DESCRIPTION OF THE SAFE_ 06 MODULE IMPLEMENTED AS PART OF THE INTENSIVE FORM OF EDUCATION (IFoE)

Module Name	*Biofuels*			
Language of Instruction	english			
Module Purpose	The aim of this module is to familiarize students with the technical, legal, and environmental aspects of biofuel production. The module will allow them to understand the role of biofuels in environmental protection and energy transition, as well as the raw materials used in their production and the technologies used to convert them into energy.			
Module Content	The lecture covers: explaining the need for biofuel production (depletion of fossil resources, the National Indicative Target, and the environmental impact of conventional fuels); the production technologies for first-, second-, and third-generation biofuels, divided into solid, liquid, and gaseous; the raw materials used to produce specific types of biofuels; and the use of biofuels in the context of sustainable development, and in the case of second-generation biofuels, the principles of a circular economy. During the exercises, sample biofuels (solid and liquid) and the raw materials used for their production are presented, including methods for assessing their properties in a specialized laboratory.			
Description of learning outcomes	Effect Symbol	Effect Name Methods	Verification and Documentation	Reference to Directional Effect Set
	KNOWLEDGE (graduate knows and understands)			
	W1	modern technologies, processes and methods used in the biofuel production industry, current research and development directions related to the green transformation in the energy sector	written test	SAFE_W01
	W2	principles of operation of technological systems for the production of biofuels, their relationship with the principles of sustainable development and environmental protection	written test	SAFE_W02

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	SKILLS (graduate can)			
	U1	independently identify, analyze and solve technological, environmental and organizational problems related to the production of solid, liquid and gaseous biofuels, using interdisciplinary knowledge	written test	SAFE_U01
	U2	justify the position in the discussion, indicating the need to replace conventional fuels with biofuels	documentation of class activities	SAFE_U04
	SOCIAL COMPETENCES (graduate is ready to)			
	K1	increasing your knowledge as technology develops and awareness of the impact of using fuels of different origins on the environment	documentation of class activities	SAFE_K01
Module crediting method	Passing with a grade			
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 2 ECTS points 0.08) Classes (hours 1 ECTS points 0.04)		Reading literature (hours 1 ECTS points 0.04) 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	Alina Kowalczyk-Juśko			
Information on the infrastructure ensuring the implementation of learning outcomes	- a multimedia presentation kit (computer and projector), - biofuel samples: solid (pellets, briquettes, wood chips), liquid (biodiesel, bioethanol), and raw materials for biogas production, along with a laboratory kit (Conventional and Alternative Fuels Laboratory), - teaching buildings equipped with elevators and walk-in rooms, making the facility accessible to people with disabilities.			

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Planned teaching methods	lecture using multimedia presentations, exercises using biofuels and raw materials of various origins
Recommended reading list	– *Rutz D., Janssen R.: Biofuel Technology Handbook. WIP Renewable Energies, München 2008.* – *Moodley P., Ray R.C., Gueguim Kana E.B.: Advances in lignocellulosic biofuel production systems. Elsevier 2023.*

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