



Subject card

Subject name and code	Modern Sources of Electric Energy, PG_00038484						
Field of study	Electrical Engineering						
Date of commencement of studies	February 2026		Academic year of realisation of subject		2026/2027		
Education level	second-cycle studies		Subject group				
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Marcin Jaskólski				
	Teachers		dr hab. inż. Marcin Jaskólski				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	Acquiring the ability to analyze and evaluate modern sources of electricity, taking into account their role in the power system and their impact on the environment.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U11] is able to analyse the variability of electricity loads, calculate power and energy losses, can carry out cost accounting		Analyzes power and energy balance in electrical power facilities. Calculates power and energy losses in sources and power supply systems.		[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
	[K7_W08] has an extended knowledge of power supply systems power supply and control systems including the use of computer networks and design of these systems in industrial facilities industrial facilities		Defines the rules for integrating renewable energy sources into the power grid. Designs simple power supply systems using modern energy sources and storage facilities.		[SW1] Assessment of factual knowledge		
	[K7_W03] has an extended and deepened knowledge of the field related to electrical power systems and electrical equipment		Characterizes electrical power systems and devices that use modern energy sources. Selects technical solutions for renewable and hybrid sources depending on operating conditions.		[SW1] Assessment of factual knowledge		

Subject contents	Course content – lecture Modern energy sources • Conventional and renewable energy sources • Energy transition and energy mix (Poland, EU, global) • Climate policy, decarbonization, RES, and distributed sources Photovoltaics and wind energy • PV technologies (materials, modules, on/off-grid systems) • Energy production forecasting and modeling • Onshore and offshore wind turbines, grid integration Storage and hybrid sources • Energy storage (electrochemical, mechanical, thermal) • Integration of RES with storage facilities • Microgrids and hybrid systems Promising technologies • Hydroelectric and offshore power plants • Fuel cells, hydrogen, biogas, Power-to-X • New generation nuclear energy (SMR, fusion) Integration and system aspects • Smart grids, automation, and digitalization (IoT, AI, blockchain) • System services from renewable energy sources and storage facilities • Life cycle assessment (LCA), economics, legal regulations, and the energy market		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Knowledge test	60.0%	100.0%
Recommended reading	Basic literature	Tytko, Ryszard, i Towarzystwo Słowaków w Polsce Wydawca. Urządzenia i systemy energetyki odnawialnej / Ryszard Tytko. Wydanie osiemnaste uzupełnione. Kraków: Wydawnictwo i Drukarnia Towarzystwa Słowaków w Polsce, 2025. Print. Zawieja, Iwona, Politechnika Częstochowska Instytucja sprawcza, i Wydawnictwo Politechniki Częstochowskiej Wydawca. Osady ściekowe źródłem energii i surowców w aspekcie zrównoważonego rozwoju: monografia / Iwona Zawieja; Politechnika Częstochowska. Częstochowa: Wydawnictwo Politechniki Częstochowskiej, 2024. Web. Werle, Sebastian, Joanna Ferdyn-Grygierek, i Wydawnictwo Politechniki Śląskiej Wydawca. Ochrona klimatu i środowiska: nowoczesna energetyka: wybrana problematyka: praca zbiorowa / pod redakcją Sebastiana Werle, Joanny Ferdyn-Grygierek. Gliwice: Wydawnictwo Politechniki Śląskiej, 2024. Print. Zieliński, Andrzej, i Wydawnictwo Naukowe PWN Wydawca. Elektrownie jądrowe w nowoczesnej gospodarce: technologie, ekonomika, bezpieczeństwo / redakcja naukowa Andrzej S. Zieliński. Wydanie I. Warszawa: Wydawnictwo Naukowe PWN, 2024. Web.	
	Supplementary literature	1. Praca zbiorowa: <i>Poradnik inżyniera elektryka. Tom III</i> . WNT, Warszawa 2007 2. Cieśliński J., Mikieliewicz J.: <i>Niekonwencjonalne źródła energii</i> . Wydawnictwo Politechniki Gdańskiej, Gdańsk 1996 3. Szargut J., Ziębik A.: <i>Podstawy energetyki cieplnej</i> . WNP, Warszawa 2000 4. Lewandowski W.: <i>Proekologiczne odnawialne źródła energii</i> . WNT, Warszawa 2007.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	• What moisture content is accepted in steam turbine? What might be the effect of too low steam quality? • Show feedwater heating on an h-s graph and a schematic diagram of turbine system. • What is the role of mixing system in a biogas plant? • What are the advantages and disadvantages of fuel cells?		

Practical activities within the subject	Not applicable
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