GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Space Missions, PG_00050015		
Field of study	Space and Satellite Technologies		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Geoinformatics -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Mariusz Figurski	
	Teachers	prof. dr hab. inż. Mariusz Figurski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	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	5.0	15.0	50

Subject objectives

The aim of the course is presenting the process of a space mission planning and implementing, including the role of space agencies (ESA, POLSA).

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U06] Is able to estimate the costs of designing and implementing the engineering activities undertaken. Is able to propose improvements to existing engineering solutions in from the field of space and satellite technology.	Student is able to evaluate the cost of space mission. He is also able to propose the improvements of existing solutions in the field of space missions planning and implementing.	[SU1] Assessment of task fulfilment
[K7_W07] Has knowledge of technical standards and norms in the space sector. Knows the objectives, main programs and principles of functioning of the European (ESA) and national (POLSA) institutions regulating, supervising and stimulating activity in the space industry. Knows space and satellite applications in security systems.	Student knows the roles of European Space Agency and Polish Space Agency in planning and implementing space missions.	[SW1] Assessment of factual knowledge
[K7_W03] He has theoretically based knowledge of astronomy and the planning and design of space missions.	Student has theoretically grounded knowledge on planning and design of space missions.	[SW1] Assessment of factual knowledge
[K7_K04] Can show resourcefulness and ingenuity in dealing with professional tasks.	Student shows ingenuity in dealing with tasks related to space mission planning and implementing.	[SK5] Assessment of ability to solve problems that arise in practice

Subject contents	Contents of the course LECTURES 1) Review of main types of space missions (research in astrophysics and planetology, meteorological, Earth observation, navigation, telecommunication, military, manned). Mission examples. 2) Basic elements of space missions. Organisations carrying out space missions. 3) Process of mission analysis and mission elements design. 4) Mission orbit defining with respect to observation, communication with Earth, power supply etc. 5) Analysis of optical instruments, passive and active. 6) Analysis of microwave and other instruments. 7) Space environment. 8) Structure and thermal system of satellite platform. 9) System of mission power supply. 10) Telecommunication systems. 11) On-board computer. 12) Platform orientation and stabilisation system. 13) Launching and orbit correction systems. 14) Ground segment, flight control system, data processing. 15) Mission cost estimation. 16) Mission risk analysis. 17) Testing, integration and verification of space missions. 18) Organisational and legal issues related to space missions. 19) International co-operation in space. 20) Outer space exploration and exploitation programs. EXERCISES: During exercise classes, students work on solving problems defined earlier on the lecture. Some tasks are implemented by students working individually and some of them by students working in groups. Sample exercises:

	1) Optical system system parametrs calculation with respect to user requirements. 2) Evaluation of environment effects for a given mission trajectory. 3) Cost estimation for a given mission.
Prerequisites and co-requisites	Basics of mathematical analysis and algebra, basic engineering knowledge in mechanics, electronics and computer science, ability to work in MS Windows environment, basics of probability theory
Assessment methods and criteria	

Subject passing criteria	Passing threshold	Percentage of the final grade
	51.0%	50.0%
	51.0%	50.0%

Recommended reading	Basic literature	Space Mission Analysis and Design, 3rd edition (Space Technology Library, Vol. 8) 3rd Edition, by Wiley J. Larson (Editor), James R. Wertz (Editor), ISBN-13: 978-1881883104
	Supplementary literature	Spacecraft Systems Engineering 4th Edition, by Peter Fortescue (Editor), Graham Swinerd (Editor), John Stark. (Editor), Wiley, ISBN-13: 978-0470750124
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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