University of Gdańsk

Subject card

Subject name and code	Navigational Equipment - laboratory classes , PG_00201124						
Field of study	Marine Hydrography						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2027/2028		
Education level	Bachelor's studies		Subject group		Obligatory subject group in the field of study Subject group related to practical vocational preparation		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		Polish		
Semester of study	4		ECTS credits		1.0		
Learning profile	practical		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Krzysztof Jaskólski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	15.0	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		1.0		9.0	25
Subject objectives	Training on the principles of operation, exploitation, and effective use of typical navigation devices, their accuracy, and the determination of corrections.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[HML3-U09] is able to critically analyse the functioning of existing technical solutions and evaluate these solutions	is able to: - calibrate the gyrocompass; interpret autopilot settings; perform basic calibration and accuracy assessment of the navigational echo sounder; verify the positional accuracy indicated by terrestrial and satellite radio navigation systems; input required parameters in the receivers of individual systems; input waypoint data and program routes and navigational alarms; - operate and use the gyrocompass and determine the errors of the gyrocompass; - utilize the autopilot, including entering the appropriate settings for the device	[SU3] text preparation/written work
	[HML3-U13] is able to determine the technical condition of navigation and hydrotechnical infrastructure, as well as maintain navigation and hydrographic equipment and systems, both on board and on shore	is able to: - calibrate a gyrocompass; interpret autopilot settings; perform basic calibration and accuracy assessment of the navigational echo sounder; verify the accuracy of position indicated by terrestrial and satellite radionavigation systems; input parameters required in the receivers of respective systems; enter waypoint data and program routes and navigational alarms; - operate and use a magnetic compass, including a fluxgate compass, and determine the errors of these devices and create a deviation table; - operate and use a gyrocompass and determine the errors of the gyrocompass. Use the autopilot, including inputting appropriate device settings; - perform radio direction finding and operate onboard receivers of Loran and AIS systems, including their adjustments and connection with other navigational devices; - use the onboard GNSS receiver, including its proper adjustment	[SU3] text preparation/written work
	[HML3-U14] is able to use the applicable terminology in presenting and discussing problems related to the field of study	is able to: - calibrate a gyrocompass; interpret autopilot settings; perform basic calibration and assess the accuracy of a navigational echo sounder; verify the accuracy of positions indicated by ground and satellite radionavigation systems; input parameters required in receivers of various systems; input waypoint data and program routes and navigational alarms; - operate and use a magnetic compass, including a fluxgate compass, as well as identify the errors of these devices and create a deviation table; - operate and use a gyrocompass and determine the errors of the gyrocompass)	[SU3] text preparation/written work

Course outcome	Subject outcome	Method of verification
[HML3-U11] is able to use navigation devices, means of technical observation and communication as well as measuring instruments, as well as apply in practice various techniques of measurement and observation in the field of professional activity related to the field of study	is able to: - calibrate the gyro compass; interpret autopilot settings; conduct basic calibration and evaluate the accuracy of the navigational echo sounder; verify the accuracy of the position indicated by terrestrial and satellite radionavigation systems; input parameters required in the receivers of individual systems; enter waypoints and program routes and navigational alarms; - operate and use a magnetic compass, including a fluxgate compass, as well as determine the errors of these devices and create a deviation table; - operate and use a gyro compass and determine the errors of the gyro compass; - perform radio navigation fixes and use onboard receivers for Loran and AIS systems, including their adjustment and connection with other navigational devices; - utilize the onboard GNSS receiver, including its proper adjustment	[SU3] text preparation/written work

Subject contents

BASIC NAVIGATION DEVICES

Construction and operation principles of magnetic, electromagnetic, and electronic compasses. Determining total correction.
Construction and operation principles of gyroscopic compasses.
Operation of autopilots.
Measurement of vessel speed.
Measurement of depth.
Exploitation of basic navigation devices.
Integrated bridge systems.
Automatic Identification System (AIS) for ships.
Voyage Data Recorders (VDR, S-VDR).

SATELLITE RADIO NAVIGATION SYSTEMS

Determining position using GNSS systems available in coastal navigation areas, such as GPS, DGPS, EGNOS.
Operation of receivers for radio navigation systems.

RADAR UTILIZATION OF RADAR DEVICES

Ability to operate, interpret, and analyze information received from radar, particularly:

- distortion of radar images and accuracy of indications,
- turning on the radar and tuning the image,
- identification of interference and image distortions, false echoes, echoes from waves, etc., racon and SART.
  Ability to acquire, interpret, and analyze information from ARPA (Automatic Radar Plotting Aid).

Prerequisites and co-requisites

Subject required by the Regulation of the Minister of Infrastructure and Development of February 5, 2014, on framework training programs and examination requirements for deck department seafarers (i.e., Journal of Laws 2023, item 1566): attendance at all classes is mandatory. AMW allows students to make up for up to 20% of excused absences from these classes in a form that enables them to acquire the missing knowledge and skills. Students who have passed the course but, due to absences exceeding 20% of classes or failure to make up for classes in a form that allows them to obtain the missing knowledge and skills, do not receive an entry in the supplement confirming completion of studies recognized at the operational level in coastal shipping.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
laboratory report	51.0%	100.0%

Recommended reading	Basic literature	1. FELSKI A., JASKÓLSKI K.: Navigational instruments. Collection of Guides for Laboratory Classes. AMW, Gdynia 2016. (in Polish and in English) 2. FELSKI A.: Measurement of Ship Speed. AMW, Gdynia 1998. (in Polish) 3. GUCMA M., MONTEWKA J.: Fundamentals of Marine Inertial Navigation. AM, Szczecin 2006. (in Polish) 4. JANUSZEWSKI J.: Satellite Systems GPS, Galileo, and Others. WN PWN, Warsaw 2006. (in Polish) 5. ŁUSZNIKOW E., DZIKOWSKI R.: Deviation of the Magnetic Compass. WN AM, Szczecin 2012. (in Polish) 6. POSIŁA J., SZYBKA P.: Classical Gyro Compasses with Internal Correction. AMW, Gdynia 2006. (in Polish)
	Supplementary literature	The principles of navigation. The Admiralty Manual of Navigation vol. 1.
	eResources addresses	
Example issues/ example questions/ tasks being completed	Determining the deviation of the magnetic compass using methods presented during the lectures. Determining the correction of the gyroscopic compass. Determining the correction of the ship's log using methods presented during the lectures. Operational handling and adjustment of the autopilot settings depending on hydro-meteorological conditions and the maneuverability, responsiveness, and stability of the ship. Operational handling of positioning receivers of satellite systems GPS, with the DGPS, GNSS, EGNOS, WAAS correction streams. TEST issues: Construction and working principle of a magnetic compass (drawing + description),construction and working principle of an electronic compass (fluxgate) (drawing + description),methods for determining the deviation of a magnetic compass, development of deviation tables, calculations (drawing + descriptions).Construction of a gyroscopic compass (drawing + description).Principle of operation of a gyroscopic compass (drawing + description).Types of gyroscopic compass deviation (drawing + description).Methods for determining the correction of a gyroscopic compass (drawing + description).Construction of an autopilot (block diagram) of the ship's control system (drawing + description).Principle of operation of an autopilot (drawing + description).Determining position using the LORAN C system (drawing + description).Principle of operation of the AIS system (drawing + description).Interference in radio wave propagation channels.Construction of the GPS system (drawing + description).Principle of operation of the GPS system (drawing + description).Construction and working principle of an inertial system using inertial technique (drawing + description).	
Work placement	Not applicable	

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