GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00071244		
Field of study	Mechanical Engineering		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2025/2026
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Fluid-Flow Machinery -> Institute of Energy -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Krzysztof Kosowski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	0.0	0.0	5.0	5

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 4968 Projektowanie napędów elektrohydrodynamicznych
https://enauczanie.pg.edu.pl/2025/course/view.php?id=4968

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	5	0.0	95.0	100

Subject objectives

The aim of the lecture is to provide in-depth knowledge in the field of designing electrohydrodynamic drives in the context of modern energy systems, with particular emphasis on energy conversion, energy efficiency and the integration of EHD drives with energy and power systems.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W01] explains and describes, on the basis of general knowledge of the scientific disciplines forming the theoretical basis of Mechanics and Mechanical Engineering, the structure and principles of operation of mechanical systems and processes	the student has in-depth knowledge of electrohydrodynamic phenomena and their importance in energy	[SW2] Assessment of knowledge contained in presentation
[K7_U13] evaluates the feasibility and potential for utilizing new technical and technological achievements in accomplishing tasks characteristic for the field of study	the student can critically compare EHD technology with other solutions used in the energy sector	[SU3] Assessment of ability to use knowledge gained from the subject
[K7_U01] utilizes information obtained from the literature and other sources in the field of Mechanics and Mechanical Engineering and presents and analyses the results of solutions to technical problems in this field	the student is able to analyze and evaluate the energy balance of an electrohydrodynamic drive	[SU2] Assessment of ability to analyse information
[K7_U04] creatively designs or modifies devices, processes or systems specific to Mechanics and Mechanical Engineering, using computer-aided design systems in the form of technical documentation, taking into account aspects of economic analysis, using appropriate tools and techniques	the student is able to select the power supply parameters and geometry of the EHD system in terms of efficiency and reliability	[SU2] Assessment of ability to analyse information
[K7_W02] demonstrates a structured and theoretically grounded knowledge of the key topics in Mechanical Engineering enabling the analysis and modelling of mechanical systems, processes and devices	the student knows advanced methods of designing and modeling electrohydrodynamic drives	[SW2] Assessment of knowledge contained in presentation

Subject contents

Course content – seminar

Introduction to EHD Drives in the Power Industry
Physical Fundamentals of Electrohydrodynamics
Structure and Components of EHD Drives
Design and Modeling of EHD Drives
EHD Applications in the Power Industry and Future Developments

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
presentation	60.0%	100.0%

Recommended reading

Basic literature	Antonio Castellanos - Electrohydrodynamics; Cagnoni, D.; Agostini, F.; Christen, T.; de Falco, C.; Parolini, N.; Stefanovic, I. - Multiphysics simulation of corona discharge induced ionic wind; William S. Franklin - Advanced Theory of Electricity and Magnetism; Boucif Abdesselam - Introduction to Classical Electrodynamics S. L. Kakani, C. Hemrajani - Electromagnetism theory and problems electrodynamics and plasma physics;
Supplementary literature	Selected articles from journals: IEEE Transactions on Dielectrics and Electrical Insulation, Physics of Fluids Conference proceedings on MEMS and microdrives
eResources addresses	

Example issues/ example questions/ tasks being completed	1. Discuss electrode materials and geometries. 2. Discuss the properties of dielectric fluids. 3. Coupling the electric field with flow
Practical activites within the subject	Not applicable

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