GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Safety in Power Engineering, PG_00042200		
Field of study	Power Engineering, Power Engineering, Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	4	Language of instruction	Polish
Semester of study	7	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Adam Kielak	
	Teachers	dr inż. Adam Kielak	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	0.0	15.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	3.0	42.0	75

Subject objectives

Introduction to the issues of security in the energy sector in the context of critical infrastructure.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_K03	The student has basic knowledge about individual and societal risks associated with energy facilities of various categories, including nuclear power plants.They know the principles of action in emergency situations in relation to the levels of INES scale. They are aware of the need for proper shaping of safety culture in engineering activities to limit the adverse impact of energy technologies on the environment.	[SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work
K6_U03	The student is prepared to identify threats in industry. Knows the rules health and safety at work. Can design architecture industrial control system ICS and determine strategy for its periodic testing and diagnosing for safety integrity level SIL.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject
K6_W06	The student knows new technologis energetics for use in industry 4.0. They can calculate reliability indicators of electrical power systems for industrial facilities. They know the basic solutions of functional safety for industrial control systems ICS to reduce the risk of health, material and environmental losses.	[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

<table>
<tr><td>Subject contents</td><td>Failures of energy facilities and systems and their causes. Integrated management systems for reliability, environment, and safety. Identification of hazards and risk evaluation, considering the relationship: human - technology - environment (MTE). Occupational safety. Reliability and safety of energy facilities and distribution systems. Critical infrastructure and the importance of the power system based on various energy sources, including RES. Reliability of electricity supply. Safety of nuclear power plants. Defining emergency scenarios. Protection of facilities and protective layers in industrial facilities of elevated risk and power plants. Consequences of emergency events. F-N curves and risk criteria. Risk evaluation in the life cycle. Risk control options. The ALARP principle. Shaping safety culture. Human reliability analysis (HRA). Functional safety of industrial control systems ICS (PN-EN 61508/61511). Cybersecurity of industrial control systems (ICS) in accordance with IEC 62443, issues of protection of related OT-IT-CT technologies. Proactive safety management in energy facilities. Risk-informed decision making (RIDM).</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of the reliability of technical systems and protection technologies in industry.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td></td><td>60.0%</td><td>50.0%</td></tr>
<tr><td></td><td>60.0%</td><td>50.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Smith D.J. Simpson K.: The Safety Critical Systems Handbook: A Straightforward Guide to Functional Safety: IEC 61508 (2010 Edition), IEC 61511 (2020 Edition) & Related Guidance, Fifth Edition.

2. Gritzalis D. Theocharidou M. Stergiopoulos G.: Critical Infrastructure Security and Resilience Theories, Methods, Tools and Technologies, Springer 2019.</td></tr>
<tr><td>Supplementary literature</td><td>1. Kosmowski K.T. (Ed.): Functional safety management in critical systems. Fundacja Rozwoju Uniwersytetu Gdańskiego, Gdańsk 2007.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:
BEZPIECZEŃSTWO W ENERGETYCE [2023/24] - Moodle ID: 26921
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26921</td></tr>
</table>
</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>