GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Navigation Systems, PG_00049081					
Field of study	Automatic Control, Cybernetics and Robotics					
Date of commencement of studies	October 2023		Academic year of realisation of subject		2026/2027	
Education level	first-cycle studies		Subject group		Optional subject group Subject group related to scientific research in the field of study	
Mode of study	Full-time studies		Mode of delivery		at the university	
Year of study	4		Language of instruction		Polish	
Semester of study	7		ECTS credits		3.0	
Learning profile	general academic profile		Assessment form		assessment	
Conducting unit	Department of Marine Electronic Systems -> Faculty of Electronics, Telecommunications and Informatics					
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Marszal				
	Teachers	dr hab. inż. Jacek Marszal				

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	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	3.0	27.0	75

Subject objectives	The aim of the course is to acquaint students with the basics of the theory of navigation, as well as the use of navigation systems.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U06] can analyse the operation of components, circuits and systems related to the field of study, measure their parameters and examine technical specifications	Student discusses the basics of functioning and application of hydroacoustic navigation systems. Describes the operation of the radar as a navigation device used in sea and air navigation.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
	[K6_W03] Knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Student defines navigation tasks and its basic concepts. Discusses mapping methods and maps. Classifies and describes classic navigation methods and technical methods of their implementation. Presents the principles of work and parameters of navigation devices. Explains the principle of work and gives the parameters of the GPS satellite navigation system.	[SW1] Assessment of factual knowledge

Subject contents	1. Organizing issue: rules of passing, consultations, literatures 2. Fundamentals of navigation 3. Navigation and geodesy 4. Shape of the Earth 5. Geographical position 6. Reference systems - review 7. WGS-84 i GRS'80 8. Projection types 9. Mercator Projection 10. Gauss-Krüger Projection and Universal Transversal Mercator 11. Projection „65" 12. Navigational maps 13. ECDIS digital maps 14. Directions, corrections – course, bearing, track angle 15. Magnetic declination and compass deviation 16. Drift, wind correction 17. Terrestric navigation 18. Inertial navigation 19. Magnetic compasses - classical 20. Magnetic compasses - electronic 21. Gyro-compasses 22. Ring Laser Gyro 23. Screw log 24. Pitometer log 25. Electromagnetic log 26. Ultrasonic Doppler log 27. Ship berthing control systems 28. Accelerometers, inertial platforms 29. Structure and GPS principles 30. GPS space segment 31. GPS control segment 32. Position determination in GPS system 33. Signal trasmitted by satelite GPS 34. Depesza nawigacyjna 35. DGPS, WAAS, EGNOS differential systems 36. GPS receivers 37. GPS in geodesy 38. Global navigational system GALILEO 39. Errors and precision of position in GPS system 40. Underwater navigation systems 41. Hydroacoustic buoys- pingers, transponders, responders 42. Hydroacoustic local navigation system with long base 43. Hydroacoustic local navigation system with short and super short base 44. Navigational echo sounder 45. Principles of radar 46. Radar in navigation 47. Instrument landing system ILS
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Practical exercise	60.0%	33.0%
	Midterm colloquium	60.0%	67.0%

Recommended reading	Basic literature	1. Czarnecki K. Geodezja współczesna w zarysie. Wyd. Wiedza i Życie Warszawa 1997. 2. Narkiewicz J. Podstawy układów nawigacyjnych. WKŁ Warszawa 1999. 3. Narkiewicz J. GPS i inne satelitarne systemy nawigacyjne. WKŁ Warszawa 2007. 4. Hogmann B., Lichtenegger H., Collind J. Global Positioning System Theory and Practice. Springer, Wien 1997
	Supplementary literature	1. Stateczny A. Nawigacja porównawcza, Wydawnictwo Gdańskie, 2001. 2. Narkiewicz J. GPS globalny system pozycyjny GPS, budowa, działanie, zastosowania. WKŁ Warszawa 2006.
	eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable