GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Application of power electronic systems in power system , PG_00057621		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
Education level	second-cycle studies	Subject group	
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Power Electronics and Electrical Machines -> Faculty of Electrical and Control Engineering		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Robert Małkowski	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	10.0	0.0	10.0	0.0	0.0	20

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	20	10.0	45.0	75

Subject objectives

Describing FACTS systems as control objects in the power system.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K7_U03	The student is able to prepare a synthetic study on the basis of literature sources, also in English	[SU3] Assessment of ability to use knowledge gained from the subject
K7_W01	The student is able to prepare a simple power grid system that allows for the analysis of selected control issues. The student is able to select and parameterize the appropriate power electronic system.	[SW1] Assessment of factual knowledge

Subject contents

LECTURE: Selected problems in the control of the power system operation.The range of power electronics application in the power system. Power electronic switches and their properties. seleced of FACTS (Flexiable AC Transmission Systems) used in power systems.Influence of FACTS systems on the power system - voltage and P, Q power flow regulation. Construction and principle of operation - shunt systems, series systems and series-shunt systems. Structures and principle of operation. Impact on power systems. Range of application.

LABORATORY: Modeling the work of selected FACTS systems. Testing the operation of FACTS systems with the use of physical models (UPFC, STATCOM, SVC).

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratories	50.0%	40.0%
Lectures	50.0%	60.0%

Recommended reading	Basic literature	1. Acha E., Fuerte-Esquivel C. R., Ambriz-Perez H., Angeles-Comacho C.: FACTS Modelling and Simulaton In Power Networks, John Wiley & Sons, LTD, 2004. 2. Aririllaga J., Smith B.: AC-DC Power System Analysis, London1998, The Institution of Electrical Engineers. 3. Machowski J.: Regulacja i stabilność systemu elektroenergetycznego, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2007. 4. Sood V. K.: HVDC and FACTS Controllers. Applications of Static Converters in Power Systems. Kluwer Academic Publishers Boston, 2004. 5. Machowski, J., Lubośny, Z., Białek, J., & Bumby, J. (2020). Power System Dynamics. Stability and Control. 3rd edition. 1-888..
	Supplementary literature	IEEE, Elsevier, CIGRE papers.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Types of modern power electronic systems supporting the operation of the power system and their classification. 2. List and describe the types of shunt power compensators 3. UPFC circuits - application, method of connection to the system, advantages and disadvantages. 4. Hybrid FACTS systems - characteristics, application.	
Work placement	Not applicable	