DESCRIPTION OF THE SAFE_03 MODULE IMPLEMENTED AS PART OF THE INTENSIVE FORM OF EDUCATION (IFoE)

Module Name	*Biostimulators*			
Language of Instruction	english			
Module Purpose	The aim of the module is to familiarize students with the types of biostimulants and their composition and action. The aim is also to provide knowledge in the field of design, prototyping and application of plant extracts (from herbal plants) with biostimulating potential in crops.			
Module Content	Definition and classification of biostimulants; – How biostimulants improve plant resilience and productivity; – The main types of biostimulants: extracts from plants, algae, and compost; microbial inoculants (e.g., mycorrhizal fungi, rhizobacteria); amino acids, peptides, and humic substances; – Preparation techniques: Extracting bioactive compounds from natural materials; – Guidelines for application: Timing, dosage, and compatibility with other substances.			
Description of learning outcomes	Effect Symbol	Effect Name Methods	Verification and Documentation	Reference to Directional Effect Set
	KNOWLEDGE (graduate knows and understands)			
	W1	Familiar with the terminology related to the production and use of biostimulants.	Test	SAFE_W01
	W2	Understands the effects of biostimulants and plant extracts with biostimulant potential on crop plants.	Test	SAFE_W01 SAFE_W03
	SKILLS (graduate can)			
	U1	Can develop simple extraction methods for herbal plants.	Test	SAFE_U02
	U2	Can select the appropriate biostimulant application method for a crop.	Test	SAFE_U03
	SOCIAL COMPETENCES (graduate is ready to)			

"Project 'Specialist in Agricultural and Food Engineering in the context of Green and Digital Transformation (Twin Transition)' is financed from the European Funds for Social Development 2021-2027 (EFSD), under the NAWA project entitled 'Support for the creation and implementation of international education programmes', project no. FERS.01.05-IP.08-0436/23".

	K1	Critically evaluate the use of biostimulants in crop plants.	Test	SAFE_K01
	K2	Effective collaboration within an interdisciplinary team to promote sustainable agriculture.	Activity in class	SAFE_K02
Module crediting method				
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 2 ECTS points 0.08) Consultations (hours 1 ECTS points 0.04)		Reading literature (hours 1 ECTS points 0.04)	
	Total contact hours 4 hr. 0.16 pt. ECTS		**Total non-contact hours 1 hr. 0.04 pt. ECTS**	
Staffing	Professor Sławomir Kocira			
Information on the infrastructure ensuring the implementation of learning outcomes	*- Lecture hall equipped with multimedia presentation devices, accessible for people with disabilities;* *- Workshop room with accessible for people with disabilities;* *- Laboratory equipped with extractors and devices for testing the physicochemical properties of biostimulants.* *Laboratory accessible for people with disabilities.*			
Planned teaching methods	lecture, exercises, laboratory			
Recommended reading list	**1.** Zulfiqar, F., Moosa, A., Ali, H. M., Bermejo, N. F., & Munné-Bosch, S. (2024). Biostimulants: A sufficiently effective tool for sustainable agriculture in the era of climate change?. Plant Physiology and Biochemistry, 211, 108699. **2.** Kocira, S., Bohatá, A., Bartos, P., Olsan, P., Pérez Pizá, M. C., Swieca, M., ... & Síma, J. (2024). Technologies for producing Plant Biostimulants using Cold Plasma and Low-Pressure Microwave Discharge.			

"Project ‘Specialist in Agricultural and Food Engineering in the context of Green and Digital Transformation (Twin Transition)’ is financed from the European Funds for Social Development 2021-2027 (EFSD), under the NAWA project entitled ‘Support for the creation and implementation of international education programmes’, project no. FERS.01.05-IP.08-0436/23”.