GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physical and chemical properties of fuels in motorsport and beyond, PG_00069283		
Field of study	Chemical Technology		
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	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 Corrosion and Electrochemistry -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Michał Szociński	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	20.0	10.0	15.0	0.0	0.0	45

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	45	5.0	25.0	75

Subject objectives

The aim of the subject is to present knowledge regarding the properties of liquid and gaseous fuels propelling combustion engines. An important aspect will be the ecological and standard requirements of fuels in the context of technological development of engines in motorsport as well as aircraft and ship engines.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_K01] critically evaluates the content of cognitive and practical problems	The student knows the parameters of liquid and gaseous fuels and their impact on the efficiency of engines; the student has knowledge on the standard and ecological requirements for fuels	[SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills
[K7_W01] defines the phenomena, processes and laws of nature used to produce consumer goods and provide services	The student can characterize the process of producing fuels for combustion engines	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K7_U02] carries out experiments using properly selected techniques and apparatus, taking advantage of new developments in technology and related fields	The student can determine the basic parameters of engine fuels.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

Subject contents

Construction of internal combustion engines and turbines in the context of their development history. Outline of the history of design changes in motorsports. Basics of the production of liquid and gaseous fuels. Physical and chemical properties of liquid and gaseous fuels (including hydrogen). Fuel combustion processes in car engines and turbines. European Union emission standards for the production of new cars. Practical aspects of EURO standards. Standard properties of fuels: octane number, cetane number, vapor pressure, cold filter plugging point, etc. Ecological additives for fuels. Design properties of sports engines. Stability of fuels in the context of their storage. Pro-ecological solutions for combustion engines and turbines.

Prerequisites and co-requisites

Fundamentals of organic chemistry

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
final test	60.0%	60.0%
presentation	60.0%	20.0%
laboratory exercises	60.0%	20.0%

Recommended reading	Basic literature	M. Pałuchowska, J. Jakóbiec. Specyfikacje jakościowe benzyny silnikowej E10, Nafta i Gaz, Listopad 2011, 825-830 B. Danek, Wpływ właściwości frakcji benzynowych na parametry składu frakcyjnego paliwa etanolowego E85, Nafta i Gaz, październik 2012, 708-713 A. Thomas Automotive Internation Combustion Engines, Fuels,1988, 214-267
	Supplementary literature	J. Litwin, Zarys historii sportu samochodowego, WKŁ, 1980 Aviation Fuels, Shevron 2007
	eResources addresses	
Example issues/ example questions/ tasks being completed	Presentation of the main points of Euro combustion standards Basic quality parameters of gasoline Basic technical solutions for supercharging of combustion engines Operation principles of the KERS system in Formula 1 engines	
Work placement	Not applicable	

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