DESCRIPTION OF THE SAFE_08 MODULE IMPLEMENTED AS PART OF THE INTENSIVE FORM OF EDUCATION (IFoE)

Module Name	*Operation of renewable energy systems*			
Language of Instruction	english			
Module Purpose	The aim of the module is to familiarize students with the basic principles of operation and maintenance of renewable energy systems. The classes have a theoretical and analytical character, enabling students to learn about operating principles and fundamental aspects of servicing and diagnostics of such systems. Students perform sample exercises involving the analysis of performance parameters and the efficiency of a selected renewable energy system.			
Module Content	Introduction to renewable energy sources (RES) – significance in the context of sustainable development and energy transition. Classification and characteristics of the main types of RES. Theoretical aspects of the operation and maintenance of renewable energy systems illustrated by photovoltaic installations. Diagnostics and maintenance of RES systems – condition assessment, performance monitoring, and example failures. Environmental impact of renewable energy system operation.			
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 role of renewable energy systems in the context of sustainable development and environmental protection.	Graded assessment. Class report. Assessment protocol and archiving of submitted assignments.	SAFE_W01
	SKILLS (graduate can)			
	U1	The student is able to analyze and interpret data related to a renewable energy system using IT tools in order to assess its efficiency.	Graded assessment. Class report. Assessment protocol and archiving of submitted assignments.	SAFE_U03
	SOCIAL COMPETENCES (graduate is ready to)			

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	K1	The student is able to critically assess the environmental and social impact of renewable energy system operation, guided by the principles of professional responsibility and sustainable development.	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 1.25 ECTS points 0.05) Consultations (hours 0.25 ECTS points 0.01) Assessment (hours 0.5 ECTS points 0.02)		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 renewable energy laboratory. In addition, the unit has access to a computer laboratory, which enables the implementation of exercises related to the course topics. The available infrastructure is accessible to persons with reduced mobility.			
Planned teaching methods	lecture, exercises			
Recommended reading list	1. Mehmet Kanoglu, Yunus A. Cengel, John M. Cimbala, Fundamentals and Applications of Renewable Energy, McGraw Hill, 2023 2. Abdul Ghani Olabi, Renewable Energy - Volume 1: Solar, Wind, and Hydropower, Academic Press, 2023 3. Mejdi Jeguirim, Patrick Dutournie, Renewable Energy Production and Distribution - Volume 2: Solutions and Opportunities, Academic Press, 2023			

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