with the equipment and perform sample exercises related to mission planning.			
Module Content	Introduction to precision agriculture – definition, objectives, and benefits of using digital technologies in crop production. Application of unmanned aerial vehicles (UAVs) in agriculture – overview of drone technologies and their role in crop monitoring and agrotechnical operations. Importance of multispectral imaging in agriculture. Spraying drones in agricultural practice – technical capabilities, flight safety, and legal limitations related to UAV operations.			
Description of learning outcomes	Effect Symbol	Effect Name Methods	Verification and Documentation	Reference to Directional Effect Set
	KNOWLEDGE (graduate knows and understands)			
	W1	The student knows the basic principles of using drones in precision agriculture, taking into account current trends in digitalization and the green transformation of agriculture.	Graded assessment. Class report. Assessment protocol and archiving of submitted assignments.	SAFE_W01
	SKILLS (graduate can)			
	U1	The student is able to select appropriate tools for planning agricultural drone missions in the context of supporting agrotechnical decision-making.	Graded assessment. Class report. Assessment protocol and archiving of submitted assignments.	SAFE_U02
	SOCIAL COMPETENCES (graduate is ready to)			

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	K1	The student is able to critically assess the environmental and social impact of drone use in agriculture, acting in accordance with the principles of safety, professional ethics, and sustainable development in agricultural practice.	Oral statements and discussion.	SAFE_K01
Module crediting method	graded credit			
ECTS credit balance (total, developing practical skills, from classes conducted using distance learning methods and techniques)	Number of contact hours/ECTS points		Number of non-contact hours/ECTS points	
	Lectures (hours 1 ECTS points 0.04) Classes (hours 1.5 ECTS points 0.06) Consultations (hours 0.25 ECTS points 0.01) Assessment (hours 0.25 ECTS points 0.01)		Reading literature (hours 1 ECTS points 0.04) Preparing a presentation (hours …. ECTS points ……) Preparing for credit (hours 1 ECTS points 0.04)	
	Total contact hours 3 hr. 0,12 pt. ECTS		**Total non-contact hours 2 hr. 0,08 pt. ECTS**	
Staffing	Paweł Karpiński, DEng			
Information on the infrastructure ensuring the implementation of learning outcomes	The unit conducting the classes includes a laboratory of agrochemical application techniques. Its equipment comprises, among others, two agricultural drones intended for operations related to precision agriculture. The first is a multispectral camera drone used for mapping and analyzing crop conditions, while the second is an unmanned aerial vehicle designed for crop spraying. In addition, the unit has access to a computer laboratory that enables the analysis of digital data related to the course topics. The available infrastructure is accessible to persons with reduced mobility.			
Planned teaching methods	lecture, exercises, laboratory classes, field activities			
Recommended reading list	1. Qamar Zaman, Precision Agriculture: Evolution, Insights and Emerging Trends, Academic Press, 2023 2. Fred Whitford et al., The Evolution of Spray Drones, Purdue University, 2025, online access via the College of Agriculture - Purdue University website			

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