Maritime University of Szczecin

Education Programme 2012
(Edition 2022)

Field of study – Navigation

Specialisation: Maritime Transport

Level of qualification:

Bologna – First Cycle Qualification
The European Qualifications Framework – EQF 6

This education programme was approved by the Navigation Faculty Council on 20 June 2012
Valid from academic year 2012/2013
Corrections 2012/2013 – approved by the Navigation Faculty Council on 15 May 2013
Corrections 2014 – approved by the Navigation Faculty Council on 14 May 2014
Corrections 2015 – approved by the Navigation Faculty Council on 13 May 2015
Amendments 2016 – approved by the Navigation Faculty Council on 15 June 2016
Corrections 2018 – approved by the Navigation Faculty Council on 14 November 2018
Amendments 2019 – approved by the Navigation Faculty Council on 13 February 2019

Programme of Studies 2012 (Edition 2022) – consolidated text, includes all corrections and amendments adopted in previous years. Approved at the Senate meeting on 18 May 2022.
Valid from the academic year 2022/2023.

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FIELD OF STUDY – NAVIGATION
SPECIALISATION: **MARITIME TRANSPORT**
BOLOGNA – FIRST CYCLE QUALIFICATION

ABOUT PROGRAMME

This four-year course prepares highly qualified graduates for officer positions capable of meeting the present and future requirements of the global merchant fleet. The scope of curriculum is aimed at performing functions on-board ships at management level, as specified by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers STCW Convention.

This degree is fully compliant with the training and educational requirements of the STCW Convention, as amended in 2010.

The full-time study course includes 6 semesters of classes and 2 semesters of sea going service (approved programme training). The teaching programme comprises 43 subjects with the total time of instruction of 2898 teaching hours (time of preparing a diploma thesis not counted), divided into four subject groups: general – 471 hrs, fundamental – 435 hrs, field-of-study – 1655 hrs and specialisation subjects – 267 hrs and mandatory basic safety training 70 hrs. The quantity of ECTS points required to pass the field studies is 240. Language of instruction/examination: English.

The student is obliged to pass all the subjects included in the curriculum by getting credits. Credits are granted by the academic teacher who conducts the subject teaching activities assesses the student progress on the basis of his performance, various types of testing, exercise reports, projects, preliminary diploma papers etc. The student is obliged to write report concerning his sea going services, write diploma thesis and pass the final diploma examination. The graduate obtains a diploma of study course completion with professional title of ***inżynier***, field of study Navigation, field of specialisation Maritime Transport, which in terms of educational standards corresponds to a Bologna – First Cycle Qualification.

The graduate having served onboard ships for a total period as provided in the regulation of minister responsible for maritime affairs on training and professional qualifications of seafarers, becomes entitled to a diploma of an officer of the watch and later is able to obtain higher certificates of competency, such a Chief Mate and Master Mariner after satysfing the requirements specified in above regulation.

The graduate of ***inżynier*** degree in navigation may take up the second cycle of study in technical sciences or other at another university, if they satisfy recruitment requirements. He/she may also continue learning taking up post-graduate programmes at a university or research institutions in Poland or abroad.

THE GRADUATE PROFILE

The graduates of the Faculty of Navigation, majoring in Maritime Transport, have good theoretical knowledge and satisfactory Practical experience to undertake work as deck officer on board deep sea going vessels, in Navigation safety departments of marine offices or relevant divisions of shipowner companies.

The graduates of the Maritime University of Szczecin have:

- very good professional qualifications,
- up-to-date technical knowledge,
- good command in English,
- self-instruction skills,
- abilities to implement technical innovations and organise training,
- good physical shape and resistance to stress,
- teamwork ability,
- responsibility for executing assigned tasks.

INTRODUCED CHANGES

Date	Kind of change	Scope
Approved at the Faculty Council meeting on 15 May 2013.	Corrections 2012/2013 Improvement of the Education Programme.	1. Modified description of the Education Programme. 2. Modified description of learning outcomes for the field of study. 3. Corrected study programme, including the study plan and/or detailed syllabuses. 4. Subject (course unit) cards: • correction of subject learning outcomes, • correction of assessment methods and criteria, • correction of specific subject contents, • correction of student workload in a semester.
Approved at the Faculty Council meeting on 14 May 2014.	Corrections 2014 Introduction of references to the Regulation of the Minister of Infrastructure and Development (*MIiR*) as of 5 February 2014 on framework training programmes and examination requirements for deck department seafarers. Improvement of the Education Programme.	1. Updating of 16 STCW-covered main subjects, specific contents in the tables – references to the ministerial regulation 2. Change in the structure of the study plan – changed order of subjects taught: *Maritime Transport Security* was shifted from semester 2 to semester 1, *Introduction to Economics* from semester 1 to sem. 2, with the assigned ECTS points remaining unchanged. 3. Introduction of provisions concerning the training in ship security and nautical command of the ship in the table listing the specialization courses and on-board training. 4. Editorial correction – standardization of the number of exams in semesters 4 and 8 for the whole field of study.
Approved at the Faculty Council meeting on 13 May 2015.	Corrections 2015 Modification of Physical Education activities and consequent changes.	1. Amended learning outcomes in Physical Education and its specific curriculum contents.
Approved at the Faculty Council meeting on 15 June 2016.	Amendment 2016 Introduction of references to the Regulation of the Minister of Maritime Economy and Inland Shipping (*MGMiŻŚ*) as of 19 Feb 2016 on framework training programmes and examination requirements for deck department seafarers. Improvement of the Education Programme	1. Updating of the STCW-covered subject Ship Construction and Stability (28), description of the subject and specific contents in module tables; references are added to the relevant ministerial regulation (*MGMiŻŚ*).
Approved at the Faculty Council meeting on 14 November 2018.	Correction 2018 Correction in the study plan (Curriculum). Change in the total number of hours of *English* and *Spanish* and their distribution in semesters.	1. *English* – reduction of number of semesters taught to three (total number of hours of English during studies changed from 219 to 135 hours). 2. *Spanish* – enlargement of number of semesters to three (total number of hours of *Spanish/German* during studies changed from 60 to 132 hours)
Approved at the Faculty Council meeting on 13 February 2019.	Amendment 2019 New syllabuses for *English* and *Spanish.*	1. *English* and *Spanish* course cards. Changes in learning outcomes and learning content in subsequent subject modules.
Approved at the Senate meeting on 18 May 2022.	Edition 2022 Improvement of the Education programme. Modification of the structure of the study plan (Curriculum) and the resulting editorial changes. Development of a consolidated text of the study programme. New syllabus for *German.*	1. Change in the structure of the study plan (Curriculum) − changing the order of subjects: • *Introduction to Maritime Sociology* − from semester III to semester II • *Psychology of human behaviour* − from semester II to semester I • *Chemistry* − from semester II to semester I • *Electronics and Electrotechnology* −

		transferring the *Electrotechnology* module from semester I to semester III • *Transport systems* − from semester II to semester I • *Technical Fleet Operation* − from semester III to semester II • *Safety of Navigation* − laboratories from semester III divided into semesters II and III • *Diploma Seminar* − transferred to semester IV • *Oil and Gas Tanker Operation* − module from semester IV to semester V 2. Changing the distribution of course content in subjects: • Physics − an increase by (1) in the number of hours of practical classes, at the expense of laboratories; transfer of realisation of practical classes and laboratories from semester I to semester II, lectures have been transferred to semester I. • Ship Structure and Stability − transferring 1 hour of lectures and laboratories from semester III to semester VIII; adjustment of the distribution of specific syllabus contents and learning outcomes. 3. Updating of syllabus contents, including literature and editorial correction. 4. Review of student workload balances. 5. New syllabus – *German* course card.

Approved at the Senate meeting on 18 May 2022
Valid from the academic year 2022/2023

CURRICULUM - Study field NAVIGATION
Specialisation field: MT - Maritime Transport

Undergraduate / Bachelor of Science (BSc)
FULL-TIME DEGREE PROGRAMM

No.	Subjects	TOTAL Number of hours					Semester 1 15 weeks				Semester 2 15 weeks				Semester 3 15 weeks				Semester 4 15 weeks				Semester 5 15 weeks				Semester 6		Semester 7		Semester 8 12 weeks			
							Number of hours per week																											
			LEC	CLA	LAB	ECTS	LEC	CLA	LAB	ECTS	LEC	CLA	LAB	ECTS	LEC	CLA	LAB	ECTS	LEC	CLA	LAB	ECTS	LEC	CLA	LAB	ECTS		ECTS		ECTS	LEC	CLA	LAB	ECTS
A	**General subjects**	**471**	**117**	**0**	**354**	**20**																												
1	English	135	0	0	135	6			3	2			3	2			3	2																
2	Spanish (German)	132	0	0	132	6															2	2			2	1							6	3
3	Physical Education	87	0	0	87	0			1				1				1				1				1								1	
4	Fundamentals to Economics	15	15	0	0	1					1			1																				
5	Introduction to Maritime Sociology	15	15	0	0	1					1			1																				
6	Psychology of Human Behaviour	15	15	0	0	1	1			1																								
7	Ergonomics	15	15	0	0	1					1			1																				
8	Health and Safety on Ships	15	15	0	0	1	1			1																								
9	Intellectual Property Protection	12	12	0	0	1																											1	1
10	Information Technology	30	30	0	0	2	1			1	1			1																				
B	**Basic science subjects**	**435**	**150**	**135**	**150**	**44**																												
11	Mathematics	135	45	90	0	21	1	2		7	1	2		7	1	2		7																
12	Physics	75	30	30	15	8	2			3		2	1	5																				
13	Chemistry	30	15	0	15	2	1		1	2																								
14	Computer science	60	0	0	60	4			2	2			2	2																				
15	Automation	30	15	0	15	2																					1		1	2				
16	Electronics and Electrotechnology	60	30	0	30	4					1		1	2	1		1	2																
17	Machine Construction and Engineering Graphics	45	15	15	15	3	1	1	1	3																								
C	**Field subjects**	**1655**	**804**	**292**	**559**	**87**																												
18	Navigation	393	147	42	204	17	2		2	2	1		2	1	2	1	4	5	2	1	1	3	2		3	3					1	1	2	3
19	Meteorology and Oceanography	90	60	15	15	4					2	1		1	2		1	3																
20	Electronic Navigation AIDS	195	90	15	90	10	2	1	1	2	1		2	2	1		1	2	1		1	2	1		1	2								
21	Geographic Information System	30	15	0	15	1									1		1	1																
22	Transport Systems	15	15	0	0	1	1			1																								
23	Technical Fleet Operation	15	15	0	0	1					1			1																				
24	Ship Manoeuvring	70	30	15	25	4													1	1		2	1		1.7	2								
25	Maritime Search and Rescue	60	30	15	15	4																	2	1	1	4								
26	Maritime Communications	105	45	0	60	6													2		2	3	1		2	3								
27	Safety of Navigation	72	30	15	27	4					1		0.5	1	1		0.5	1		1		1										1	1
28	Ship Construction and Stability	210	87	60	63	12	2		1	2	1		1	2	1	2		3	1	2	1	4										1	1.5	1
29	Marine Power Plants	30	15	10	5	2																	1	0.6	0.4	2								
30	Cargo Handling	105	75	0	30	7									1			1	2		1	3	2		1	3								
31	Ship Management	60	30	30	0	4													1	1		2	1	1		2								
32	Ship Safety	45	15	30	0	2																	1	2		2								
33	Maritime Law	60	60	0	0	3									2			1	2			2												
34	Marine Environment Protection	30	15	15	0	2									1	1		2																
35	Port Infrastructure	15	15	0	0	1													1			1												
36	Maritime Transport Security	30	15	15	0	1	1	1		1																								
37	Diploma Seminar	25	0	15	10	1														1		1											1	
D	**Specialisation subjects**	**267**	**84**	**105**	**78**	**14**																												
38	Ship Surveys, Maintenance and Repairs	60	15	15	30	3													1	1		2			2	1								
39	Bulk Carrier Operations	36	12	0	24	2																											1	2	2
40	Oil and Gas Tanker Operations	75	15	36	24	3																	1	0.8		1							2	2	2
41	Liner Shipping	51	12	39	0	3														1		1											1	2	2
42	Maritime Inspections	30	15	15	0	2																	1	1		2								
43	Pilotage of Seagoing Vessels	15	15	0	0	1													1			1												
	Basic Safety Training	70		70		60																												
	Practical Training																											30		30				
	Diploma Thesis					15																												15
	Total	**2898**	**1155**	**602**	**1141**	**240**				**30**				**30**				**30**				**30**				**30**		**30**		**30**				**30**
	Hours per week						16	**5**	12		13	5	14		14	6	13		15	9	9		15	6	16						5	5	16	
	Week workload A+C+L			**2898**				**33**				**32**				**33**				**33**				**37**							**26**		
	Number of exams						**3**				**3**				**3**				**3**				**3**								**3**			

Shipboard Training

Shipboard Training

LEC Lectures
CLA Classes
LAB Laboratories
ECTS European Credit Transfer System

Navigation 2012 (Edition 2022) − Structure of the study plan, implementation of course modules in subsequent semesters

	Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
1	N2022/11/GS/01/E1	N2022/12/GS/01/E2	N2022/23/GS/01/E3	N2022/24/GS/02/S(G)1	N2022/35/GS/02/S(G)2	Shipboard training	Shipboard Training	N2022/48/GS/02/S(G)3
2	N2022/11/GS/03/PE1	N2022/12/GS/03/PE2	N2022/23/GS/03/PE3	N2022/24/GS/03/PE4	N2022/35/GS/03/PE5			N2022/48/GS/03/PE6
3	N2022/11/GS/06/PHB	N2022/12/GS/04/FE	N2022/23/BS/11/M3	N2022/24/FS/18/N4	N2022/35/BS/15/A			N2022/48/GS/09/IPP
4	N2022/11/GS/08/HSS	N2022/12/GS/05/IMS	N2022/23/BS/16/EE2	N2022/24/FS/20/ENA4	N2022/35/FS/18/N5			N2022/48/FS/18/N6
5	N2022/11/GS/10/IT1	N2022/12/GS/07/ER	N2022/23/FS/18/N3	N2022/24/FS/24/SM1	N2022/35/FS/20/ENA5			N2022/48/FS/27/SN4
6	N2022/11/BS/11/M1	N2022/12/GS/10/IT2	N2022/23/FS/19/MO2	N2022/24/FS/26/MC1	N2022/35/FS/24/SM2			N2022/48/FS/28/SCS5
7	N2022/11/BS/12/PH1	N2022/12/BS/11/M2	N2022/23/FS/20/ENA3	N2022/24/FS/27/SN3	N2022/35/FS/25/MSR			N2022/48/FS/37/DS2
8	N2022/11/BS/13/CH	N2022/12/BS/12/PH2	N2022/23/FS/21/GIS	N2022/24/FS/28/SCS4	N2022/35/FS/26/MC2			N2022/48/SS/TM/39/BCO
9	N2022/11/BS/14/CS1	N2022/12/BS/14/CS2	N2022/23/FS/27/SN2	N2022/24/FS/30/CH2	N2022/35/FS/29/MPP			N2022/48/SS/TM/40/OGTO2
10	N2022/11/BS/17/MCEG	N2022/12/BS/16/EE1	N2022/23/FS/28/SCS3	N2022/24/FS/31/SMt1	N2022/35/FS/30/CH3			N2022/48/SS/TM/41/LS2
11	N2022/11/FS/18/N1	N2022/12/FS/18/N2	N2022/23/FS/30/CH1	N2022/24/FS/33/ML2	N2022/35/FS/31/SMt2			N2022/BST
12	N2022/11/FS/20/ENA1	N2022/12/FS/19/MO1	N2022/23/FS/33/ML1	N2022/24/FS/35/PI	N2022/35/FS/32/SS			N2022/PT
13	N2022/11/FS/22/TS	N2022/12/FS/20/ENA2	N2022/23/FS/34/MEP	N2022/24/FS/37/DS1	N2022/35/SS/TM/38/SSMR2			N2022/DT
14	N2022/11/FS/28/SCS1	N2022/12/FS/23/TFO		N2022/24/SS/TM/38/SSMR1	N2022/35/SS/TM/40/OGTO1			
15	N2022/11/FS/36/MTS	N2022/12/FS/27/SN1		N2022/24/SS/TM/41/LS1	N2022/35/SS/TM/42/MI			
16		N2022/12/FS/28/SCS2		N2022/24/SS/TM/43/PSV				

GS − General subjects
BS − Basic Science subjects
FS − Fieled subjects
SS − Specialisation subjects

LIST OF APPROVED PROGRAM PRACTICE, BASIC SAFETY TRAINING AND SPECIALISED COURSES

Field of study navigation – specialisation Maritime Transport

The scope of training shall meet the requirements of the STCW 78 Convention as amended		Year of studies, semester												Note
		1st year			2nd year			3rd year			4th year			
		w	s1	s2	w	s3	s4	w	s5	s6	w	s7	s8	
Basic safety training and specialised courses														
Personal Survival Techniques	hours	20	*											
Fire Prevention & Fire Fighting – Basic level	hours	16	*											
Elementary First Aid	hours	11	*											
Personal Safety and Social Responsibilities	hours	21	*											
Security-awareness	hours		4											
For seafarers with designated security duties	hours		5											
Utilizing of Radar and ARPA – Operational Level	hours								70					
GMDSS – GOC/General Operator Certificate	hours								105					Σ
Operational Use Electronic Chart Display and Information Systems	hours												40	
Bridge Resource Management	hours												32	Σ
Hazardous Cargo Carriage on Vessels	hours						12							
Practical training on board ship														
Preparatory onboard training for candidates	weeks		2											
Seamanship training – tugboat	week		1											
Seamanship training – ferries	weeks				3									
Manoeuvring-navigational training	weeks				3									
Individual onboard training	month									12 months				

TEACHING PROGRAMME

SYLLABUSES

FULL–TIME STUDY
BOLOGNA – FIRST CYCLE QUALIFICATION

GENERAL SUBJECTS

1.	Course unit:	N2022/11/GS/01/E1

ENGLISH – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			3			45	2
2	15			3			45	2
3	15			3			45	2

I. Course unit aims

In this course unit, students will acquire and improve their linguistic and intercultural competences as set forth in standards of the Common European Framework of Reference (CEFR). The scope of Maritime English taught complies with the requirements of the STCW Convention. Students will achieve a satisfactory proficiency in the use of English used by navigators in their daily routine work and in emergency situations, necessary for effective performance of watch officer's duties.

II. Preliminary requirements

Knowledge of a foreign language at a secondary school level as required by CEFR.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes		Field-specific
LO1	Demonstrates the knowledge of English, its specialist nautical and technical register.	K_W21; K_U02
LO2	Uses phrases recommended by the STCW convention.	K_W26; K_U07
LO3	Can communicate at the support/operational level in English in the work environment.	K_W31; K_U03; K_U08; K_K09
LO4	Can head a team using the professional language.	K_W12; K_W20; K_K04; K_U05
LO5	Is engaged in continuous upgrading of linguistic competences.	K_U06; K_K01
LO6	Can use professional publications.	K_W13; K_W14; K_U01; K_U27
LO7	Can make entries in logbooks, write technical and other reports in English.	K_U05; K_U28
LO8	Understands cultural differences, has cultural awareness for cooperation within multinational crews.	K_U08; K_K03
LO9	Knows, understands and uses occupational safety principles, also in the setting of multinational crews.	K_W19; K_U22; K_K06

Assessment methods and criteria				
LO1, LO2, LO3, LO4, LO5, LO6, LO7, LO8, LO9	Demonstrates the knowledge of English, its specialist to nautical and technical register.			
Assessment methods	Written tasks. Various types of written tests. E-learning tasks. Oral assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of professional spoken and written terminology.	Does not answer or has very limited vocabulary to be able to perform a task.	Knows job-specific terminology, written and spoken, at a minimum required level.	Has satisfactory level of job-specific terminology allowing a relatively effective communication	Has a very good level of job-specific terminology, at times above the required standard.
Criterion 2 Knowledge of grammatical structures, spoken and written.	Does not answer or has very limited knowledge of grammar structures that makes the task impossible to perform.	Has a limited knowledge of linguistic structures, makes many mistakes making communication difficult; utterances are not fluent, makes mistakes in pronunciation and intonation.	Has a good knowledge of linguistic structures, mistakes do not disturb communication significantly, speaks relatively fluently, has good pronunciation and intonation.	Linguistic skills above the required standards; few mistakes do not disturb communication, speaks fluently, with good pronunciation and intonation.
Criterion 3	Utterances are chaotic, poor, non-communicative,	Gives incomplete answers, partly not relevant; some information	Can practically utilize information using relevant forms in writing	Can interpret and express opinions on the information received,

Providing accurate job related information in speaking and writing.	basic information is confused and imprecise.	is missing or ambiguous.	and speaking; can pass information as instructed.	can formulate problems and plans of action; communicates effectively in professional matters.
Criterion 4 Listening comprehension (also when disturbances are heard) and understanding of a written text.	Does not understand a spoken text, even to a minimum allowing to get a general idea/meaning of an utterance.	Has a limited understanding of a spoken text, assisted by teacher can make out general meaning of a message or utterance.	Can answer using short forms or full sentences, at times missing the point of a question; can pass received information.	Understands messages/longer text very well, can identify and properly interpret messages with mistakes, or heard with disturbances (on the radio).
Criterion 5 Can introduce him/herself or describe a problem, in speaking or writing.	Cannot describe a problem or introduce him/herself in a spoken or written form.	Oral or written presentation is incomplete and reproductive rather than creative.	Presents using a correct structure, and rich content; can continue even if interrupted with questions.	Gives a auto/presentation that has a perfect structure, and interesting content; can easily express him/herself; focuses on what to say, not how.
Criterion 6 Ability to acquire information and use professional publications.	Cannot use professional publications and find specific information.	Needs assistance in using job-related materials and, partially, instruction how to use them.	Has some difficulties in interpreting an information source due to insufficient knowledge of certain grammar structures; occasionally misunderstands a statement.	Proficiently uses professional publications, browses resources in English, interprets/understands the text correctly.
Criterion 7 Engagement in upgrading linguistic competences.	Does not demonstrate any progress in improving his/her linguistic skills.	Very slow progress in linguistic skills, mostly forced by a teacher.	Develops professional language skills, but neglects general English.	Works individually on improving all his/her linguistic skills, above required standards.
Marlins Test from module 4.		written test = 85%	Level: Junior Officer.	oral: intermediate level.

Syllabus

SEMESTER 1	ENGLISH	CLASSES	45 HOURS

No. of Topic in the Standard Marine Communication Phrases – SMCP

Grammar

Revision of tenses and verb forms, including conditionals, time clauses (grammar at intermediate level).

Maritime English

Exercises in the comprehension and conducting radio communication on the topics listed below using SMCP Phrases.

1. Spelling, numbers. (1 h) — SMCP – General
2. Crew. Deck department – responsibilities, routine work. (3 h)
3. Nautical phrases incl. their definitions selected from the IMO Standard Marine Communication Phrases (General) and N. Bowditch manual – The American Practical Navigator, Glossary of Marine Navigation. (2 h) — SMCP – General
4. Navigation instruments and equipment (gyro-compass, marine speed log, echo sounder, autopilot) – basic terminology and functions. (2 h)
5. Ship design – deck equipment (mooring arrangements, anchor and windlass, gangways, cranes, davits) and deck systems (ballast, bilge, fuel, fire, etc.). Description of a chosen ship type. (4 h)
6. Maritime Security and Piracy. ISPS Code definitions. (3 h)
7. Ship-to-ship/shore communication at sea (18 h), inc. practical VHF conversations **using walkie-talkies** — A1/1 – A1/3

   Distress: causes, SAR, requesting medical assistance
   Urgency
   Safety – weather, navigational warnings
   Pilotage

Specials – helicopter and icebreaker operations
VTS standard phrases

8. **Appendix to A1**: standard distress/urgency/safety messages – structure and examples. (1 h) — Appendix to A1
9. On-board communication phrases – standard wheel orders, engine orders. (2 h) — A2/1; A2/2
10. Marine accidents/incidents at sea – case studies. (2 h)
11. A selected piece of equipment (GPS/VDR/AIS) – How does it work? (1 h)
12. Weekly Notices to Mariners, List of Lights (selected fragments). (1 h)
13. Some definitions from COLREGs. (1 h)

Revisions through kahoot quizzes, mind maps, multimedia presentations, online research: essey, dialogs, tests.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	45	
Hours with direct teacher participation: consultations with the teacher, passing tests/exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	45	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**100**	**2**
Workload related to direct teaching activities:	50	1
Workload related to practice-oriented activities:	90	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

1.	Course unit:							N2022/12/GS/01/E2
ENGLISH – module 2								
Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			3			45	2
2	15			3			45	2
3	15			3			45	2

III/2. Learning outcomes and syllabus

The learning outcomes and assessment criteria and methods have been defined for the whole course unit and presented in Module 1.

Syllabus

SEMESTER 2	ENGLISH	CLASSES	45 HOURS

No. of Topic in the Standard Marine Communication Phrases – SMCP

Grammar

Revision of modal verbs, verb forms, common phrasal verbs.

Maritime English

Exercises in the comprehension and conducting radio communication on the topics listed below using SMCP Phrases.

1. Pilot on the bridge − propulsion system, manoeuvring, radar, draft and air draft, tug assistance. A1/4; A1/6.4, A2/3
2. Helicopter and icebreaker operations. A1/5.1; A1/5.2
3. VTS standard phrases. A1/6
4. Anchoring – Going to anchor; Leaving the Anchorage, Berthing and unberthing. A2/3.5–3.7
5. Operative Shiphandling: Handing over the watch, briefing on position, movement and draft and other data. B1
6. Safety on board: general activities − raising alarm – roll call. (2 h) B2
7. Ordering abandon vessel, In-boat procedures, life-saving appliances. B2/1.7
8. Occupational safety: instruction, practical occupational safety, accidents at work. (1 h) B2/2
9. Fire protection and fire-fighting. (2 h) B2/3
10. Damage control − Checking equipment status and drills, activities, Reporting: flooding, readiness for action, Orders for damage control, Cancellation of alarm. (1 h) B2/4
11. Grounding: Reporting grounding and ordering actions, reporting damage, orders for refloating, checking seaworthiness. (2 h) B2/5
12. Symbols and abbreviations used on British Admiralty charts and The IALA Maritime Buoyage System.
13. Recommended publications: British Admiralty nautical publication − Chart 5011; International Hydrographic Organization − Chart specifications of the IHO; The IALA Maritime Buoyage System and other aids to navigation.
14. Nautical publications: British Admiralty – Weekly Notices to Mariners, List of Lights. (1 h)
15. Health and safety on board ships. Personal safety.
    Recommended publications: selected terms related to the ILO, Maritime Labour Convention and ITF Guidance about the Health and Safety on Ships.
    Revisions through kahoot quizzes, mind maps, multimedia presentations, online research: essey, dialogs, tests.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	45	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	45	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**100**	**2**
Workload related to direct teaching activities:	50	1

Workload related to practice-oriented activities:	90	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

1.	Course unit:							N2022/23/GS/01/E3
ENGLISH – module 3								
Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			3			45	2
2	15			3			45	2
3	15			3			45	2

III/3. Learning outcomes and syllabus

The learning outcomes and assessment criteria and methods have been defined for the whole course unit and presented in Module 1.

Syllabus

SEMESTER 3	ENGLISH	CLASSES	45 HOURS

No. of Topic in the Standard Marine Communication Phrases – SMCP

Grammar

Selected grammar topics at intermediate and advanced levels.

1. Search and Rescue on-board activities. (3 h) — B2/6
2. Cargo handling and care, damage, dangerous goods. (4 h) — B3/1.1–1.3; B3/2
3. Passenger care. (2 h) — B4
4. Revision of the SMCP, practical communications exercises. (6 h)
5. Safety of Navigation – standards regarding watchkeeping, watchkeeping procedures, bridge communication. Bridge resource management, STCW Code, Part A, Chapter VIII – Watchkeeping. (3 h)
6. Parts of the body, illnesses, injuries. Requesting medical assistance. (2 h)
7. Maritime Safety Information, meteorological and hydrological conditions: NAVTEX messages, radio reports and forecasts, Mariners Handbook. (2 h)
8. Examples of ship procedures and checklists. (3 h)
9. Ship and crew documents. Cargo documentation, Bill of Lading, Charter Party. (2 h)
10. Selected reading: Sailing Directions, Annual Notice to Mariners, Mariner's Handbook, Guide to Port Entry, IMO Ship's Routeing. (4 h)
11. Selected terms related to the MARPOL – International Convention for the Prevention of Pollution from Ships; descriptions of oil spill combating. (3 h)
12. Summary of lessons learned from casualties for presentation to seafarers (MAIB). (3 h)
13. Revisions through kahoot quizzes, mind maps, flashcards (quizlet.com) multimedia presentations, online research: essey, dialogs, tests.
    Recommended publications: IMO
    Correspondence: examples of claims, notices and reports, Sea Protest; Business correspondence, orders.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	45	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	45	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**100**	**2**
Workload related to direct teaching activities:	50	1
Workload related to practice-oriented activities:	90	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

After three semesters of English classes, the student shall take a computer-based operational level test and spoken Marlins (TOSE) test. The result considered as passing shall be 85% or more in the computer test and the minimum of intermediate level in the spoken assessment (the cost of the first attempt shall be covered by the Maritime University of Szczecin).

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. IMO's *Standard Marine Communication Phrases*.
2. Peter van Kluijven, *An English Course for Students at Maritime Colleges and for On-Board Training – IMLP*.
3. MARENG and MARENG PLUS – programs available at: www.mareng.utu.fi.
4. Marlins, *English for Seafarers – part I and II.*
5. Seagull &Videotell – *Learning films, Pocket guides, Onboard courses*.
6. SEATALK *materials (pdf files)*.
7. Peter Trenkner, The IMO Standard Marine Communication Phrases in Dialogues and recordings.
8. MAIB Safety Digest – current edition and other issues
9. Online resources: www.marineinsight.com, seatalk.pro, marinetraffic.com.

VI. Extra reading
1. The British Admiralty navigational charts and publications.
2. CD*s and* DVDs *on the safety of navigation, medical aid, firefighting,* VTS *etc.*
3. *Original materials* – VHF, *weather forcasts, navigational warnings etc.*
4. ICS – *Bridge Procedures Guide*.
5. Babicz J., *Dictionary of Marine Technology.*
6. Babicz J., *Shipbuilding Dictionary.*
7. Blakey T.N., *English for Maritime Studies.*
8. Kemp P., *Oxford Companion to Sea & Ships.*
9. Plucińska E., *Tanker's Voyage.*

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

2.	Course unit:	N2022/24/GS/02/S1

SPANISH – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15			2			30	2
5	15			2			30	1
8	12			6			72	3

I. Course unit aims

This course aims at teaching linguistic skills, comprehension and formulation of both written and spoken utterances in everyday Spanish and that used in job environment, based on the standards recommended by the Common European Framework of Reference (CEFR).

II. Preliminary requirements

Knowledge of a foreign language at a secondary school level as required by the CEFR.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, without a division into semesters.

Learning outcomes		Field-specific
LO1	Demonstrates the knowledge of Spanish, also that for special purposes, enabling effective communication in everyday life and job-related matters.	K_W21; K_W26; K_W30; K_W34; K_U08
LO2	Uses phrases recommended by the ESOPKJRE.	K_U07
LO3	Can communicate at the support/operational level in Spanish in the work environment.	K_W19; K_U02; K_K04
LO4	Can discuss technical simple issues and write reports.	K_U05
LO5	Knows, understands and uses occupational safety principles, also in the setting of multinational crews.	K_W32; K_U22; K_K06; K_K09
LO6	Can use professional publications.	K_U06
LO7	Is engaged in continuous upgrading of linguistic competences.	K_K01

Assessment methods and criteria				
LO1, LO2, LO3, LO4, LO5, LO6, LO7	The assessment methods and criteria given below refer to all defined learning outcomes.			
Assessment methods	Written tasks. Various types of written tests. E-learning tasks. Assessment of student in class performance			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of professional spoken and written terminology.	Does not answer or has very limited vocabulary to be able to perform a task.	Knows job-specific terminology, written and spoken, at a minimum required level.	Has satisfactory level of job-specific terminology allowing a relatively effective communication.	Has a very good level of job-specific terminology, at times above the required standard.
Criterion 2 Knowledge of grammatical structures, spoken and written.	Does not answer or has very limited knowledge of grammar structures that makes the task impossible to perform.	Has a limited knowledge of linguistic structures, makes many mistakes making communication difficult; utterances are not fluent, makes mistakes in pronunciation and intonation.	Has a good knowledge of linguistic structures, mistakes do not disturb communication significantly, speaks relatively fluently, has good pronunciation and intonation.	Linguistic skills above the required standards; few mistakes do not disturb communication, speaks fluently, with good pronunciation and intonation.
Criterion 3 Providing accurate job related information in speaking and writing.	Utterances are chaotic, poor, non-communicative, basic information is confused and imprecise.	Gives incomplete answers, partly not relevant; some information is missing or ambiguous.	Can practically utilize information using relevant forms in writing and speaking; can pass information as instructed.	Can interpret and express opinions on the information received, can formulate problems and plans of action; communicates effectively in professional matters.

Criterion 4 Listening comprehension (also when disturbances are heard) and understanding of a written text	Does not understand a spoken text, even to a minimum allowing to get a general idea/meaning of an utterance.	Has a limited understanding of a spoken text, assisted by teacher can make out general meaning of a message or utterance.	Can answer using short forms or full sentences, at times missing the point of a question; can pass received information	Very good reading comprehension, correctly distinguishing and interpreting linguistic distortions and disruptions.
Criterion 5 Can introduce him/herself or describe a problem, in speaking or writing.	Cannot describe a problem or introduce him/herself in a spoken or written form.	Oral or written presentation is incomplete and reproductive rather than creative.	Presents using a correct structure, and rich content; can continue even if interrupted with questions.	Gives an auto/presentation that has a perfect structure, and interesting content; can easily express him/herself; focuses on what to say, not how.
Criterion 6 Ability to acquire information and use professional publications	Cannot use professional publications and find specific information.	Needs assistance in using job-related materials and, partially, instruction how to use them.	Has some difficulties in interpreting an information source due to insufficient knowledge of certain grammar structures; occasionally misunderstands a statement.	Proficiently uses professional publications, browses resources in Spanish interprets/understands the text correctly.
Criterion 7 Engagement in upgrading linguistic competences	Does not demonstrate any progress in improving his/her linguistic skills.	Very slow progress in linguistic skills, mostly forced by a teacher.	Develops professional language skills, but neglects everyday Spanish.	Works individually on improving all his/her linguistic skills, above required standards.

Syllabus

SEMESTER 4	SPANISH	CLASSES	30 HOURS

1. **Grammar –** Alfabeto. Reglas de la pronunciación y escritura. Accento gráfico. Pronombres personales (*yo, tú, él*). Interrogativos (*dónde, qué, de dónde, cómo, por qué, quién, cuándo, cuánto*). Presente de indicativo de *ser, llamarse, hacer, vivir*. Masculino y femenino de los adjetivos y los sustantivos y plural de éstos. Artículos indeterminados (*un, una, unos, unas*) y determinados (*el, la, los, las*). Adjetivos demonstrativos (*este, ese, aquel*). Números (*0–100*). Presente de indicativo de los verbos regulares. Adjetivos posesivos en singular y en plural (*mi, mío, tu, tuyo, su, suyo*). Verbos *haber* (hay) *estar, tener, poner* y los preposiciones de lugar (*al lado de, cerca, encima de, sobre, a la izquierda, a la derecha*). Verbos *querer, apetecer*. Verbos reflexivos (*quedarse, irse, ducharse*). *También, tampoco*.
2. **Everyday Spanish –** Having simple interactions. Asking and responding to easy questions about professions, nationalities, numbers, colors, days, months, introducing oneself and the others. Using basic vocabulary describing family members, house, city, hobbies, food and simple everyday tasks.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing	30	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**70**	**2**
Workload related to direct teaching activities:	35	1
Workload related to practice-oriented activities:	60	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

2.	Course unit:							N2022/35/GS/02/S2
SPANISH – module 2								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15			2			30	2
5	15			2			30	1
8	12			6			72	3

III/2. Learning outcomes and syllabus

The learning outcomes and assessment criteria and methods have been defined for the whole course unit and presented in Module 1.

Syllabus

SEMESTER 5	SPANISH	CLASSES	30 HOURS

1. **Grammar –** Revisión del material del semestre anterior. Verbos del movimiento (*ir, irse, venir, salir, subir, bajar*). Descripción de acciones futuras *ir + a + infinitivo*. Descripción de dirección *ir + a + lugar*. Verbos *gustar* y *encantar, parecer, quedar*. Pronombres personales de complemento directo (*lo, la, los, las*). Expresión de obligación personal e impersonal (*hay que, tener que, deber*). Construcción *estar + gerundio*. Grados de adjetivos. Marcadores temporales. Pretérito perfecto. Pretérito indefinido de *ir, ser* y verbos regulares. *Muy, mucho, buen, bueno, bien*. Qué + adjetivo.
2. **Everyday Spanish –** Describing someone´s appearance and character. Describing future plans and intentions. Talking about past events. Having a telephone conversation. Expressing opinions, wishes and moods. Understanding and creating short written forms (e-mails, letters, articles).

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**55**	**1**
Workload related to direct teaching activities:	35	0.5
Workload related to practice-oriented activities:	45	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

2.	Course unit:							N2022/48/GS/02/S3
SPANISH – module 3								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15			2			30	2
5	15			2			30	1
8	12			6			72	3

III/3. Learning outcomes and syllabus
The learning outcomes and assessment criteria and methods have been defined for the whole course unit and presented in Module 1.

Syllabus

SEMESTER 8	SPANISH	CLASSES	72 HOURS

1. **Grammar –** Revisión de las formas presentes, las construcciones de expresar futuro y los tiempos del pasado (*pretérito perfecto y pretérito indefinido*). Pretérito indefinido de verbos irregulares. Pretérito imperfecto. Presente de subjuntivo (verbos regulares). Imperativo afirmativo y negativo. Condicional simple. Complemento indirecto. Usos de *ser* y *estar*. Futuro simple. *Se* impersonal. Pretérito pluscuamperfecto. Voz pasiva. Estilo indirecto: verbos introductiorios, trasmisión de preguntas.
2. **Everyday Spanish –** Being able to act in most everyday situations (shop, pharmacy, workplace, school, bar, etc.). Formulating correct orders and expressing more complex wishes, also involving conditions. Using passive voice to build formal phrases. Vocabulary related to travelling, working, doing sports. Weather-related vocabulary.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	72	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing	12	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**106**	**3**
Workload related to direct teaching activities:	77	1.5
Workload related to practice-oriented activities:	84	1.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
Not applicable.

V. Recommended reading
1. *Nuevo Ven 1 y 2* (Student's book and workbook), F. Castro, F. Marín, R. Morales, S. Rosa, Edelsa, Spain
2. *Hiszpański nie gryzie*, Publikacja zbiorowa, Egdard
3. *Hiszpański w tłumaczeniach: Gramatyka 1*, Magdalena Filak, Preston Publishing

VI. Extra reading
1. *Uso de la grámatica española elemental*, Francisca Castro, Edelsa, Spain
2. *Dual, pretextos para hablar*, M. Ángeles Palomino, Edelsa, Spain
3. *Gramática básica del estudiante del español*, Rosario Alonso Raya, Difusión, Spain

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

2.	Course unit:	N2022/24/GS/02/G1

GERMAN – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15			2			30	2
5	15			2			30	1
8	12			6			72	3

I. Course unit aims

This course aims at teaching linguistic skills, comprehension and formulation of both written and spoken utterances in everyday Spanish and that used in job environment, based on the standards recommended by the Common European Framework of Reference (CEFR).

II. Preliminary requirements

Knowledge of a foreign language at a secondary school level as required by the CEFR.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, without a division into semesters.

Learning outcomes		Field-specific
LO1	Demonstrates the knowledge of German, also that for special purposes, enabling effective communication in everyday life and job-related matters.	K_W21; K_W26; K_W30; K_W34; K_U08
LO2	Uses phrases recommended by the CEFR (Common European Framework of reference for Languages).	K_U07
LO3	Can communicate at the support/operational level in German in the work environment.	K_W19; K_U02; K_K04
LO4	Can discuss technical simple issues and write reports.	K_U05
LO5	Knows, understands and uses occupational safety principles, also in the setting of multinational crews.	K_W32; K_ U22; K_K06; K_K09
LO6	Can use professional publications.	K_U06
LO7	Is engaged in continuous upgrading of linguistic competences.	K_K01

Assessment methods and criteria				
LO1, LO2, LO3, LO4, LO5, LO6, LO7	The assessment methods and criteria given below refer to all defined learning outcomes.			
Assessment methods	Written tasks. Various types of written tests. E-learning tasks. Assessment of student in class performance			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of professional spoken and written terminology.	Does not answer or has very limited vocabulary to be able to perform a task.	Knows job-specific terminology, written and spoken, at a minimum required level.	Has satisfactory level of job-specific terminology allowing a relatively effective communication.	Has a very good level of job-specific terminology, at times above the required standard.
Criterion 2 Knowledge of grammatical structures, spoken and written.	Does not answer or has very limited knowledge of grammar structures that makes the task impossible to perform.	Has a limited knowledge of linguistic structures, makes many mistakes making communication difficult; utterances are not fluent, makes mistakes in pronunciation and intonation.	Has a good knowledge of linguistic structures, mistakes do not disturb communication significantly, speaks relatively fluently, has good pronunciation and intonation.	Linguistic skills above the required standards; few mistakes do not disturb communication, speaks fluently, with good pronunciation and intonation.
Criterion 3 Providing accurate job related information in speaking and writing.	Utterances are chaotic, poor, non-communicative, basic information is confused and imprecise.	Gives incomplete answers, partly not relevant; some information is missing or ambiguous.	Can practically utilize information using relevant forms in writing and speaking; can pass information as instructed.	Can interpret and express opinions on the information received, can formulate problems and plans of action; communicates effectively in professional matters.

Criterion 4 Listening comprehension (also when disturbances are heard) and understanding of a written text	Does not understand a spoken text, even to a minimum allowing to get a general idea/meaning of an utterance.	Has a limited understanding of a spoken text, assisted by teacher can make out general meaning of a message or utterance.	Can answer using short forms or full sentences, at times missing the point of a question; can pass received information	Very good reading comprehension, correctly distinguishing and interpreting linguistic distortions and disruptions.
Criterion 5 Can introduce him/herself or describe a problem, in speaking or writing.	Cannot describe a problem or introduce him/herself in a spoken or written form.	Oral or written presentation is incomplete and reproductive rather than creative.	Presents using a correct structure, and rich content; can continue even if interrupted with questions.	Gives an auto/presentation that has a perfect structure, and interesting content; can easily express him/herself; focuses on what to say, not how.
Criterion 6 Ability to acquire information and use professional publications	Cannot use professional publications and find specific information.	Needs assistance in using job-related materials and, partially, instruction how to use them.	Has some difficulties in interpreting an information source due to insufficient knowledge of certain grammar structures; occasionally misunderstands a statement.	Proficiently uses professional publications, browses resources in Spanish interprets/understands the text correctly.
Criterion 7 Engagement in upgrading linguistic competences	Does not demonstrate any progress in improving his/her linguistic skills.	Very slow progress in linguistic skills, mostly forced by a teacher.	Develops professional language skills, but neglects everyday Spanish.	Works individually on improving all his/her linguistic skills, above required standards.

Syllabus

SEMESTER 4	GERMAN	CLASSES	30 HOURS

1. **Begrüßung, Befinden –** Hören/Sprechen: sich begrüßen/verabschieden; nach dem Befinden fragen; sich und andere vorstellen; Länder, Alphabet; Verbkonjugation Singular, W-Fragen.
2. **Angaben zur Person** – Sprechen: über den Beruf und persönliches sprechen, Lesen: Visitenkarten, Internetprofil, Schreiben: einen Steckbrief/kurzen Text über sich schreiben; Berufe, Familienstand, Zahlen 1–100; Verbkonjugation Singular und Plural, Negation mit nicht, Wortbildung -in.
3. **Familie –** Hören/Lesen: Drehbuchausschnitt, Sprechen: über die Familie und über Sprachkenntnisse sprechen: Familie, Sprachen; Ja-/Nein- Fragen, ja-nein-doch, Possessivartikel mein/dein, Verben mit Vokalwechsel.
4. **Einkaufen, Möbel** – Hören: Beratungsgespräche/Hilfe anbieten, Sprechen: nach Preisen fragen und Preise nennen, etwas bewerten; Zahlen: 100–1 000 000, Möbel, Adjektive; definiter Artikel der, das, die, Personalpronomen er/es/sie.
5. **Gegenstände, Produkte** – Sprechen: nach Wörtern fragen und Wörter nennen, um Wiederholung bitten, etwas beschreiben, sich bedanken; Farben, Dinge, Materialien, Formen; indefinit. Artikel ein/ein/eine, Negativartikel kein/kein/keine.
6. Büro & Technik – Hören: Telefongespräche, Sprechen: Telefonstrategien, Lesen: E-Mail und SMS; Büro, Computer, Singular – Plural, Akkusativ.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing	30	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**70**	**2**
Workload related to direct teaching activities:	35	1
Workload related to practice-oriented activities:	60	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

2.	Course unit:							N2022/35/GS/02/G2
GERMAN – module 2								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15			2			30	2
5	15			2			30	1
8	12			6			72	3

III/2. The learning outcomes and syllabus
The learning outcomes and assessment criteria and methods have been defined for the whole course unit and presented in Module 1.

Syllabus

SEMESTER 5	GERMAN	CLASSES	30 HOURS

1. **Freizeit, Komplimente –** Hören: Aussagen zu Freizeitaktivitäten, Sprechen: Komplimente machen, über Hobbys/Fähigkeiten sprechen, um etwas bitten, sich bedanken; Freizeitaktivitäten, Modalverb können, Satzklammer.
2. **Freizeit, Verabredungen –** Sprechen: sich verbreden, einen Vorschlag machen und darauf reagieren;Tageszeiten, Wochentage, Uhrzeiten, Freizeitaktivitäten; Verbposition im Satz, temporale Präpositionen am, um.
3. **Essen, Einladung zu Hause –** Hören: Gespräch über die Vorlieben beim Essen, Sprechen: über Essgewohnheiten sprechen; Konversation beim Essen, Lesen: Comic; Lebensmittel und Speisen; Konjugation mögen, „möchte“ , Wortbildung Nomen + Nomen.
4. **Reisen, Verkehrsmittel –** Hören: Durchsagen, Sprechen: sich informieren, ein Telefonat beenden; Verkehrsmittel, Reisen; trennbare Verben.
5. **Tagesablauf, Vergangenes –** Sprechen: über Vergangenes sprechen, Lesen: Terminkalender, E-Mail, Schreiben: einen Tagesablauf beschreiben; Alltagsaktivitäten; Perfekt mit „haben“, temporale Präpositionen von … bis, ab.
6. **Feste, Vergangenes –** Hören: Interviews, Sprechen: über Feste und Reisen sprechen, Lesen: Informationstexte; Jahreszeiten, Monate; Perfekt mit sein, temporale Präposition im.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**55**	**1**
Workload related to direct teaching activities:	35	0.5
Workload related to practice-oriented activities:	45	0.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

2.	Course unit:							N2022/48/GS/02/G3
GERMAN – module 3								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15			2			30	2
5	15			2			30	1
8	12			6			72	3

III/3. Learning outcomes and syllabus
The learning outcomes and assessment criteria and methods have been defined for the whole course unit and presented in Module 1.

Syllabus

SEMESTER 8	GERMAN	CLASSES	72 HOURS

1. **Wege beschreiben**: Hören: Wegbeschreibung; Sprechen: jemanden um Hilfe bitten; Wortfelder: Institutionen und Plätze in der Stadt; Lokale Präpositionen +Dativ
2. **Wohnen:** Sprechen; etwas beschreiben und bewerten; Schreiben; E-Mail; Possessivartikel; Genitiv bei Eigennamen
3. **In der Stadt**: Sprechen: einen Ort bewerten; nach Einrichtungen fragen; Verben mit Dativ; Personalpronomen im Dativ;
4. **Termine:** Horen/Sprechen: Hilfe anbieten; um Hilfe bitten; Auf Entschuldigung reagieren; E-Mail: Termine vereinbaren und verschieben; temporale Präpositionen;
5. **Pläne und Wünsche:** Sprechen: Wünsche äußern und über Pläne sprechen; Lesen: Zeitungstext; Futur I; Präpositionen mit/ohne; Modalverb „will".
6. **Gesundheit und Krankheit:** Hören/Sprechen: Schmerzen beschreiben; Ratschläge geben; über Krankheiten sprechen; Körperteile; Imperativ; Modalverben
7. **Aussehen und Charakter:** Hören: Smalltalk; Sprechen: Personen beschreiben; erstaunt reagieren; Präteritum; Perfekt
8. **Im Haushalt:** Sprechen: Bitten und Aufforderungen; Aktivitäten im Haushalt; Personalpronomen im Akkusativ; Zustandspassiv
9. **Regeln:** Sprechen: seine Meinung sagen; über Regeln sprechen; Regeln in Verkehr und Umwelt; Modalverben dürfen; sollen; müssen;
10. **Kleidung:** Hören; Sprechen; über Kleidung sprechen und sie bewerten; Aussagen verstärken; Komparation; Steigerung; Vergleiche
11. **Wetter:** Sprechen: Gründe angeben; über das Wetter sprechen; Himmelsrichtungen; Wetterbericht; Wortbildung -los; Konjunktionen; denn, weil, da, wenn
12. **Feste und Feiern:** Sprechen: Wünsche äußern; gratulieren; Einladungen; Konjunktiv II; Konditionalis; Ordinalzahlen
13. **Berufe und Familie**; Hören/Sprechen: über Berufe sprechen; Familiengeschichten erzählen; Reihenfolge angeben; Possessivartikel; Vergangenheitsformen
14. **Tourismus:** Natur und Landschaften; Wortbildung Nomen: Verb +er und Verb +ung
15. **Arbeitsleben:** Sprechen: Wichtigkeit ausdrücken; Arbeitsleben beschreiben; Adjektivendungen
16. Firmenporträt; bekannte deutschen Firmen; Branchen; Rechtsformen; reflexive Verben; Konjunktionen: wenn; als

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	72	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing	12	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**106**	**3**
Workload related to direct teaching activities:	77	1.5
Workload related to practice-oriented activities:	84	1.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
Not applicable.

V. Recommended reading
1. *Menschen;* Kursbuch; A1; A2; B1; Hueber Verlag, 2016.
2. *Menschen*; Arbeitsbuch; A1; A2; B1; Hueber Verlag, 2016.
3. Grundstufen-Grammatik für Deutsch als Fremdsprache; Hueber Verlag, 2015.

VI. Extra reading
1. Unternehmen Deutsch – Grundkurs; LektorKlett.
2. Swick Ed, *Practice Makes Perfect: Complete German ALL-in-One*, McGraw-Hill Education, 2020.
3. Richards Olly, *Short Stories in German for Beginners*, John Murray Press, 2018.
4. Balley N., Arnold Th., *Dictionary English-German and German-English*, Arkose Press, 2015.
5. Selected articles from trade magazines.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

3.	Course unit:	N2022/11/GS/03/PE1

PHYSICAL EDUCATION – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			1			15	
2	15			1			15	
3	15			1			15	
4	15			1			15	
5* SEA	15			1			15	
8* SEA	12			1			12	

* SEA – SPORT ELECTIVE ACTIVITIES

I. Course unit aims

In physical education classes, students will get familiar with threats related to work and leisure activities by the rivers, lakes etc., learn how to handle emergency situations and come to assistance, and principles of mental hygiene in the context of balanced mental and physical effort; another teaching objective is to impart knowledge and skills of organizing and participating in various activities aimed at keeping fit; students will also be taught the safety principles to be observed in training sessions involving sports equipment; various forms of physical effort of individuals and teams are intended to impart in students habits of actively spent pastime and health promoting attitudes.

II. Preliminary requirements

No medical counter indications to practice in a swimming pool or any specific form of physical activity.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 1		Field-specific
LO1	Can swim the backstroke; can swim a relatively long distance without stopping; understands the principles for safe leisure activities by the water and is able to implement the principles while organizing and managing activities aimed at developing fitness and improving swimming skills; assumes an attitude of being responsible for himself and other people participating in an activity by the waterside, responds properly in emergency situations.	K_W32; K_U03; K_K01

Assessment methods and criteria				
LO1	Can swim the backstroke; can swim a relatively long distance without stopping; understands the principles for safe leisure activities by the water and is able to implement the principles while organizing and managing activities aimed at developing fitness and improving swimming skills; assumes an attitude of being responsible for himself and other people participating in an activity by the waterside, responds properly in emergency situations.			
Assessment methods	Practical test.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Backstroke swimming technique.	Cannot swim on back.	Performs body movement tasks much different from model ones.	Performs tasks slightly different from model ones.	Performs tasks similar to model tasks and average movement effectiveness.
Criterion 2 Ability to swim a distance in 15 minutes.	Does not swim a minimum assigned distance.	Covers half a distance assigned.	Covers 75% of the distance assigned.	Covers the whole distance assigned.
Criterion 3 Organization and safety during exercises in water.	Does not meet basic safety principles – acts dangerously for himself and other swimmers.	Applies safety principles during exercises in water to avoid threats for himself.	Applies safety principles during exercises in water –identifies threats.	Applies safety principles during exercises in water identifies and responds to threats.

Syllabus

SEMESTER 1	PHYSICAL EDUCATION	LAB CLASSES	15 HOURS

SWIMMING

1. Familiarization with swimming pool rules and regulations, required hygiene, required personal outfit, requirements for a semester pass.
2. Getting acquainted with water exercises, assessment of student's swimming abilities.
3. Learning horizontal alignment on back in water, swimming with a kickboard.
4. Learning and improvement of flutter kick.
5. Learning armstroke in backstroke style.
6. Swimming the backstroke.
7. Swimmer's breathing exercise (breath out into water).
8. Learning flutter kick in breast-down position, breath in a side position.
9. Learning armstroke in the in breast-down position.
10. Jumping into water, various styles: legs first, squatting.
11. Backstroke swimming technique in sea rescue.
12. Basic exercises in immersion (in one place).
13. Assessment of backstroke and breaststroke swimming technique.
14. Distance swimming – test of endurance.
15. Assessment of learning outcomes and final evaluation.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams		
Total workload	**16**	
Workload related to direct teaching activities	16	
Workload related to practice-oriented activities	15	

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

3.	Course unit:							N2022/12/GS/03/PE2
PHYSICAL EDUCATION – module 2								
Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			1			15	
2	15			1			15	
3	15			1			15	
4	15			1			15	
5* SEA	15			1			15	
8* SEA	12			1			12	

* SEA – SPORT ELECTIVE ACTIVITIES.

III/2. Learning outcomes and syllabus

Learning outcomes– semester 2		Field-specific
LO1	Can swim the front crawl; can swim a relatively long distance without stopping; understands the principles for safe leisure activities by the water; can use techniques and methods aimed at developing fitness in water – diving with fins, elementary life-saving techniques.	K_W32; K_U17; K_K01; K_K04; K_K06

Assessment methods and criteria				
LO1	Can swim the front crawl; can swim a relatively long distance without stopping; understands the principles for safe leisure activities by the water; can used techniques and methods aimed at developing fitness in water – diving with fins, elementary life-saving techniques.			
Assessment methods	Practical test.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Front crawl technique.	Cannot swim the front crawl.	Performs body movement tasks much different from model ones.	performs tasks slightly different from model ones.	performs tasks similar to model tasks and average movement effectiveness.
Criterion 2 Ability to swim a distance in 30 minutes.	Does not swim a minimum assigned distance.	Covers half a distance assigned.	Covers 75% of the distance assigned.	Covers the whole distance assigned.
Criterion 3 Can hold his breath underwater for a length of time.	Cannot immerse his face in the water for a minimum time.	Can hold his breath with face underwater for a 50%-time limit.	Can hold his breath with face underwater for a 75%-time limit.	Can hold his breath with face underwater for the whole-time limit.

Syllabus

SEMESTER 2	PHYSICAL EDUCATION	LAB CLASSES	15 HOURS

SWIMMING

1. Familiarization with class program, additional equipment used during PhE classes, requirements for a semester pass. Preliminary assessment of students swimming skills.
2. Improvement of various swimming techniques using fins and swimming paddles.
3. Learning backstroke technique, lower limbs action and synchronization.
4. Learning breaststroke technique, lower limbs action and synchronization.
5. Learning breaststroke technique, upper limbs action and synchronization.
6. Breaststroke technique, with elemental coordination of upper/lower limbs actions and breathing, associated with a good overall position in the water.
7. Learning rescue crawl. Swim in the front crawl technique (up-head). Coordination of upper/lower limbs actions with respiration. Respiratory cycle.
8. Learning techniques for controlling breath holding under water.
9. Learning to stay upright in place in the water (preparation for evacuation from water).
10. Jump into the water in working clothes – simulated accident.
11. Learning rescue approach – getting out of the water using a step/ladder, climb onto boat, climb onto a board.
12. Development of endurance and improvement of breaststroke and backstroke techniques.
13. Distance swimming − test of endurance.
14. Simultaneous upper/lower limbs actions, assessment of swimming techniques.
15. Assessment of learning outcomes and final evaluation.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams		
Total workload	**16**	
Workload related to direct teaching activities	16	
Workload related to practice-oriented activities:	15	

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

3.	Course unit:	N2022/23/GS/03/PE3

PHYSICAL EDUCATION – module 3

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			1			15	
2	15			1			15	
3	15			1			15	
4	15			1			15	
5* SEA	15			1			15	
8* SEA	12			1			12	

* SEA – SPORT ELECTIVE ACTIVITIES.

III/3. Learning outcomes and sylabus

Learning outcomes – semester 3		Field-specific
LO1	Can swim the breaststroke; can swim a relatively long distance without stopping; understands the principles for safe leisure activities by the water.	K_W32; K_U06; K_K01; K_K04
LO2	Can tow a partner; understands and can use methods and techniques for developing physical fitness characteristic of activities related to water – distance swimming underwater.	K_W32 K_U03; K_U06; K_U17; K_K01; K_K04

Assessment methods and criteria				
LO1	Can swim the breaststroke; can swim a relatively long distance without stopping; understands the principles for safe leisure activities by the water.			
Assessment methods	Practical test.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Breaststroke swimming style technique	Cannot swim the breaststroke style.	Performs body movement tasks much different from model ones.	Performs tasks slightly different from model ones.	Performs tasks similar to model tasks and average movement effectiveness.
Criterion 2 Ability to swim a distance in 30 minutes.	Does not swim a minimum assigned distance.	Covers half a distance assigned.	Covers 75% of the distance assigned.	Covers the whole distance assigned.
LO2	Can tow a partner; understands and can use methods and techniques for developing physical fitness characteristic of activities related to water – distance swimming underwater.			
Assessment methods	Practical test.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Distance towing of a partner	Can tow a partner on a minimum defined distance.	Tows on half a defined distance	Tows on 75% of a defined distance	Tows on the whole defined distance.
Criterion 2 Can swim a long distance underwater.	Cannot swim a minimum assigned distance.	Covers half a distance assigned.	Covers 75% of the distance assigned.	Covers the whole distance assigned.

Syllabus

SEMESTER 3	PHYSICAL EDUCATION	LAB CLASSES	15 HOURS

SWIMMING

1. Familiarization with the program, requirements for a pass. Preliminary assessment of physical fitness based on the front crawl and backstroke style swimming.
2. Lifegaurd's jump into water, various styles: compact jump, stride jump.
3. Lifegaurd's jump into water – classic style.
4. Swimming exercises – sidestroke, swimmer in clothes.
5. Introduction for towing swim.
6. Towing a partner in a side position. Practising towing on back.
7. Swimming in working clothes in various positions – self-rescue.
8. Learning principles of underwater swimming. Evacuation from flooded rooms/compartments.
9. Getting familiar with life-saving equipment – life vest, rescue tube.
10. Exercises in self rescue.
11. Development of endurance and improvement of known style techniques.
12. Swimming in difficult conditions – waves, rough water; simulated limb injury.
13. Test of endurance in water.

14. Improving rescue techniques and skills.
15. Assessment for final grade.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams		
Total workload	**16**	
Workload related to direct teaching activities:	16	
Workload related to practice-oriented activities:	15	

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

3.	Course unit:	N2022/24/GS/03/PE4

PHYSICAL EDUCATION – module 4

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			1			15	
2	15			1			15	
3	15			1			15	
4	15			1			15	
5* SEA	15			1			15	
8* SEA	12			1			12	

* SEA – SPORT ELECTIVE ACTIVITIES.

III/4. Learning outcomes and syllabus

Learning outcomes – semester 4		Field-specific
LO1	Has knowledge of methods and techniques used in achievement physical and occupational fitness. He/she can perform physical tasks of a sporting nature in order to shape physical fitness. Understands the need for systematic increasing physical activity to achieve necessary fitness in the taught profession.	K_W19; K_W32; K_U06; K_K01; K_K04
LO2	Understands the principles and safety requirements of working with loads, working at height and in enclosed spaces.	K_W32; K_U03; K_U17; K_U22
LO3	Demonstrates the ability to co-operate in a team and the responsibility for team members and the tasks performed. Is able to assess risks of activities and threats to team members.	K_W32; K_K03; K_K04; K_K05

Assessment methods and criteria				
LO1	Has knowledge of methods and techniques used in achievement physical and occupational fitness. He/she can perform physical tasks of a sporting nature in order to shape physical fitness. Understands the need for systematic increasing physical activity to achieve necessary fitness in the taught profession.			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know the basic methods and techniques of physical fitness formation.	Knows methods, uses basic techniques of physical fitness formation appropriate for the realised curriculum contents.	He/she knows methods and uses various techniques of physical fitness formation appropriate to the realisation of the programme contents. Understands safety rules.	Shows a proper attitude of caring for physical fitness, skillfully selects movement tasks to shape particular types of physical fitness. Respects safety rules.
EU2	Understands the principles and safety requirements of working with loads, working at height and in enclosed spaces.			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	He cannot apply because he does not know the basic safety rules and requirements for working with loads, working at height and in confined spaces.	Observes safety rules and understands the requirements when working with loads, working at height and in confined spaces.	Demonstrates a good understanding of safety rules and requirements when working with loads, working at height and in confined spaces. Is aware of the need for belaying.	Demonstrates a full understanding of the safety principles and requirements when working under load, working at height and in confined spaces. Is able to organise this type of work and is aware of the associated risks.
EU3	Demonstrates the ability to co-operate in a team and the responsibility for team members and the tasks performed. Is able to assess risks of activities and threats to team members.			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Makes it difficult to cooperate in a team and to complete the tasks set. Is unable to assess the risk of the tasks performed and the potential danger to the group.	Demonstrates basic ability to work as part of a team and is committed to completing tasks.	Demonstrates a strong ability to work as part of a team, assesses risks and threats to the safe performance of tasks.	Demonstrates an attitude of team leadership. Shares experiences and knowledge with others. Identifies the strengths of other team members and uses them to allocate tasks skilfully.

Syllabus

SEMESTER 4	PHYSICAL EDUCATION	LAB CLASSES	15 HOURS

SA **H/C/L** – SPORT ACTIVITY DEVELOPMENT FOR WORKING AT **H**EIGHT/OVER THE SIDE, IN **C**ONFINED SPACES (ENCLOSED) AND WITH **L**OAD – IN THE SAFETY AND OCCUPATIONAL HEALTH ASPECT.

1. Familiarize yourself with the syllabus, facility rules, additional equipment used in class, the safety requirements of the class and the conditions for passing.
2. The importance of warming up before beginning physically demanding tasks. Strengthening and stretching of muscles.
3. To develop basic motor skills for a chosen activity using specialist equipment.
4. Recognize the basic principles of lifting, lowering and carrying loads or pushing and pulling – individually and as a team. Threats to the danger for the spine and the locomotor system, assistance.
5. Exercises preparing to perform tasks with load. Cooperation in pairs or in small teams while performing tasks with heavy load, crew member should be of similar stature; important points in lifting techniques, maintain a good posture while lifting or carrying loads.
6. Learning to move on a ladder with a safety harness with a lifeline secured above the work position, climb on a rope and interweave on a truss. When working, maintaining three points of contact with the ladder (both feet and a handhold).
7. Principles of belaying when working at height. Securing and using equipment for work aloft: gantlines, lizard, blocks, a stage, ladder, scaffolding, bosun's chair or scaffold tower, especially when work is to be done beyond normal reach. Teamwork tasks, supervision, training. Dangers and potential risk assessment.
8. Exercises in preparation for performing tasks at height in accordance with safe procedure and good practice.
9. Moving in confined spaces, vertical and horizontal structures – belaying. Team tasks.
10. Exercises in preparation for performing tasks in confined spaces. Motor skills in confined spaces.
11. Post-accident activities – premedical aid. Safety rules – do not aggravate injury.
12. Elements of physical rehabilitation of injuries of joints, tendons, ligaments, muscles and spinal pains. Prevention and elimination of pathological movement patterns.
13. Learning to row.
14. Checking the effects of training – task track, individual tasks.
15. Checking the effects of training – task track, team tasks.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams		
Total workload	**16**	
Workload related to direct teaching activities:	16	
Workload related to practice-oriented activities:	15	

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

3.	Course unit:	N2022/35/GS/03/PE5

PHYSICAL EDUCATION – module 5

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			1			15	
2	15			1			15	
3	15			1			15	
4	15			1			15	
5* SEA	15			1			15	
8* SEA	12			1			12	

* SEA – SPORT ELECTIVE ACTIVITIES.

SPORT ELECTIVE ACTIVITIES

1) Students declare participation and realisation of selected sport activities from among physical recreation classes:
   a) basic classes – classes organized by SWFiS: crossfit, fitness, team games, swimming, strength sports, rowing, other classes (e.g., on students' request – corrective gymnastics);
   b) extended classes – classes organized by SWFiS in cooperation with Academic Sports Association of the Maritime University (AZS AM) (partly paid – AZS membership fee required): crossfit, fitness, team games, athletics, karate, swimming and diving, strength sports, shooting, table tennis, rowing, diving and sailing;
   c) advanced classes – classes organized in selected sports clubs and associations (fee related – the university does not bear any costs of the student's participation).
2) Applying for a credit for P.E. classes through the recognition of the student's sport achievements:
   a confirmed membership and participation in sports clubs and associations is the basis for applying for credit for PE classes;
   b) preparation and participation of the university representatives in Polish Academic Championships or other sports competitions are the basis for applying for a credit for P.E. classes;
   c) it is also possible to receive credit for P.E. classes conducted as part of sports activities other than those listed in item 1, confirmed in a formal manner. Decisions in this matter are made by the head of the SWFiS.
3) In the case when there are SEA in a semester, it is the student's responsibility to choose the type of sports classes (discipline). In order for a student to participate in PE classes, it is necessary to submit a written declaration to the SWFiS within the deadline communicated to students, and after launching the functionality in the Virtual University – a declaration through the e-platform. Students who do not submit a written/electronic declaration by the deadline will be assigned to groups or sections where there are places.

III/5. Learning outcomes and syllabus

Learning outcomes – semester 5		Field-specific
LO1	Knows and can select appropriate techniques and methods to improve physical fitness in different forms of physical activity. Understands and applies safety rules for selected forms of physical activity. Knows how to select and use technical aids for sports and recreational activities and sports facility equipment.	K_W32; K_U06
LO2	Understands the concept of health and pro-health behaviour, is aware of the need to maintain physical fitness. Can apply the knowledge he/she possesses to activities, perform sports and recreation tasks in order to shape and sustain physical fitness. He/she can evaluate their predispositions, current physical fitness and health, indicate shortcomings (self-evaluation skills).	K_W32; K_U03; K_U22; K_K01
LO3	Adopts an attitude of readiness to cooperate, responsibility for team members and tasks performed. Promotes the social, cultural significance of sport and physical activity.	K_K04; K_K06; K_K07

Assessment methods and criteria				
LO1	Knows and can select appropriate techniques and methods to improve physical fitness in different forms of physical activity. Understands and applies safety rules for selected forms of physical activity. Knows how to select and use technical aids for sports and recreational activities and sports facility equipment.			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	He does not know methods and techniques used in shaping physical fitness connected with the realised curricular contents, he does not apply safety rules, he poses a	Knows the methods and techniques appropriate to the chosen activity, selects and uses the basic means of technical support of the	Has a good understanding of the methods and techniques appropriate to the chosen activity, makes appropriate use of a variety of technical aids to activities; understands	Demonstrates a good knowledge of methods and techniques of forming physical fitness in selected forms of physical activity; implements safety rules, knows the

	threat to other exercising people.	activity; supervied observes safety rules.	and applies safety rules.	regulations of selected disciplines.
LO2	Understands the concept of health and pro-health behaviour, is aware of the need to maintain physical fitness. Can apply the knowledge he/she possesses to activities, perform sports and recreation tasks in order to shape and sustain physical fitness. He/she can evaluate their predispositions, current physical fitness and health, indicate shortcomings (self-evaluation skills).			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Has not achieved the minimum level of fitness of the chosen physical activity. Is not aware of fitness deficiencies and does not demonstrate self-evaluation skills.	Performs movement tasks with considerable deviations from the pattern; makes a self-evaluation attempt, recognises his/her needs for action in order to improve proper level of fitness.	Performs movement tasks with few deviations from the pattern; makes a self-evaluation of the fitness, verifies actions in order to improve the level of fitness.	Performs movement tasks in accordance with the pattern and with high efficiency of movement; makes good use of his/her own predispositions of motor skills, strives to raise the level.
LO3	Adopts an attitude of readiness to cooperate, responsibility for team members and tasks performed. Promotes the social, cultural significance of sport and physical activity.			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Inability to cooperate in a team, hindering the implementation of team tasks.	Cooperates in a team, shows sufficient commitment to tasks.	Good team cooperation, takes responsibility for the tasks performed. Takes care to develop his/her own physical activity mobilises others.	Accepts responsibility for the team and the tasks performed with commitment; motivates group members to complete tasks and develop further.

Syllabus

SEMESTER 5	PHYSICAL EDUCATION	LAB CLASSES	15 HOURS

FOR PHYSICAL RECREATION ACTIVITIES SELECTED BY THE STUDENT

1. Introduction to the programme of classes, rules and regulations of using the facility, organisation and safety during sports and recreation classes.
2. Warm-up as a basic form of preparing the body for exercise.
3. Practising of sports and recreation – basic individual techniques of selected sport activities and recreation.
4. Learning about basic rules and regulations of selected sports and recreation.
5. The role of a co-exerciser in the aspect of assistance during exercises of selected sports and recreation disciplines.
6. The aim of the course is to learn about the use of technical aids for physical exercises in sports and recreation (equipment, devices, trainers) equipment of the object or natural conditions.
7. Familiarisation with methods of planning individual development of selected motor abilities used in sport and recreation.
8. Recognise methods of planning individual development of selected technical skills used in sport and recreation.
9. Learning the principles of organising physical activities, refereeing during sports and recreational games.
10. Testing the learning outcomes in selected forms of physical activity.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams		
Total workload	**16**	
Workload related to direct teaching activities:	16	
Workload related to practice-oriented activities:	15	

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

3.	Course unit:	N2022/48/GS/03/PE6

PHYSICAL EDUCATION – module 6

Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			1			15	
2	15			1			15	
3	15			1			15	
4	15			1			15	
5* SEA	15			1			15	
8* SEA	12			1			12	

*SEA – SPORT ELECTIVE ACTIVITIES – **for the introduction see module 5**

III/6. Learning outcomes and syllabus

Learning outcomes – semester 8		Field-specific
LO1	Knows and can select appropriate techniques and methods to improve physical fitness in different forms of physical activity. Understands and applies safety rules for selected forms of physical activity. Knows how to select and use technical aids for sports and recreational activities and sports facility equipment.	K_W32; K_U06
LO2	Understands the concept of health and pro-health behaviour, is aware of the need to maintain physical fitness. Can apply the knowledge he/she possesses to activities, perform sports and recreation tasks in order to shape and sustain physical fitness. He/she can evaluate their predispositions, current physical fitness and health, indicate shortcomings (self-evaluation skills).	K_W32; K_U03; K_U22; K_K01
LO3	Adopts an attitude of readiness to cooperate, responsibility for team members and tasks performed. Promotes the social, cultural significance of sport and physical activity.	K_K04; K_K06; K_K07

Assessment methods and criteria				
LO1	Knows and can select appropriate techniques and methods to improve physical fitness in different forms of physical activity. Understands and applies safety rules for selected forms of physical activity. Knows how to select and use technical aids for sports and recreational activities and sports facility equipment.			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	He does not know methods and techniques used in shaping physical fitness connected with the realised curricular contents, he does not apply safety rules, he poses a threat to other exercising people.	Knows the methods and techniques appropriate to the chosen activity, selects and uses the basic means of technical support of the activity; supervied observes safety rules.	Has a good understanding of the methods and techniques appropriate to the chosen activity, makes appropriate use of a variety of technical aids to activities; understands and applies safety rules.	Demonstrates a good knowledge of methods and techniques of forming physical fitness in selected forms of physical activity; implements safety rules, knows the regulations of selected disciplines.
LO2	Understands the concept of health and pro-health behaviour, is aware of the need to maintain physical fitness. Can apply the knowledge he/she possesses to activities, perform sports and recreation tasks in order to shape and sustain physical fitness. He/she can evaluate their predispositions, current physical fitness and health, indicate shortcomings (self-evaluation skills).			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Has not achieved the minimum level of fitness of the chosen physical activity. Is not aware of fitness deficiencies and does not demonstrate self-evaluation skills.	Performs movement tasks with considerable deviations from the pattern; makes a self-evaluation attempt, recognises his/her needs for action in order to improve proper level of fitness.	Performs movement tasks with few deviations from the pattern; makes a self-evaluation of the fitness, verifies actions in order to improve the level of fitness.	Performs movement tasks in accordance with the pattern and with high efficiency of movement; makes good use of his/her own predispositions of motor skills, strives to raise the level.
LO3	Adopts an attitude of readiness to cooperate, responsibility for team members and tasks performed. Promotes the social, cultural significance of sport and physical activity.			
Assessment methods	Practical test, evaluation of activity and attitude.			
Criteria/Grade	2	3	3.5−4	4.5−5

Criterion 1	Inability to cooperate in a team, hindering the implementation of team tasks.	Cooperates in a team, shows sufficient commitment to tasks.	Good team cooperation, takes responsibility for the tasks performed. Takes care to develop his/her own physical activity mobilises others.	Accepts responsibility for the team and the tasks performed with commitment; motivates group members to complete tasks and develop further.

Syllabus

SEMESTER 8	PHYSICAL EDUCATION	LAB CLASSES	12 HOURS

FOR PHYSICAL RECREATION ACTIVITIES SELECTED BY THE STUDENT

1. Introduction to the programme of classes, rules and regulations of using the facility, organisation and safety during sports and recreation classes.
2. Warm-up as a basic form of preparing the body for exercise.
3. Practising of sports and recreation – basic individual techniques of selected sport activities and recreation.
4. Learning about basic rules and regulations of selected sports and recreation.
5. The role of a co-exerciser in the aspect of assistance during exercises of selected sports and recreation disciplines.
6. The aim of the course is to learn about the use of technical aids for physical exercises in sports and recreation (equipment, devices, trainers) equipment of the object or natural conditions.
7. Familiarisation with methods of planning individual development of selected motor abilities used in sport and recreation.
8. Recognise methods of planning individual development of selected technical skills used in sport and recreation.
9. Learning the principles of organising physical activities, refereeing during sports and recreational games.
10. Testing the learning outcomes in selected forms of physical activity.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	12	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams		
Total workload	**13**	
Workload related to direct teaching activities:	13	
Workload related to practice-oriented activities:	12	

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training

not applicable

V. Recommended reading

1. Nawara H., *Badminton*.
2. Laughlin T., *Swimming for all*.

VI. Extra reading

1. Lifeguard manual

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

4.	Course unit:							N2022/12/GS/04/FE
FUNDAMENTALS TO ECONOMICS								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1			15			1

I. Course unit aims

The aim of this unit is to: prepare the future graduate for work using principles characteristic of market economy, teach the principles of generating, accounting and distribution of national income, and problems of economic growth; explain basic categories of the market mechanism and define the role of various entities in the operation of an economy.

II. Preliminary requirements

The scope of a secondary school.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 2		Field-specific
LO1	Knows and understands the essence of, objectives and regularities of the operation of an economy.	K_W01; K_W29; K_W31
LO2	Identifies basic elements of the market mechanism.	K_W33; K_W34
LO3	Understands the generation, accounting and distribution of the national income and problems of economic growth.	K_W34; K_W35
LO4	Defines the role of various entities in the operation of an economy.	K_U13; K_U14

Assessment methods and criteria				
LO1	Knows and understands the essence of, objectives and regularities of the operation of an economy.			
Assessment methods	Test, essay, research study, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The defined scope of knowledge and understanding.	Does not have basic knowledge of the defined scope.	Knows and understands the essence of management.	Understands the essence and is able to describe objectives of management.	Defines all regularities of management.
LO2	Identifies basic elements of the market mechanism.			
Assessment methods	Test, essay, research study, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The defined scope of knowledge and understanding.	Does not know basic actions of the market mechanism.	Prompted by the teacher, properly defines elements of the market mechanism.	Characterizes elements and actions of the market mechanism, relates them to problems of economic growth.	Defines interrelations between elements of the market mechanism in case of market equilibrium; analyses problems of economic growth.
LO3	Understands the generation, accounting and distribution of the national income and problems of economic growth.			
Assessment methods	Test, essay, research study, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The defined scope of knowledge and understanding.	Does not know basic issues of and does not understand the term national income.	Understands the principles of generating national income.	Characterizes principles of generating and distributing the national income.	Demonstrates a deepened knowledge of principles of generating and distributing the national income; identifies measures of the national income.
LO4	Defines the role of various entities in the operation of an economy.			
Assessment methods	Test, essay, research study, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The defined scope of knowledge and understanding.	Does not know the basic scope of management and its elements.	Prompted by the teacher, properly defines various entities involved in management.	Characterizes the participation of entities in the process of management.	Defines principles of rational management and refers them to business entities.

Syllabus

SEMESTER 2	FUNDAMENTALS TO ECONOMICS	LECTURES	15 HOURS

1. Essence, goals and regularities of management, economy as a system, characteristics of basic economic systems, management in conditions of ecological hazards.
2. Creation, recording and distribution of national income, state budget and fiscal policy, economic growth.
3. Role of the state in market economy, options and dilemmas of Polish economic system transformation.
4. Market economy; market segments, basic categories and market participants, theory of consumers' choice, market mechanism.
5. Functioning of a company in the market economy, forms of companies, company operation efficiency, strategies of company development.
6. Functioning of the money-capital market; money – evolution of money and its functions, basic operations on the money market, functions, tasks and goals of banks, securities market, functioning of a stock exchange.
7. Labor market; labor supply and demand; unemployment as a symptom of unbalanced labor market, causes and effect of unemployment, unemployment versus inflation.
8. Global economy, globalization of the world economy, international economic cooperation and economic integration. Main social and economic problems of the contemporary world.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	3	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**23**	**1**
Workload related to direct teaching activities:	18	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Recommended reading
1. Sowell T., *Basic Economics: A Common Sense Guide to the Economy* – fourth edition 2010. Published by basic Books, A Memeber of the perseus Books Group.

V. Extra reading
1. Eurostat. Eurostat Database. 2021. Available online: https://ec.europa.eu/eurostat/data/database (accessed on 25 May 2021).

VI. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

5.	Course unit:							N2022/12/GS/05/IMS
INTRODUCTION TO MARITIME SOCIOLOGY								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1			15			1

I. Course unit aims

This course unit aims at presentation of selected problems of maritime sociology, with focus on issues of international marine work environment. Enhancement of the shaping of human values system, implementation for the ability to observe and analyse sociological and psychological processes, indication of the need to develop social competences for better functioning in the work environment.

II. Preliminary requirements

The scope of a secondary school.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 2		Field-specific
LO1	Understands basic research problems of maritime sociology, defines basic terms.	K_W30; K_W33
LO2	Defines the specifics of work environment and life at sea. Identifies and characterizes relations among ship crew as a social group, indicates factors affecting an individual.	K_W29; K_W30; K_W31
LO3	Identifies hazards related to work environment and life at sea.	K_W32; K_U22; K_K05; K_K06

Assessment methods and criteria				
LO1	Understands basic research problems of maritime sociology, defines basic terms.			
Assessment methods	Essay, test, participation in class discussion.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not identify basic issues of sociology.	Lists basic research problems of sociology; when directed, can define basic terms.	Distinguishes, defines and explains basic research problems of maritime sociology, understands their meaning.	Has in-depth knowledge, properly understands and analyses basic terms of maritime sociology.
LO2	Defines the specifics of work environment and life at sea. Identifies and characterizes relations among ship crew as a social group, indicates factors affecting an individual.			
Assessment methods	Essay, test, participation in class discussion.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Lack of basic knowledge in the discussed subject.	When directed, defines the specifics of work environment and life at sea.	Properly defines the specifics of work environment and life at sea, understands interpersonal relations and conditions within a group – ship's crew.	Properly characterizes the specifics of work environment and life at sea, understands and defines interpersonal relations and conditions within a group – ship's crew.
LO3	Identifies hazards related to work environment and life at sea.			
Assessment methods	Essay, verification test, participation in class discussion.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not identify or try to understand basic problems found in work environment and life at sea.	When directed, defines basic dangers related to work environment and life at sea.	Properly characterizes hazards related to work environment and life at sea.	Properly defines hazards related to work environment and life at sea, understands the impact of psycho-social factors and their role in dangers.

Syllabus

SEMESTER 2	INTRODUCTION TO MARITIME SOCIOLOGY	LECTURES	15 HOURS

1. Sociology as a scientific discipline. Diversity of research aims in sociology. Characteristics of research methods in sociology: experiment, questionnaires and polls, observation, historical research.
2. Major related, economic and cultural bases of social life. Social inequalities. Inequality in access to economic resources. Influence of the social environment on an individual.
3. Race, nationality, nation: discrimination and ethnic prejudice. Characteristics of basic symbolic systems in society: language, systems of values, belief systems, systems of norms and knowledge resources. Cultural differences and prejudices.
4. Globalization and its international determinants. Social dimension of globalization in maritime economy.

Leadership and Teamwork; Human Element, Leadership and Management (HELM) – STCW 2010, Manila Amendments

5. Working environment and life on a ship. Specifics of seafarer's and fisherman's jobs. Conditions of work at sea. Ship as an enclosed institution.
6. Intercultural communication at work at sea. Awareness of cultural difference, inborn traits, attitudes, behaviour and intercultural interactions.
7. Types (and kinds) of social bonds. Social bonds on a ship. Ship's crew as a small integrated social group. Informal social structures on a ship.
8. Sociological aspects of managing and conning a sea-going ship, team work.
9. Professional preparation for work at sea. Job adaptation of seaman and fisherman. Motivations and needs of a seafarer on a ship versus stress and job adaptation.
10. Psychosocial factors of occupational accidents of seamen and fishermen. Human error, situational awareness. Awareness of automation of performed actions.
11. Specifics of seamen and fishermen jobs and their social consequences in life on land, including family life.
12. Influence of work at sea on personality. Free time of seamen and fishermen. Complacency, boredom.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	2	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**23**	**1**
Workload related to direct teaching activities:	17	1
Workload related to practice-oriented activities:	2	

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training

not applicable

V. Recommended reading

1. Sociology at Sea. Culture, Economy and Society in a Maritime Perspective.

VI. Extra reading

1. Gregory D., Shanahan P., *The Human Element. A guide to human behaviour in the shipping industry*, The Stationery Office (TSO) UK, July 2010 [https://www.nautinst.org/uploads/assets/uploaded/e22106a2-337b-46a9-9449aa6fc2c439f5.pdf].

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

6.	Course unit:	N2022/11/GS/06/PHB

PSYCHOLOGY OF HUMAN BEHAVIOUR

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1			15			1

I. Course unit aims

Presentation of fundamentals of psychology, sociology and ergonomics. Imparting skills of observation and analysis of various social and sociological processes. Understanding the need of better functioning in the social environment to avoid unnecessary problems. Preparation of the future graduate for work where basic psychological concepts of human being are applicable (psychoanalysis, behaviourism, human psychology).

II. Preliminary requirements

The scope of a secondary school.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 1		Field-specific
LO1	Knows basic concepts of psychology of cognitive processes, learning and memory, understands their role in human development.	K_W32
LO2	Understands the nature of emotions, the mechanism of interaction and regulation and its role in building appropriate interpersonal relations.	K_K06
LO3	Characterizes basic social processes: adjustment, co-operation, competition and conflict.	K_W31
LO4	Defines human behaviour in situations of distress; understands the need to control own behaviours, counteract stress.	K_W32; K_W31
LO5	Can assess own ability to behave assertively and respond to the assertiveness of other people.	K_U02; K_U22

Assessment methods and criteria				
LO1	Knows basic concepts of psychology of cognitive processes, learning and memory, understands their role in human development.			
Assessment methods	Essay, test, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know a basic scope of issues under consideration.	Identifies basic cognitive processes, (prompted) describes their role in human development.	Defines cognitive, learning and memory processes; understands their role in human development.	Has deepened knowledge of cognitive processes, assesses their role in human development.
LO2	Understands the nature of emotions, the mechanism of interaction and regulation and the role in building appropriate interpersonal relations.			
Assessment methods	Essay, test, participation in class discussions			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know a basic scope of issues taught.	Prompted, basically defines emotions, explains the mechanism of their interaction.	Correctly defines emotions, understands the mechanism of interactions and regulation.	has a deepened knowledge of the nature of emotions, mechanism of interactions and regulation; characterizes control actions.
LO3	Characterizes basic social processes: adjustment, co-operation, competition and conflict.			
Assessment methods	Essay, test, participation in class discussions			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know a basic scope of issues taught.	prompted, characterizes basic social processes.	properly characterizes basic social processes, assesses influence of a group on the behaviour of an individual.	has deepened knowledge of social processes, interprets sources and causes of errors and limits of adjustment.
LO4	Defines human behaviour in situations of distress; understands the need to control own behaviours, counteract stress.			
Assessment methods	Essay, test, participation in class discussions			

Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	does not identify the problem, does not understand the issues taught.	identifies human behaviour in emergency situations, copes with stress.	identifies human behaviour in emergency situations, copes with stress and negative emotions; can assess own behaviour in emergency situations.	has a deepened knowledge of human behaviour in emergency situations; correctly assesses and controls own behaviour in such situations; understands the need to counteract stress related to various work positions, including managerial ones.
LO5	Can assess own ability to behave assertively and respond to the assertiveness of other people.			
Assessment methods	Oral exam, written exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	does not know basics of the issues taught, does not participate in class discussions.	prompted, assesses the need to behave assertively.	understands the need to behave assertively, can assess own abilities; prompted, properly reacts to assertiveness of others in practical exercises.	perfectly assesses a situation and need to behave assertively, properly reacts to assertiveness of others in practical exercises.

Syllabus

SEMESTER 1	PSYCHOLOGY OF HUMAN BEHAVIOUR	LECTURES	15 HOURS

1. Psychology: subject and methods. Cognitive process – perception.
2. Personality and its basic characteristics – personal development.
3. Conscious and sub-conscious behaviour of a person. Domination, influence, submissiveness, agreement.
4. Professional personality: relations with people, style of thinking, feelings and emotions.
5. Influence of personality traits and work environment on human reactions: domination, communicativeness, adaptation and stabilization.
6. Emotional intelligence and its correlation with success at work. Psychological competences: self-awareness, self-evaluation, self-control. Social competence: empathy, assertiveness, persuasion, leadership, cooperation. Action competence: motivation, adaptation abilities, conscientiousness.
7. Human reliability. A person in emergency situations.
8. Communication between people, effective communication.
9. The art of negotiations.

Leadership and Teamwork; Human Element, Leadership and Management (HELM) – STCW 2010, *Manila Amendments*

10. Team work. Influence of an individual on the group and vice versa. Roles played in a group. Leader characteristics in a constructive group leadership. Improvement of teamwork.
11. Psychology of a decision process. Decision making and techniques of problem solution. Stages of conscious decision making. Assessment of a situation, problem and risk. Identification and consideration of existing solutions. Choice of action. Assessment of outcome effectiveness.
12. Psychological aspects of the motivating process.
13. Self-awareness of personal skills and behavioural characteristics (traits). Opportunities for personal and professional development.
14. Self-organization of work. Mental work. Mental hygiene.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**27**	**1**
Workload related to direct teaching activities:	17	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. Elliot Aronson, Timothy D. Wilson, Robin M. Akert, *Social Psychology*, Pearson New International Edition 8/E.

VI. Extra reading
1. Influence: Science and Practice Robert Cialdini
2. Gregory D., Shanahan P., *The Human Element. A guide to human behaviour in the shipping industry*. The Stationery Office (TSO)UK, July 2010 [https://www.nautinst.org/uploads/assets/uploaded/e22106a2-337b-46a9-9449aa6fc2c439f5.pdf].

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

7.	Course unit:							N2022/12/GS/07/ER
ERGONOMICS								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1			15			1

I. Course unit aims

In this course unit students will learn basics of work ergonomics, the system 'human-machine-environment', awareness of threats and risk that occur daily in the place of work, standards of optimal work station. Enhancement of the awareness in the context of responsibility for the condition of own health, including the shaping of correct posture, reduction of paying and fatigue during work activities, which improve physical and mental condition, and comfort of work.

II. Preliminary requirements

The scope of secondary school, occupational safety on ships.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 2		Field-specific
LO1	Knows basic concepts of ergonomics and examples of use in the work environment; understands the interdisciplinary character of ergonomics; knows trends in ergonomics.	K_W19; K_W31; K_U22
LO2	Analyses physical and chemical factors of the work environment and can explain their influence on humans, specifies their maximum allowed intensities and concentrations.	K_W19
LO3	Can apply ergonomic factors to improve the quality of workplace; defines accidents at work and occupational illnesses; knows principles and institutions of labour protection.	K_W31
LO4	Describes and characterizes the system 'human-machine-environment'; knows ergonomics research methods used in designing and assessment of work stations and methods of determining the expenditure of energy in the course of work.	K_W31
LO5	Defines and verifies all potential dangers related to a work station and work done; distinguishes dynamic, static, monotype and hypokinetic loads of a human.	K_W19; K_U22; K_K05
LO6	Knows factors forming the microclimate of a work environment.	K_W19
LO7	Can design an optimal spatial structure of a work station at a computer monitor.	K_U26
LO8	Knows applicable methods of recovering physical and mental strength at work.	K_W32
LO9	Has skills of self-instruction and efficient use of information resources: standards, catalogues, the Internet; understands the need of continuous learning to keep up with changes in the system 'person–machine–environment' from the ergonomic perspective.	K_U01; K_K01

Assessment methods and criteria				
LO1	Knows basic concepts of ergonomics and examples of use in the work environment; understands the interdisciplinary character of ergonomics; knows trends in ergonomics.			
Assessment methods	Tests, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know or understand basic concepts of ergonomics.	Understands basic concepts of ergonomics and knows examples of use in the work environment.	Can characterize the system 'human-machine-environment'; understands the interdisciplinary character of ergonomics.	Analyses the system 'human-machine-environment' in view of ergonomics applications.
LO2	Analyses physical and chemical factors of the work environment and can explain their influence on humans, specifies their maximum allowed intensities and concentrations.			
Assessment methods	Tests, participation in class discussions			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Cannot list factors affecting the work environment.	Can list factors affecting the work environment, cannot explain how they affect the human body, cannot specify maximum allowable concentrations/intensities.	Can characterize factors of the work environment and describe their effect on the human body, but cannot specify maximum allowable concentrations/intensities.	Can characterize factors of the work environment (lighting, colours, noise, vibrations, dusts, radiation) and describe their effect on the human body; can specify their maximum allowable concentrations/intensities.

LO3	Defines accidents at work and occupational illnesses; knows principles and institutions of labour protection; can suggest ergonomic factors to improve the quality of workplace.			
Assessment methods	Tests, participation in class discussions			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Cannot define accidents at work or occupational illnesses.	Can define accidents at work and occupational illnesses.	Cannot define accidents at work and occupational illnesses, and principles of labour protection.	Cannot define accidents at work and occupational illnesses, and principles of labour protection; can suggest ergonomic factors to improve the quality of workstation.
LO4	Describes and characterizes the system 'human-machine-environment'; knows ergonomics research methods used in designing and assessment of workstations and methods of determining the expenditure of energy in the course of work.			
Assessment methods	Tests, participation in class discussions			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know the system 'human-machine-environment'.	Describes and characterizes the system 'human-machine-environment'.	Defines accidents at work and occupational illnesses; knows principles and institutions of labour protection.	Knows ergonomics research methods used in designing and assessing workstations and methods of determining the expenditure of energy in the course of work.
LO5	Defines and verifies all potential risks related to a work station and work done; distinguishes dynamic, static, monotype and hypokinetic loads of a human.			
Assessment methods	Tests, participation in class discussions			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know potential risks related to a workstation and work done.	Knows potential risks related to a workstation and work done.	Knows, defines and verifies all potential risks related to a workstation and work done.	Knows, defines and verifies all potential risks related to a workstation and work done; distinguishes dynamic, static, monotype and hypokinetic loads of a human being.
LO6	Knows factors forming the microclimate of a work environment.			
Assessment methods	Tests, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know factors forming the microclimate of the work environment.	Knows factors forming the microclimate of the work environment.	Defines air temperature, humidity, air movement, heat radiation, atmospheric pressure.	Knows, defines and can affect or restrict negative effect of the workplace microclimate on the human body.
LO7	Can design an optimal spatial structure of a work station at a computer monitor.			
Assessment methods	Tests, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know potential risks related to work at computer monitors.	Knows potential risks related to work at computer monitors.	Knows potential risks related to work at computer monitors; can design an optimal spatial arrangement of a workstation at a computer monitor.	Knows potential risks related to work at computer monitors; can design an optimal spatial arrangement of a workstation at a computer monitor, and knows counter-indications for work at computer monitors.
LO8	Knows applicable methods of recovering physical and mental strength at work.			
Assessment methods	Tests, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know methods used for the recovery of mental and physical power at work.	Knows methods used for the recovery of mental and physical power at work.	Knows methods used for the recovery of mental and physical power at work, knows maximum time of work and minimum time of rest.	Knows methods used for the recovery of mental and physical power at work, knows maximum time of work and minimum time of rest; can specify parameters and form optimal conditions of the work environment.
LO9	Has skills of self-instruction and efficient use of information resources: standards, catalogues, the Internet; understands the need of continuous learning to keep up with changes in the system 'person–machine–environment' from the ergonomic perspective.			

Assessment methods	Tests, participation in class discussions.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Ability to use source information	Does not understand basic ergonomics terminology.	Uses a basic scope of ergonomics terminology.	Uses an extended scope ergonomics terminology.	Is proficient in discussing various aspects related to ergonomics.
Criterion 2 Effective attendance of lectures, skill of self-instruction and understanding of the need to upgrade professional qualifications.	Does not participate actively in lectures/classes, is not able to independently acquire and deepen his/her knowledge.	Demonstrates activity needed for effective learning.	Demonstrates engagement in the learning process; identifies and solves a problem with slight teacher's assistance.	Works independently, shows desire to deepen his/her knowledge; shows initiative, critical thinking and need of professional improvement.

Syllabus

SEMESTER 2	ERGONOMICS	LECTURES	15 HOURS

BASIC PROBLEMS OF ERGONOMICS

1. Definitions of ergonomics.
2. Interdisciplinary character of ergonomics.
3. Use of ergonomics in the human environment.
   - 3.1. Social and economic aspects of ergonomics.
   - 3.2. Ergonomics and job satisfaction.
   - 3.3. Ergonomics for older people.
   - 3.4. Ergonomics of mass products.
4. Trends in ergonomics.
   - 4.1. Corrective ergonomics.
   - 4.2. Conceptual ergonomics.
   - 4.3. Approval of machine and device prototypes.
5. Person – work system.
6. Physical conditions of work, influence of work environment on a person.
7. Physical and chemical factors of work environment.
   - 7.1 Micro climate.
   - 7.2 Lighting.
   - 7.3 Colours.
   - 7.4 Noise.
   - 7.5 Vibrations.
   - 7.6 Dusts.
   - 7.7 Radiation.
8. Workload. Static and dynamic work.
9. Physiology of human body and physical work.
   - 9.1. Influence of the posture on physical and mental state.
   - 9.2. Spine bio-mechanics principles. Mechanisms of forming muscular-skeletal disorders. Avoidance of overloads.
   - 9.3. Regeneration of mental and physical power at work.
10. Ergonomic factors in shaping the work environment.
    - 10.1. Work space. Anthropometry, person models.
    - 10.2. Design and distribution of workstations.
11. Computer station.
    - 11.1 Effects of using a computer on human body.
    - 11.2 Parameters of working conditions. Computer monitor as a source of radiation.
    - 11.3 Height of a chair, desk and vision angle of computer screen.
    - 11.4 Counter-indications for work at computer stations.
12. Nervous system and mental work.
13. Rest during and after work.
14. Ergonomic research.
    - 14.1. Ergonomic assessment of machine and device designs and prototypes.
    - 14.2. Methods and techniques used in ergonomic research.
    - 14.3. Examination of mental and physical load.
    - 14.4. Examination of physical environment of work.
15. Work security.
    - 15.1. Occupational diseases.
    - 15.2. Accidents at work.
    - 15.3. Work safety management.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	1	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**24**	**1**
Workload related to direct teaching activities:	17	1
Workload related to practice-oriented activities:	1	

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
not applicable.

V. Recommended reading
1. ILO – *Guidelines for implementing the occupational safety and health provisions of the Maritime Labour Convention, 2006.*
   [https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/normativeinstrument/wcms_325319.pdf

VI. Extra reading
1. Mariner Safety Research Initiative – *Ergonomic & Safety Discussion Paper*, January 2016. [https://maritime.lamar.edu/pubdoccenter/attachments/article/128/EDP%20-%20Habitability%20and%20Comfort%20No%208.pdf]

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

8.	Course unit:							N2022/11/GS/08/HSS
HEALTH AND SAFETY ON SHIPS								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1			15			1

I. Course unit aims

This course unit aim is to impart knowledge of basic occupational safety principles observed on board a ship and the influence of all external factors posing risks to personnel working onboard; to make students aware of risks and hazards related with work on a sea-going ship.

II. Preliminary requirements

Physics, chemistry, biology and basic occupational work training.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 1		Field-specific
LO1	Has fundamental knowledge of work safety principles, legal acts, safety requirements and accident risks – causes and ways of avoiding accidents on a ship.	K_W19; K_W31; K_W32

Assessment methods and criteria				
LO1	Has fundamental knowledge of work safety principles, legal acts, safety requirements and accident risks – causes and ways of avoiding accidents on a ship.			
Assessment methods	Project, presentation.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know and does not understand occupational safety principles, safety requirements and risks of accidents at work on ships.	Has knowledge of issues lectured, sees cause-and-effect relations while working onboard a ship.	Has knowledge as above, and can predict and interpret the work done on a ship and resulting risks.	Has knowledge as above, knows issues lectured, can predict situations posing risks taking into account fatigue and interpersonal relations on the ship; is an active class participant.

Syllabus

SEMESTER 1	HEALTH AND SAFETY ON SHIPS	LECTURES	15 HOURS

1. Labour legislation in Poland and in the world.
2. Scope of activities and powers of labor inspection services.
3. Obligations and rights of workers in the light of the labour code.
4. Contracts of employment.
5. Institutions for arbitration of work related disputes.
6. MLC Convention 2006 in the context of seafarer's employment.
7. Contacts with foreign ship owners.
8. ITF – activities for the defense of seafarer's rights.
9. Work safety principles on ships – legal acts and ship owner's regulations.
10. Work safety requirements on a ship.
11. Personal protective equipment.
12. Accident risks on ships – causes, places, elimination.
13. Crewmember's tiredness and ship's safety.
14. Accidents at work and job-related diseases – procedure.
15. Preventive measures in maritime transport.
16. Medical care.
    16.1. Medical signals in the International Code of Signals.
    16.2. MFAG*(Medical First Aid Guide).*
17. Fatigue and sleep of a crewmember and ship's safety.
    17.1. Alertness and fatigue.
    17.2. Biological clock.
    17.3. Sleep quality, disturbances.

17.4. Dysrhythmia during daily activities
18. Interpersonal relations.
18.1. Crew management, building an authority.
18.2. Organization of crew's work to avoid fatigue.
18.3. Workaholism, job burn-out. Mobbing at work
18.4. Loneliness on a ship and remedies.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	6	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	3	
Total workload	**26**	**1**
Workload related to direct teaching activities:	17	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *On board Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. ILO – Maritime Labour Convention, 2006.
2. IMO – *Guidelines on Fatigue*, MSC.1/Circ.1598, 2019.
3. ITF – Guidane about the Health and Safety on Board Ships.
4. Safety procedures and documents used on ships.

VI. Extra reading
1. Chosen IMO resolutions and other documents.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

9.	Course unit:							N2022/48/GS/09/IPP
INTELLECTUAL PROPERTY PROTECTION								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
8	12	1			12			1

I. Course unit aims

This course unit aims at familiarizing students with issues of intellectual property protection, problems related to copyright and its interpretation, and industrial property law. Students will become familiar with some aspects of dynamically changing intellectual property law, covering new media of transmission and exchange of information, including the Internet.

II. Preliminary requirements

none

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 8		Field-specific
LO1	can define subject matter of intellectual property, copyright and industrial property.	K_W35
LO2	knows Polish and international determinants for the functioning of intellectual property.	K_W27; K_W35
LO3	knows, understands and properly interprets the content of copyright law.	K_W29; K_W35
LO4	knows, understands and properly interprets the content of industrial property law.	K_W33
LO5	knows and understands the functioning of intellectual property law on the Internet.	K_W33; K_W35

Assessment methods and criteria				
LO1	Can define subject matter of intellectual property, copyright and industrial property.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Cannot give appropriate definitions.	Defines partly, making mostly wrong statements.	Defines most terms correctly; defines all terms repeating memorized definitions.	Defines all terms adding at time his own remarks and conclusions; defines all terms, tries to create own definitions, is critical towards the existing definitions, develops and extends them.
LO2	Knows Polish and international determinants for the functioning of intellectual property.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know and does not describe (LO2).	Knows partly LO2 often makes mistakes.	Knows determinants of intellectual property law, mostly does not make mistakes; his knowledge is hardly systematic; knows the problems well, his knowledge is well structured.	Knows the problems well, fluently specifies determinants of the functioning of intellectual property systems. Knows the problems very well, makes own remarks and has knowledge beyond the scope lectured.
LO3	knows, understands and properly interprets the content of copyright law.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know the content of copyright law.	Knows partly the content of copyright law and cannot interpret it.	Knows partly the content of copyright law and can interpret it to some extent; Knows well the content of copyright law and can interpret it well.	Knows very well the content of copyright law and can interpret it very well. Can compare various interpretations. Knows excellently the content of copyright law and can interpret it. Draws his own conclusions and presents interesting examples not included in lectures.
LO4	knows, understands and properly interprets the content of industrial property law.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know the	Knows partly the content of	Knows partly the content of industrial property law and can	Knows very well the content of industrial property law and can interpret it

	content of industrial property law.	industrial property law and cannot interpret it.	interpret it to some extent. Knows well the content of industrial property law and can interpret it well.	very well. Can compare various interpretations. Knows excellently the content of industrial property law and can interpret it. Draws his own conclusions and presents interesting examples not included in lectures.
LO5	Knows and understands the functioning of intellectual property law on the Internet.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know nor describe intellectual property law.	Knows partly the content of intellectual property law and often makes mistakes.	Knows legal determinants of intellectual property on the Internet, does not make mistakes in most cases his knowledge is poorly structured and incomplete; knows the problems well; his knowledge is well structured.	Knows the problems well, fluently specifies determinants of the functioning of intellectual property systems on the Internet. Knows the problems very well, makes own remarks and has knowledge beyond the scope lectured.

Syllabus

SEMESTER 8	INTELLECTUAL PROPERTY PROTECTION	LECTURES	12 HOURS

1. Copyrighted item.
2. Subjects of copyright.
3. Content of copyright.
4. Copyright term.
5. Transfer of author's economic rights.
6. Property rights protection.
7. Non-property rights protection.
8. Special status of audio visual works.
9. Computer programs as copyrighted items.
10. Neighbouring rights.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures	12	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	2	
Total workload	**16**	**1**
Workload related to direct teaching activities:	14	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
not applicable.

V. Recommended reading
1. Selected terms – The Copyright and Related Rights Regulations 2003 (Legislation.gov.uk)

VI. Extra reading

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

10.	Course unit:	N2022/11/GS/10/IT1

INFORMATION TECHNOLOGY – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1			15			1
2	15	1			15			1

I. Course unit aims
In this course unit students will extend their knowledge and skills of using methods and tools of information technologies in various fields of human activities, in maritime economy in particular.

II. Preliminary requirements
The scope of a secondary school.

III/1. Learning outcomes and syllabus
The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 1		Field-specific
LO1	Has basic knowledge of information technologies.	K_W06
LO2	Is aware of the development of information technologies and their impact on people and economy.	K_W35
LO3	Has basic theoretical knowledge of computers, computer networks and software.	K_W06; K_W23

Assessment methods and criteria				
LO1	Has basic knowledge of information technologies.			
Assessment methods	Written or oral assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not have basic knowledge of information theory, cannot answer correctly, even when prompted by an examiner.	Has basic knowledge of information theory, information acquisition and processing.	Has broad knowledge of information theory, information acquisition and processing.	Has broad knowledge of information theory, information acquisition and processing; understands principles governing the flow of information.
Criterion 2	Does not have basic knowledge allowing to describe examples of IT applications in the world around us.	Has basic knowledge of IT applications, can indicate simple examples of IT use.	Is familiar with aspects of IT use, is able to show examples in the surrounding world.	Can indicate independently examples of IT use in various fields of human activity.
LO2	Is aware of the development of information technologies and their impact on people and economy.			
Assessment methods	Written or oral assessment			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not have basic knowledge of information theory, cannot answer questions correctly, even prompted by the examiner.	Has basic knowledge of information theory, information acquisition and processing.	Has broad knowledge of information theory, information acquisition and processing.	Has broad knowledge of information theory, information acquisition and processing; understands principles governing the flow of information.
Criterion 2	Does not have basic knowledge allowing to describe examples of IT applications in the world around us.	Has basic knowledge of IT applications, can indicate simple examples of IT use.	Is familiar with aspects of IT use, is able to show examples in the surrounding world.	Can indicate independently examples of IT use in various fields of human activity.
LO3	Has basic theoretical knowledge of computers, computer networks and software			
Assessment methods	Written or oral assessment			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not have basic knowledge of	Has basic knowledge of the construction and	Has broad knowledge of the architecture,	Has broad knowledge of the architecture,

	computers, cannot correctly name basic components of a computer, even with teacher's assistance.	principle of operation of PC computers.	construction and principles of operation of computers in general, including PCs.	construction and principles of operation of computers in general, can indicate dis/advantages of various solutions.
Criterion 2	Does not have basic knowledge of computer networks, cannot identify correctly basic topologies or names of network equipment.	Has basic knowledge of computer networks, can name identify basic topologies, and knows general principles of operation.	Has broad knowledge of computer networks, their topologies, and principles of operation.	Has broad knowledge of computer networks, their topologies, principles of operation, and protocols, can indicate dis/advantages of various solutions.
Criterion 3	Does not have basic knowledge of types of software and computer systems, cannot name basic concepts related to computer software.	Has basic knowledge of types of software and computer systems.	Has broad knowledge of types of software and computer systems.	Has broad knowledge of types of software and computer systems, understands the need for creating various types of software.

Syllabus

SEMESTER 1	INFORMATION TECHNOLOGY	LECTURES	15 HOURS

1. Sources of information – quantity of information, coding, compression, decompression, archiving of information.
2. Means and standards of communicating information. Formats of data.
3. Standards of data transmission. Solutions used in data transmission. Methods of sound transmission. Methods of image transmission.
4. The subject and methods of information technology. Basic concepts.
5. Information society: knowledge society, digital world, digitized documents, systems of document circulation.
6. Hardware. Classification of hardware. Representation of data in computer systems. Hardware classification.
7. Hardware items.
8. Computer networks. The Internet. Network services.
9. System software.
10. User software. Programming – phases of programming.
11. Programming and its phases.
12. IT systems. Structure of IT system creation process.
13. IT applications in the maritime economy.
14. Selected legal issues: copyright, data security.
15. Development trends in information technology.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	15	
Total workload	**31**	**1**
Workload related to direct teaching activities:	16	1
Workload related to practice-oriented activities:		

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

10.	Course unit:							N2022/12/GS/10/IT2
INFORMATION TECHNOLOGY – module 2								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1			15			1
2	15	1			15			1

III/2. Learning outcomes and syllabus

Learning outcomes – semester 2		Field-specific
LO1	Has basic theoretical knowledge of programming.	K_W06
LO2	Has basic knowledge of solutions used and development trends in IT and their impact on people and economy.	K_W06; K_W35

Assessment methods and criteria				
LO1	Has basic theoretical knowledge of programming.			
Assessment methods	Written or oral assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not have basic knowledge of programming, cannot name basic operations performed when a program is being written (even prompted by the examiner).	Has basic knowledge of solutions used in programming, can describe basic operations performed when a program is being written.	Has basic knowledge on program creation, structures and solutions used in programming.	Has basic knowledge on program creation, structures and solutions used in programming, can analyse an algorithm to create relevant program.
Criterion 2	Does not have basic knowledge of the principles of programming using Visual Basic for Application; cannot name basic structures and operations used during writing a program, (even prompted by the examiner).	Has basic knowledge of the principles of programming using Visual Basic for Application; can name basic structures and operations used during writing a program.	Has basic knowledge of creating programs, structures and solutions used in programming in the language Visual Basic for Application.	Has basic knowledge of creating programs, structures and solutions used in programming in the language Visual Basic for Application; can analyse an algorithm to create relevant program.
LO2	Has basic knowledge of solutions used and development trends in IT and their impact on people and economy.			
Assessment methods	Written or oral assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not have basic knowledge of methods used in IT, cannot answer questions correctly (even prompted by the examiner).	Has basic knowledge of methods used in IT; understands the concept of artificial intelligence.	Has basic knowledge of methods used in IT; can state basic methods of artificial intelligence.	Has knowledge of methods used in IT, including methods of artificial intelligence.
Criterion 2	Does not have basic knowledge of IT development trends.	Can state basic IT development trends in information technology.	Has basic knowledge of individual IT development trends.	Has basic knowledge of the most important IT development trends.
Criterion 3	Does not have basic knowledge needed to give examples if IT use in the surrounding world.	Has basic knowledge of IT applications, can give simple examples.	Is well familiar with various aspects of IT applications, easily indicates examples in the surrounding world.	Can give examples of IT applications in various areas of human activities.

Syllabus

SEMESTER 2	INFORMATION TECHNOLOGY	LECTURES	15 HOURS

1. Algorithms. Design and analysis of algorithms. Block diagram.

2. Program structure (VBA, Delphi, C, Java, VB), edition, compilation, activating a program. Program debugging. Input/ output instructions. Types of data, structures of data, variables, assignment statements. Arithmetic and logical terms.
3. Conditional and selection instructions, iterative instructions, index variables.
4. Procedures and functions. Functions and recurrent algorithms. Files. Operations on files.
5. Elementary examples of algorithms.
6. Selected legal issues.
7. Data security.
8. Applications of information technology in the maritime economy.
9. Selected problems of artificial intelligence.
10. Development trends in information technology.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	15	
Total workload	**31**	**1**
Workload related to direct teaching activities:	16	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The student is awarded an assigned amount of credits for course unit pass in a semester

IV. Practical training
not applicable

V. Recommended reading
1. Brookshear G.J., *Computer Science: An Overview*, Addison-Wesley, 2012.
2. Aho A., Hopcroft J.E., Ullman J., *The Design and Analysis of Computer Algorithms*, Addison-Wesley, 1974.
3. Sommerville I., *Software Engeneering*, Addison-Wesley, 2010.
4. Tanenbaum A.S., Wetherall D.J., *Computer Networks*, Prentice Hall, 2010.
5. White R., Downs T., *How Computers Work*, Que Publishing 2007.

VI. Extra reading
1. Gleick J., *The Information: A History, a Theory, a Flood*, Pantheon Books, New York 2011.
2. Harel D. *Algorithmics: The Spirit of Computing*. Addison-Wesley, 2004.
3. Dunsmore B, Skandier T., *Telecommunications Technologies Reference*, Cisco Press, 2002.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

BASIC SCIENCE SUBJECTS

11.	Course unit:	N2022/11/BS/11/M1

MATHEMATICS – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1	2		15	30		7
2	15	1	2		15	30		7
3	15	1	2		15	30		7

I. Course unit aims

Students will get familiar with various mathematical methods used in navigation, acquire skills of handling these methods, and have better understanding of fundamental and professional subjects.

II. Preliminary requirements

The fundamental scope of mathematics taught at a secondary school.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 1		Field-specific
LO1	Uses the tools of single-variable and multi-variable differential calculus.	K_W01
LO2	Knows integration rules, can use them; can use a definite integral in geometry.	K_W01

Assessment methods and criteria				
LO1	Uses the tools of single-variable and multi-variable differential calculus.			
Assessment methods	Written exam, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Calculation of limits of sequences of numbers and functions	Cannot calculate any sequence or function limit.	Can calculate limits of a sequence whose terms are polynomial quotients, calculates limits of elementary functions at a point and ±∞, determines asymptotes of rational functions.	Like for grade 3, additionally**:** calculates rather simple limits of sequences and functions at a point, at ±∞, leading to indeterminate forms (expressions) ∞/∞, ∞–∞, examines the continuity of functions described by one equation, determines asymptotes of irrational functions, uses squeeze/ sandwich rule for sequences. Like for 3.5 grade, additionally: Calculates limits of sequences and functions of different (various) level of difficulty, uses the theorem on three sequences for calculating sequence limits, examines the continuity of spline functions.	Like for grade 4, additionally: on the basis of definition, proves that a given number is a limit of a sequence/function; Like for grade 4, additionally: uses specialist math language while describing solutions to problems, makes use of sequences of numbers and their limits, functions and their limits.
Criterion 2 Calculation of function derivatives.	Cannot determine function derivatives.	Determines derivatives and differentials of elementary functions, sum/difference of functions, product of a constant and a function, product of two elementary functions, quotient of two elementary functions.	Like for grade 3, additionally: determines derivatives and differentials of composite functions composed of two functions, gives geometric interpretation of a function derivative, uses a function differential in approximate calculations, from the definition determines the derivative of a rational function. Like for 3.5 grade, additionally: Determines derivatives and differentials of multiple composite functions, examines the	Like for grade 4, additionally: investigates differentiability of functions of various difficulty, uses the theorem on inverse function derivative. Like for grade 4.5, additionally: uses specialist maths language while describing solutions to problems and makes use of the function derivative.

			differentiability of simple functions, from the definition determines the derivatives of trigonometric/logarithmic/irrational function.	
Criterion 3 Application of function derivatives.	Cannot use function derivatives.	Examines the monotonicity of elementary functions, determines extremes of these functions, examines convexity and concavity of elementary functions, determines their points of inflexion, uses the de l'Hospital rule for calculating the limits of elementary functions quotient.	Like for grade 3, additionally: Examines the monotonicity of functions consisting of two elementary functions, determines extremes of these functions, examines convexity and concavity of these functions, determines their points of inflexion, uses the de l'Hospital rule for calculating the limits of such functions quotient/product/difference. Like for 3.5 grade, additionally: determines asymptotes of various functions. Examines the monotonicity, convexity and concavity of various functions, determines their extremes, points of inflexion, uses the de l'Hospital rule for calculating the limits of various functions; writes Taylor and Maclaurin formula for a polynomial of a rational/exponential/trigonometric function.	Like for grade 4, additionally: makes analyses of various functions. Like for grade 4.5, additionally: Uses specialist language of mathematics to describe problem solutions, problems leading to the examination of monotonicity, convexity and concavity of functions, determination of their extremes and points of inflexion.
Criterion 4 Determination of partial derivatives of a function.	Cannot determine partial derivatives of a function.	Determines partial derivatives of first and second order of simple two variable functions.	Like for grade 3, additionally: determines partial derivatives of first, second and third order of simple three variable functions. Like for grade 3.5, additionally: Determines exact differentials of two variable functions.	Like for grade 4, additionally: determines exact differentials of three variable functions. Like for grade 4.5, additionally: Determines directional derivatives of two variable functions.
Criterion 5 Use of partial derivatives of a function.	Cannot use partial derivatives of a function.	Determines extremes of simple two variable functions.	Like for grade 3, additionally: Calculates an approximate value of an expression. Like for 3.5 grade, additionally: Determines the least/greatest value of a simple two-variable function in a closed and a limited area.	Like for grade 4, additionally: Determines extremes of various two-variable functions. Like for 4.5, additionally: Uses specialist language of mathematics to describe problem solutions, problems using partial derivatives of two-variable functions.
LO2	Knows integration rules, can use them; can use a definite integral in geometry.			
Assessment methods	Written exam, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Calculation of integrals.	Cannot calculate an integral from a polynomial.	Calculates integrals from a polynomial.	Uses integration by substitution or/and by parts in indicated integrals.	Can select independently a method of integration and use it.
Criterion 2 Determination of geometric quantities.	Cannot draw a region connected with a given problem, or cannot	Draws a region within Cartesian coordinate system for calculation, and determines the region area.	Determines a selected geometrical quantity in Cartesian coordinates. Determines a selected geometrical quantity in a parametric description.	Determines a selected geometrical quantity in polar coordinates. Determines geometrical quantities in any coordinates.

	determine the area of that region.			
Criterion 3 Calculations of multiple and curvilinear integrals.	Cannot calculate any integrals.	Can calculate one indicated type of integrals.	Can calculate two/three indicated types of integrals.	Can independently distinguish types of integrals and calculate (most of) them.

Syllabus

SEMESTER 1	MATHEMATICS	LECTURES	15 HOURS

1. Differential calculus of single real variable function: supplementary knowledge of cyclometric functions, limits of sequences and functions, function derivative and differential, derivatives and differentials of higher orders, theorems on mean value, Taylor formula, monotonicity, extremes, convexity and concavity**,** points of inflexion, asymptotes, deL'Hospital rules, investigation of a behaviour of a function.
2. Integral calculus of single real variable function: indefinite integral, fundamental integration methods and theorems, integration of rational, irrational and trigonometric functions, definite integral (Riemann's definition), fundamental theorems and properties of definite integral, Newton-Leibnitz theorem, improper integrals, use of definite integral in geometry.
3. Differential and integral calculus of multi-variable function: definition of two-variable function, boundary and continuity of two-variable function, partial derivatives, derivatives of the composite function, exact differential, partial derivatives and exact differentials of higher orders, Taylor formula, multi-variable function extremes, definition and properties of double integral and triple integral, reduction of multiple integrals to iterated integrals, curvilinear directed and undirected integrals, Green's theorem.

SEMESTER 1	MATHEMATICS	CLASSES	30 HOURS

The Classes cover topics and problems lectured.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	15	15
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	60	60
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	30	30
Total workload	**150**	**7**
Workload related to direct teaching activities:	60	2.5
Workload related to practice-oriented activities:	120	4.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

11.	Course unit:	N2022/12/BS/11/M2

MATHEMATICS – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1	2		15	30		7
2	15	1	2		15	30		7
3	15	1	2		15	30		7

III/2. Learning outcomes and syllabus

Learning outcomes – semester 2		Field-specific
LO1	Has basic knowledge of linear algebra.	K_U01
LO2	Has basic knowledge of analytical geometry.	K_U01
LO3	Has basic knowledge of the series theory and series applications.	K_W01

Assessment methods and criteria				
LO1	Has basic knowledge of linear algebra.			
Assessment methods	Various types of tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Performing operations in a set of matrices.	Cannot perform any operations in a set of matrices.	Adds, subtracts matrices, multiplies a matrix by a scalar, determines a transposed matrix, multiplies square matrices, calculates a determinant of matrix of first/second/third order using the rule of Sarrus.	Like for grade 3, additionally: determines a product of matrices, not only square ones, finds an inverse matrix, calculates a determinant of a square matrix of n order from the definition (Laplace's development). Like for grade 3.5, additionally: performs sequences of operations on matrices, solves matrix equations, calculates a calculates the rank of matrix using the concept of minor.	Like for grade 4, plus: calculates the determinant of matrix of n order using theorems and determinant properties, calculates the rank of matrix obtaining a reduced form of the matrix. Like for grade 4.5, uses specialist language of mathematics to describe problem solutions.
Criterion 2 Solving systems of linear equations.	Cannot solve systems of linear equations.	Uses the matrix method and Cramer's method to solve a system of linear equations with three unknowns and three equations.	Like for grade 3, additionally: Uses the matrix method and Cramer's method to solve a system of linear equations with n unknowns and n equations. Like for grade 3.5, additionally: Based on the Kronecker-Capelli theorem, finds the number of solutions of a linear equations system.	Like for grade 4, plus: gives solutions of a system of linear equations with n unknowns and m equations. Like for grade 4.5 plus: Uses specialist language of mathematics to describe problem solutions, problems leading to systems of linear equations.
Criterion 3 Performing operations in a set of complex numbers.	Cannot perform any operation in a set of complex numbers.	Gives a Cartesian/trigonometric form of a complex number and its geometric interpretation, gives a relevant complex conjugate, adds, subtracts, multiplies and divides complex numbers in the Cartesian form, multiplies and divides complex numbers in the trigonometric form, uses de Moivre's formula to write n-th power of a complex number, uses a formula for k-th root of a complex number.	Like for grade 3, additionally: gives an exponential form of complex number, determines n-th power of complex number and leaves the result (if possible) in Cartesian form, determines roots of complex number based on the definition and theorem and leaves the result (if possible) in Cartesian form. Like for grade 3.5, additionally: Solves simple equations in a set of complex numbers.	Like for grade 4, additionally: interprets geometrically given sets of complex numbers. Like for grade 4.5, additionally: uses specialist language of mathematics to describe solutions of problems involving complex numbers.
LO2	Has basic knowledge of analytical geometry.			

Assessment methods	Various types of tests during the semester			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Performing operations on vectors in space R^3.	Cannot perform any operations on vectors.	Determines vector coordinates, calculates vector length, adds and subtracts vectors, multiplies a vector by a scalar, performs scalar and vector multiplication of vectors, calculates a mixed product of vectors.	Like for grade 3, additionally: determines an angle measure between vectors, verifies the condition of perpendicularity, parallelism an coplanarity of vectors. Like for grade 3.5, additionally: calculates the area of a parallelogram built on two vectors, calculates the area of a triangle with given vertices based on the vector product, calculates the volume of a parallelepiped built on three vectors, calculates the volume of a tetrahedron built on three vectors.	Like for grade 4, additionally: solves various problems using vectors, knows the concept of linear in/dependence of vectors. Like for grade 4.5, additionally: uses specialist language of mathematics to describe solutions of problems using vector calculus.
Criterion 2 Writes the equation of a plane.	Cannot write the equation of a plane.	Writes the equation of a plane, having a point belonging to the plane and a normal vector of the plane, calculates the distance of the point to the plane, can determine normal vector coordinates based on the determined vector coordinates, can give the plane equation, finds a point of plane intersection.	Like for grade 3, additionally: finds equation of a plane, given two vectors parallel to the plane but not to each other, can write the equation of a plane, given three points belonging to the plane, examines if two given planes are parallel, perpendicular, determines the angle between them, calculates the distance between the planes. Like for grade 3.5, additionally: Finds the equation of a plane going through a given point and parallel to another plane; finds the equation of a plane going through a given point and perpendicular to given two non-parallel planes, gives the segment equation of a plane, finds the equation of a plane parallel to a given plane lying at a given distance to that plane.	Like for grade 4, additionally: finds equations of planes – bisectors of angles between given planes, finds the equation of a plane going through a given axis of the coordinate system, forming a given angle with a given plane, finds o point of symmetry of a point relative to a given plane. Like for grade 4.5, additionally: Uses specialist language of mathematics to describe problem solutions.
Criterion 3 Writes the line equation in a R^3 space.	Cannot write a line equation.	Writes a parametric and canonic equation of a line, having a given point belonging to the line and vector parallel to this line, can give a parametric and canonic equation of that line while having two points belonging to the looked for line.	Like for grade 3, additionally: finds a line equation having a given point belonging to that line and an equation of a line parallel or perpendicular to the looked for line, finds the angle between the given lines in a parametric or canonic form, finds a mutual position of pairs of lines given in the parametric or canonic form, finds a distance of a point from a line given in parametric or canonic form, finds the distance between parallel lines given in parametric or canonic form. Like for grade 3.5, additionally: Presents a line given in an edge/parametric form, find the angle between lines given in the edge form, finds mutual position of pairs of lines given in the edge form, finds the distance of a point to a line given in edge	Like for grade 4, additionally: finds equations of bisectors of angles between straight lines given by various equations, finds the equation of a line running across a given point and intersecting two straight lines, finds a point symmetrical to a given point relative to a given line. Like for grade 4.5, additionally: Uses specialist language of mathematics to describe problem solutions.

			form, finds the distance between parallel lines given in the edge form, finds distance between skew lines.	
Criterion 4 Solution of a problem related to a point and a plane.	cannot solve a problem related to a point and a plane.	Finds a point of intersection between a line in a parametric form and a plane.	Like for grade 3, additionally: calculates the angle formed by a line in a parametric or canonic form and a plane, finds an equation of the plane going through lines given in parametric or canonic form. Like for grade 3.5, additionally: Calculates the angle formed by a line in an edge form and a plane, finds an equation of the plane going through two lines given in edge form, finds the equation of a plane going through a point and a line perpendicular to a line given in the edge form.	Like for grade 4, additionally: finds a projection of a straight line on a plane, finds the projection of a point on a plane, finds a projection of a point on a straight line. Like for grade 4.5, additionally: Uses specialist language of mathematics to describe problem solutions.
LO3	Has basic knowledge of the series theory and series applications.			
Assessment methods	Various types of tests during the semester			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Testing of the convergence of series	Cannot test the convergence of	Checks the necessary condition of the convergence of a series, finds sums of selected series, examined the convergence of simple series of numbers with non-negative terms by d'Alembert criterion, Cauchy's criterion and the integral criterion.	Like for grade 3, additionally: tests the convergence of series of numbers with non-negative terms, of medium difficulty, by the d'Alembert/Cauchy's/integral criterion leading to direct integration by substitution/parts. Like for grade 3.5, additionally: Tests the convergence of series of numbers with non-negative terms, of varying difficulty, by the d'Alembert/Cauchy's/integral criterion leading to direct integration by substitution/parts, Tests the convergence of series with any terms by the Leibnitz criterion, determines the radius and interval of convergence of selected power series.	Like for grade 4, additionally: tests the convergence of not complicated series of numbers with non-negative terms, by the comparative criterion. Like for grade 4.5, additionally: Tests the uniform convergence of selected series of functions.
Criterion 2 Expansion of functions into Taylor series	Cannot expand functions into Taylor series.	Expands rational functions into Taylor/MacLaurin series.	Like for grade 3, additionally: expands into Taylor and Maclaurin series selected irrational, trigonometric, exponential, logarithmic functions, calculates approximate values of irrational numbers, using the expansions. Like for grade 3.5, additionally: Expands cyclometric functions into Taylor and MacLaurin series.	Like for grade 4, additionally: calculates approximate values of definite integrals using expansions to power series and relevant theorems relating to integration and differentiation of series of functions. Like for grade 4.5, additionally: Uses specialist language of mathematics to describe solutions of problems involving power series.

Syllabus

SEMESTER 2	MATHEMATICS	LECTURES	15 HOURS

1. Matrices and determinants: definition and types of matrix, operation on matrices, definition and properties of determinants, rank of a matrix, inverse matrix.
2. Systems of linear equations, Cramer's formulas, matrix method, Kronecker – Capelli theorem.
3. Set of complex numbers, definition of complex number, Cartesian and trigonometric form of complex number, de Moivre formula, operations on complex numbers.
4. Analytical geometry in R3 space: vector calculus, plane and line equations, surfaces of second order.
5. Series of numbers and functions: definition of a series of numbers, criteria of convergence of series with non-negative terms, alternating series, conditionally and absolutely convergent series of numbers, functional sequences and series, convergence and uniform convergence of a series and functional series, power series, Taylor series.

SEMESTER 2	MATHEMATICS	CLASSES	30 HOURS

The Classes cover topics and problems lectured.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	15	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	60	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	30	
Total workload	**150**	**7**
Workload related to direct teaching activities:	60	2.5
Workload related to practice-oriented activities:	120	4.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

11.	Course unit:							N2022/23/BS/11/M3
MATHEMATICS – module 3								
Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1	2		15	30		7
2	15	1	2		15	30		7
3	15	1	2		15	30		7

III/3. Learning outcomes and syllabus

Learning outcomes – semester 3		Field-specific
LO1	Distinguishes basic types of differential equations and can solve them.	K_W01
LO2	Knows basic concepts of the probability calculus and can use them in analysing random variables.	K_U11
LO3	Determines confidence intervals for various parameters, and formulates and verifies statistical hypotheses.	K_U11

Assessment methods and criteria				
LO1	Distinguishes basic types of differential equations and can solve them.			
Assessment methods	Written exam, various types of tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Solving differential equations with separable variables	Cannot separate variables.	Can separate variables.	Can separate variables and calculate integral for one variable. Can separate variables and calculate integrals for both variables.	Solves equations and leaves the result in an implicit format. Solves equations and leaves the result in an explicit format.
Criterion 2 Solving uniform differential equations.	Cannot transform an equation to a uniform form or cannot use a substitution.	Can transform an equation to a uniform form and can use a substitution.	Can transform an equation to a uniform form and can use a substitution, calculate an integral for one variable. Can transform an equation to a uniform form, use a substitution and calculate integrals for both variables.	Solves equations and leaves the result in an implicit format. Solves equations and leaves the result in an explicit format.
Criterion 3 Solving various type equations	Cannot solve any of the indicated equation.	Can solve one indicated type of equation.	Can solve two indicated types of equation. Can solve three indicated types of equation.	Can distinguish types of equation and solve them, leave the results in an implicit format. Can distinguish types of equation and solve them, leave the results in an explicit format.
LO2	Knows basic concepts of the probability calculus and can use them in analysing random variables.			
Assessment methods	Written exam, various types of tests during the semester			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Determination of event probability.	Cannot list all elementary events.	Lists all elementary events.	Like for grade 3, additionally: determines elementary events favouring one event. Like for grade 3.5, additionally: determines elementary events favouring all events.	Like for grade 4, additionally: determines a sum and product of events. Like for grade 4.5, additionally: determines a difference of events.
Criterion 2 Determination of event probability.	Cannot determine a probability by any method.	Can determine a probability by calculating the elements in a space of	Like for grade 3, additionally: uses a formula for the number of	Like for grade 4, additionally: uses

		outcomes or using an event tree, calculates probabilities in the Bernoulli scheme.	combinations, permutations and variations. Like for grade 3.5, additionally: uses conditional probability.	properties of probability. Like for grade 4.5 additionally: uses geometric probability.
Criterion 3 Language of mathematics.	Actions are performed chaotically, not in the right order; no cause-and-effect series is observed in a problem being solved (by a student).	A minimum description of actions performed; if no action is described, at least actions performed are in the right order, making up a logical whole.	The language of mathematics with reservations, part/most of actions performed are explained.	The language of mathematics correct, most of/all the actions explained.
Criterion 4 Determination of parameters of random discrete variables.	Cannot determine any parameter, based on a probability distribution.	Determines, on the basis of probability distribution, one parameter.	Determines, on the basis of probability distribution, two parameters; determines, on the basis of probability distribution, all parameters.	Determines a distribution of probability of a random variable and its parameters. Like for grade 4.5, additionally: can determine a distribution of a random variable on the basis of parameters.
Criterion 5 Determination of parameters of random continuous variables.	Cannot determine any parameter on the basis of the probability density function.	Determines a parameter on the basis of the probability density function.	Determines two parameters on the basis of the probability density function; determines all parameters on the basis of the probability density function.	Determines a distribution function. Like for grade 4.5, additionally: determines conditions, for which a given function is a density function.
Criterion 6 Identification of characteristic distributions of random variables.	Cannot calculate a probability for any indicated distribution.	Calculates probabilities for an indicated distribution.	Calculates probabilities for two indicated distributions; Calculates probabilities for three indicated distributions.	Calculates probabilities for four indicated distributions. Like for grade 4.5, additionally: from the text of a problem identifies a given distribution and applies relevant formulas.
LO3	Determines confidence intervals for various parameters, and formulates and verifies statistical hypotheses.			
Assessment methods	Written exam, various types of tests during the semester			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Determination of confidence intervals	Cannot determine parameters from a sample, necessary to determine a preset confidence interval.	Determine parameters from a sample, necessary to determine a preset confidence interval.	Determines all components of an indicated confidence interval; determines an indicated confidence interval.	Determines an appropriate confidence interval, chooses the right method and assesses the results.
Criterion 2 Verification of statistical hypotheses.	Cannot determine test statistic on the basis of an indicated sample.	Determines test statistic on the basis of an indicated sample.	Determines test statistic and critical value, verifies a hypothesis.	Formulates a hypothesis and verifies it, interprets the results.
Criterion 3 Language of mathematics.	Actions are performed chaotically, not in the right order; no cause-and-effect series is observed in a problem being solved (by a student).	A minimum description of actions performed; if no action is described, at least actions performed are in the right order, making up a logical whole.	The language of mathematics with reservations; explains part/most of actions performed.	The language of mathematics correct, explains most of/all the actions.

Syllabus

SEMESTER 3	MATHEMATICS	LECTURES	15 HOURS

1. Ordinary differential equations: selected types of first order equations (e.g., equations with distributed variables, simultaneous equations, linear equations), selected types of second order differential equations: particular cases, linear differential equations of second order with constant coefficients.
2. Probability calculus: elementary events, random events, definition of probability, properties of probability, conditional probability, independence of random events, Bernoulli scheme, total probability, Bayes formula, random variables, probability distributions of random variables, parameters of random variables, 2D discrete and continuous random variables, covariance, correlation coefficients, correlated random variables, independence of random variables.
3. Fundamentals of mathematical statistics: basic terms and theorems, some probability distributions occurring in mathematical statistics, estimators, confidence intervals, statistical hypotheses and their verification, statistical tests.

SEMESTER 3	MATHEMATICS	CLASSES	30 HOURS

The Classes cover topics and problems lectured.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	15	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	60	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	30	
Total workload	**150**	**7**
Workload related to direct teaching activities:	60	2.5
Workload related to practice-oriented activities:	120	4.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

VI. Practical training
not applicable

V. Recommended reading
1. Montgomery D.C., Runger G.C., *Applied Statistics and Probability for Engineers*, John Wiley and Sons Inc., New York 1994.
2. Mustoe L.R., Barry M.D.J., *Mathematics for engineering and science*, John Wiley and Sons Inc., Chichester 1998.
3. Reid D.M., Flangen G.T.H., *Pracical mathematics for marine engineers*, James Munro b.r., Glasgow 1995.
4. Traczyk T., *Universal algebra and applications*, PWN, Warszawa 1982.
5. Trench W.L., *Introduction to Real Analysis*, Trinity University Digital Commons & Trinity, http://digitalcommons.trinity.edu/cgi/viewcontent.cgi?article=1006&context=mono

VI. Extra reading
1. Ciesielski Z., *Probability theory*, PWN, Warszawa 1979.
2. Rossberg H.L., Jesiak B., Siegel G., *Analytic methods of probability theory*, Akademie Verlag, Berlin 1985.
3. Wakulicz A., *Computational mathematics*, PWN, Warszawa 1984.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

12.	Course unit:	N2022/11/BS/12/PH1

PHYSICS – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2			30			3
2	15		2	1		30	15	5

I. Course unit aims

This course unit is to teach students fundamentals of physics as a science of properties of the surrounding world and phenomena occurring in it, on this basis finding correlations between causes and effects of processes taking place in the material world.

II. Preliminary requirements

The scope of physics included in the syllabus of secondary schools.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 1		Field-specific
LO1	Can define basic terms and physical quantities in the scope covered by the curriculum content specific for the field of study. Understands and can indicate their applications in the environment. Is able to determine relations with other physical quantities using the known mathematical apparatus.	K_W02; K_U11
LO2	Can define and explain fundamental physical laws in the scope covered by the programme contents proper for the field of study. Understands the limitations and scope of applicability of these laws in the surrounding world. Can explain the purpose and significance of simplified models in the description of physical phenomena.	K_W02; K_U11
LO3	Has skills for self-instruction and effective use of information resources, including international sources of information on physical laws and phenomena taking place in the surrounding world. Understands that the need for lifelong learning during professional career due to the pace of changes in standards and technologies used requires the knowledge of fundamental laws of physics.	K_U01; K_U05; K_K01

Assessment methods and criteria				
LO1	Can define basic terms and physical quantities in the scope covered by the curriculum content specific for the field of study. Understands and can indicate their applications in the environment. Is able to determine relations with other physical quantities using the known mathematical apparatus.			
Assessment methods	Written exam, spoken exam, home assignments, Assessment of classes, lab classes/simulators, report, project, presentation, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding	Does not know or understand basic laws of physics; does not know basic units.	Knows basic laws of physics and units; has some problems in understanding or proper interpretation.	Well understands problems; knows how to use mathematical tools.	Has extensive systematic knowledge; can use recommended reading.
LO2	Can define and explain fundamental physical laws in the scope covered by the programme contents proper for the field of study. Understands the limitations and scope of applicability of these laws in the surrounding world. Can explain the purpose and significance of simplified models in the description of physical phenomena.			
Assessment methods	Written exam, spoken exam, home assignments, Assessment of classes, lab classes/simulators, report, project, presentation, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding;	Does not know basic laws or equations describing physical phenomena.	Knows the basic physical laws and can transform equations describing them.	Can analyse a problem by selecting appropriate equations, transform them and perform operations on units.	Able to find alternatives indicate advantages and disadvantages of different methods.

LO3	Has skills for self-instruction and effective use of information resources, including international sources of information on physical laws and phenomena taking place in the surrounding world. Understands that the need for lifelong learning during professional career due to the pace of changes in standards and technologies used requires the knowledge of fundamental laws of physics.			
Assessment methods	Written exam, spoken exam, home assignments, Assessment of classes, lab classes/simulators, report, project, presentation, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Efficient participation in classes/lectures, skill of self-instruction and awareness of the need of continuous updating and deepening of knowledge	Does not demonstrate appropriate activity in class, the ability to independently assimilate and deepen knowledge.	Demonstrates activity necessary for effective learning.	Demonstrates engagement in learning; identifies and solves a problem with slight assistance from the teacher.	Works independently and shows willingness to deepen his/her knowledge. Develops and extends competences and critical thinking towards the problems posed.
Criterion 2 Ability to utilize source information	Cannot find basic information referring to issues under consideration.	To some extent uses international publications and the Internet.	Uses international publications and other information resources, also electronic means of data conveyance.	Uses freely international publications and other information resources.

Syllabus

SEMESTER 1	PHYSICS	LECTURES	30 HOURS

MECHANICS

1. Physical quantities: scalars and vectors. Fundamentals of vector calculus, operations on vectors.
2. Kinematics and dynamics of a material point.
3. Newton's principles of dynamics. Newton's universal low of gravitation. Fundamental forces in mechanics.
4. Energy conservation. Elastic and inelastic collisions of bodies.
5. Kinematics and dynamics of rigid bodies in progressive and rotational motion.
6. Kepler's laws.

FLUID MECHANICS

7. Fluids, density and pressure. Pressure measurement, units. Static properties of fluids.
8. Hydrostatics. Pascal's law and hydraulic systems.
9. Archimedes' law and buoyancy force. Relationship between weight and volume of a body. Centre of buoyancy. Equation of gravity and buoyancy force. Conditions of equilibrium, mutual position of the centre of gravity and the centre of buoyancy.
10. Hydrodynamics. Continuity equation of a jet. Bernoulli's equation for steady flow, examples.
11. Hydrodynamic buoyancy resulting from progressive movement of a body on a water surface.
12. Perfect liquid, real liquid. Viscosity and turbulence.

THERMODYNAMICS

13. Basic concepts and principles of thermodynamics.

VIBRATIONS AND WAVES WITH ELEMENTS OF ACOUSTIC

14. Harmonic motion. Comparison of harmonic motion with uniform motion in a circle.
15. Simple and damped harmonic oscillations. Forced vibration.
16. Wave motion. Parameters describing waves. Reflection and refraction. Diffraction and interference. Standing waves and resonance.
17. Sound waves. Speed and intensity of sound. Doppler effect.

ELECTRICITY AND MAGNETISM

18. Electrostatics, electric charge, Coulomb's law, electric field, Gauss's law, electric capacitance.
19. Electric current. Ohm's law and Kirchhoff's law. Direct-current circuits.
20. Magnetic field and its sources. Electromagnetic induction. Inductance. Alternating current circuits.
21. Electromagnetic waves.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	45	

Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**85**	**3**
Workload related to direct teaching activities:	75	3
Workload related to practice-oriented activities:		

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

12.	Course unit:	N2022/12/BS/12/PH2

PHYSICS – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2			30			3
2	15		2	1		30	15	5

III/2. Learning outcomes and syllabus

Learning outcomes – semester 2		Field-specific
LO1	The student is able to use mathematical methods and apply them to solve and analyse physical problems using the knowledge provided in lectures.	K_W02; K_U11
LO2	The ability to represent graphically the dependence of physical quantities on various parameters and to interpret them.	K_W01; K_W04; K_U04
LO3	Can measure basic physical quantities and present the results of measurements graphically. Can compile a measuring system to test physical properties when solving simple technical problems. Will be able to use selected measuring and control equipment and work individually as well as in a team.	K_W01; K_W09; K_W10; K_K04; K_K05; K_U01; K_U02; K_U04

Assessment methods and criteria				
LO1	The student is able to use mathematical methods and apply them to solve and analyse physical problems using the knowledge provided in lectures.			
Assessment methods	Assessment of the ability to perform calculus exercises, tests and control works in the semester. Evaluation of independent problem solving and self-education skills.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding	Cannot use mathematical apparatus to solve simple physical problems.	The student uses the mathematical apparatus to solve simple physics problems to a basic extent.	Demonstrates a good understanding of physics and the ability to apply the mathematical apparatus appropriately.	Has considerably extended, systematised knowledge and the ability to solve and analyse simple and complex physical problems.
LO2	The ability to represent graphically the dependence of physical quantities on various parameters and to interpret them.			
Assessment methods	Passing of laboratories/classes, correctness of performing experiments, evaluation of reports and work activity during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding	Cannot describe or distinguish simple phenomena of classical physics.	Knows basic phenomena, can describe and interpret them, has problems with mathematical notation.	Knows basic phenomena, can discuss them and interpret them correctly, using mathematical apparatus.	Has detailed systematic knowledge, demonstrates the use of the recommended reading.
LO3	Can measure basic physical quantities and present the results of measurements graphically. Can compile a measuring system to test physical properties when solving simple technical problems. Will be able to use selected measuring and control equipment and work individually as well as in a team.			
Assessment methods	Passing of laboratories/classes, correctness of performing experiments, evaluation of reports and work activity during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Ability to measure basic physical quantities	Cannot carry out basic measurements using proper meters; does not know physical laws underlying the experiments.	Can make measurements of basic physical quantities with slight assistance from the teacher.	Can measure, unassisted, basic physical quantities, and set up a simple measuring circuit.	Can measure, unassisted, various physical quantities, as well as set up a measuring circuit.
Criterion 2 Knowledge of the error calculus.	Does not understand phenomena causing measuring errors; cannot determine errors using analytical methods.	Knows causes of a measuring error and simple methods of error calculus.	Additionally, indicates limitations of the methods, assumes an allowable error or approximation of calculations, illustrates it graphically.	Assesses applicability of the methods in various cases; gives examples.

Syllabus

SEMESTER 2	PHYSICS	CLASSES	30 HOURS

Solving and discussion of tasks, analysis of results from the topics covered in the auditorium, including:
1. Basics of vector calculus: addition and subtraction of vectors, multiplication of a vector by a scalar, scalar and vector product.
2. Kinematics and dynamics of a material point.
3. Newton's principles of dynamics. Law of universal gravitation.
4. Conservation of energy.
5. Elastic and inelastic collisions.
6. Static equilibrium and elasticity.
7. Statics. Coordinates of the centre of mass. Rigid body dynamics.
8. Hydrostatics and hydrodynamics.
9. Mechanical and thermodynamic properties of solids, liquids and gases.
10. Simple and damped harmonic vibration.
11. Mechanical and electromagnetic waves. Parameters describing waves.
12. Electric current. Ohm's law and Kirchhoff's law. Direct current circuits.

SEMESTER 2	PHYSICS	LAB CLASSES	15 HOURS

Introduction to lab classes, introducing students to the principles of safe measurement, preparation of reports, including processing and analysis of measurement results. Estimation of measurement uncertainty.
1. Determination of speed of sound in air by a time-of-flight method.
2. Determination of gyroscope moment of inertia.
3. Physical pendulum problems – finding moment of inertia.
4. Determination of modulus of rigidity by a torsion pendulum.
5. Estimation of coefficient of linear expansion of solids by electrical method.
6. Determination of the (EMF) electromotive force of a cell.
7. Examination of current flow laws.
8. Investigation of the temperature dependence of metal and semiconductor resistance.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	45	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	6	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	45	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**102**	**5**
Workload related to direct teaching activities:	51	2
Workload related to practice-oriented activities:	90	3

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
not applicable

V. Recommended reading
1. Urone P., Hinrichs R., Dirks K., Sharma M., *College Physics*, Rice University, Web resource OpenStax, Published 2012, Web Version updated March 03, 2022 [https://openstax.org/details/books/college-physics]

VI. Extra reading

1. Rogers Eric M., *Physics for the inquiring mind, The methods, nature and philosophy of physical science;* Princeton University Press.
2. Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

13.	Course unit:							N2022/11/BS/13/CH
CHEMISTRY								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1		1	15		15	2

I. Course unit aims

This course unit aims at teaching students basic chemical and physicochemical laws and processes. Students will gain a theoretical basis for professional course units, such as cargo handling and marine environment protection, and will acquire knowledge and skills related based on general chemistry useful in formulating and solving problems connected with the operation of marine systems and equipment.

II. Preliminary requirements

The scope of a secondary school.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 1		Field-specific
LO1	Uses the knowledge of selected problems of general in/organic chemistry, and environmental chemistry, for safe use of chemical substances and avoidance of hazards, and the protection of life, health and the environment.	K_W01; K_W03; K_W07; K_W19; K_W22; K_W25; K_W34; K_K02
LO2	Can do chemical experiments, interpret results, formulate conclusions, and draw research reports.	K_U01; K_U02; K_U06; K_U09; K_U10
LO3	Can reason by identifying cause-and-effect relations, work individually and in a team.	K_K02; K_K03; K_K05

Assessment methods and criteria				
LO1	Uses the knowledge of selected problems of general in/organic chemistry, and environmental chemistry, for safe use of chemical substances and avoidance of hazards, and the protection of life, health and the environment.			
Assessment methods	Various types of tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Use of the knowledge of chemistry in solving simple and complex problems in typical and new situations.	Cannot use the knowledge specified in the syllabus for solving simple problems.	Uses basic chemical knowledge for solving simple and typical problems.	Uses basic chemical knowledge for independent solving of typical complex problems.	Uses chemical knowledge for independent solving of problems and performing tasks in untypical situations.
LO2	Can do chemical experiments, interpret results, formulate conclusions, and draw research reports.			
Assessment methods	Report, problems to be solved individually.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Skill of doing research, analysing results and preparing reports.	Cannot use safely simple lab equipment and chemical reagents; does not demonstrate cognitive activity or willingness to work.	Assisted by an instructor, can make experiments safely, process the results and write a report on the experiments.	Unassisted, can make experiments safely, process the results and write a technical report.	Can plan and safely perform chemical experiments, formulates conclusions and is capable of generalizing and abstract thinking.
LO3	Can reason by identifying cause-and-effect relations, work individually and in a team.			
Assessment methods	Activity in class, tasks/projects to be done individually.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Competences including logical thinking, ability to work alone or in a team.	Cannot work alone, disrupts team work.	Assisted by an instructor, solves problems, is passive while working in a team.	Reasons by indicating cause-and-effect relations and using the knowledge acquired in the course of studies, is an active team member.	Reasons by indicating cause-and-effect relations, using interdisciplinary knowledge, is a team leader.

Syllabus

SEMESTER 1	CHEMISTRY	LECTURES	15 HOURS

1. Classification and characteristics, and safe procedures in handling dangerous chemical substances, warning pictograms and symbols, symbols of dangers and safe handling, characteristics cards.
2. General characteristics of selected groups of organic and inorganic compounds, systematic names, molecular/structural/graphic formulas, ionic and molecular compounds.
3. Atomic structure: elementary particles of matter, quantum numbers, electronic structure and electron shell structure of selected elements, general characteristics of elements of s, p, d, f blocks.
4. Structure of a molecule: electronegativity scale, chemical bonds, hybridization of atomic orbitals and spatial structures of selected molecules of chemical compounds, polarity of molecules.
5. Periodic system of elements used for the prediction of reactivity and properties of chemical substances: periodicity of physical properties of elements – atomic radius, ionic radius, ionization energy, trends of electro positivity, electronegativity and electron affinity, general characteristics of selected element groups versus the periodic system.
6. Real solutions and colloid systems, molar heat of solution, electrolytic solutions, dissociation of acids, bases and salts, degree of dissociation, dissociation constant, theories of acids and bases, ionic product of water, pH scale and indicators, pH buffers, solubility product, reaction of salt ions with water.
7. Classification of chemical reactions, reactions of: neutralization and hydrolysis, precipitation, oxidation and reduction; equilibrium constant, principle of mobile equilibrium (Le Chatelier-Braun's principle) and the influence of external factors on the chemical equilibrium.
8. Catalysis and catalysts: classification, activation energy, homogeneous and heterogeneous catalysis, mechanism of catalytic action, chain and photochemical reactions.
9. Concepts of electrochemistry: metal electrode potential, standard (normal) potential, electrochemical series of metals and its role in shipbuilding, electrochemical cells, electrochemical corrosion and hull protection against corrosion.

SEMESTER 1	CHEMISTRY	LABORATORY CLASS	15 HOURS

1. Occupational safety in handling chemicals. Preparation of real and colloid solutions, types of concentration, molar heat of solution, solubility product of some salts.
2. Examination of properties of selected elements, vital for maritime transport.
3. Examination of electrolytic dissociation, degree of dissociation, dissociation constant, influence of temperature and dilution, common ion effect.
4. pH tests of water solutions of acids, bases and salts and pH buffers (buffer solutions), indicators, corrosive effect of the reactions of water solutions of salts.
5. Performing neutralization reactions and preparation of neutralizing solutions for the treatment of dangerous spills.
6. Tests of chemical reactions and the influence of external factors on chemical equilibrium, principle of mobile equilibrium.
7. Performing and balancing oxidation-reduction reactions in solutions.
8. Examination of electrochemical corrosion and anti-corrosion protection used in shipbuilding, electrochemical series of metals.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**54**	**2**
Workload related to direct teaching activities:	34	1
Workload related to practice-oriented activities:	30	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
not applicable

V. Recommended reading
1. Matt Lisle and OpenStax, UT Austin – Principles of Chemistry. Online: https://legacy.cnx.org/content/col11830/1.13, Web site: [https://cnx.org/contents/nUDSK9dF@13.367:Yk4362Ux@1/UT-Austin-Principles-of-Chemistry]
2. Chemistry – Open Educational Resources (OER), [https://libguides.humboldt.edu/openedu/chem]

VI. Extra reading
Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

14.	Course unit:							N2022/11/BS/14/CS1
COMPUTER SCIENCE – module 1								
Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			2			30	2
2	15			2			30	2

I. Course unit aims

The aim of this course unit is to broaden practical skills of using computer tools, particularly software, in various fields of human activity, with the focus on professional with students future professional tasks related with the maritime economy.

II. Preliminary requirements

The scope of a secondary school.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 1		Field-specific
LO1	Can find information on the Internet, integrate and interpret it.	K_U01
LO2	Can effectively use basic application programs (process documents according to the rules of text editing, can insert basic and advanced components of a document).	K_U09
LO3	Can effectively use a spreadsheet (can make calculations using a spreadsheet and present numerical data graphically).	K_U09
LO4	Can effectively use a system for operating relational databases (can create relational databases, formulate queries to databases, create forms and reports).	K_U09

Assessment methods and criteria				
LO1	Can find information on the Internet, integrate and interpret it.			
Assessment methods	Assessment of exercises, labs/simulators.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Browsing for information.	Despite teacher's hints, (student) cannot find sufficient information, integrate or interpret it to solve a formulated problem, possibly with teachers' assistance.	Can find information, integrate and interpret it to solve a formulated problem, possibly with teacher's assistance.	Finds information, integrates and interprets it to synthesize a formulated problem with possible assistance of a teacher.	Finds information, integrates and interprets it to synthesize and evaluate a formulated problem with possible assistance of a teacher.
LO2	Can effectively use basic application programs (process documents according to the rules of text editing, can insert basic and advanced components of a document).			
Assessment methods	Assessment of classes, laboratories/simulators, project, presentation or tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Makes significant errors in documents with model components.	Can create documents with model components, may make minor errors.	Can create documents with components which differ from models, can make minor errors.	Proficiently creates documents with components that differ from models.
LO3	Can effectively use a spreadsheet (can make calculations using a spreadsheet and present numerical data graphically).			
Assessment methods	Assessment of classes, laboratories/simulators, project, presentation or tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Computing.	Makes significant errors in computations similar to model ones.	Makes computations similar to model ones with possible minor errors.	Can make computations that differ from model ones, can make minor errors.	Proficiently makes computations that are different from model ones.
Criterion 2 Data presentation.	Makes significant errors in graphic presentations of data similar to model presentations.	Prepares a graphical presentation of data similar to model presentations, can make minor errors.	Can prepare a graphical presentation of data that differ from model ones, can make minor ones.	Proficiently prepares a graphical presentation of data that differ from model ones.
LO4	Can effectively use a system for operating relational databases (can create relational databases, formulate queries to databases, create forms and reports).			

Assessment methods	Assessment of classes, laboratories/simulators, projects, presentation or tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Creation of a database.	Makes significant errors in creating databases similar to model ones.	Creates databases similar to model ones, can make minor mistakes.	Creates databases that differ from models, can make minor errors.	Proficiently creates databases that differ from model ones.
Criterion 2 Queries.	Makes significant errors in formulating queries similar to model ones.	Formulates queries similar to model ones, can make minor errors.	Formulates queries that differ from model queries, can make minor errors.	Proficiently creates queries that differ for model ones.
Criterion 3 Forms and reports.	Makes significant errors in creating forms and reports similar to model ones.	Creates forms and reports similar to model ones, can make minor errors.	Creates forms and reports that differ from model ones, can make minor errors.	Proficiently creates forms and reports that differ from model ones.

Syllabus

SEMESTER 1	COMPUTER SCIENCE	LAB CLASSES	30 HOURS.

1. Construction of a PC.
2. Operating systems – structure and configuration.
3. Operation of selected utility programs.
4. Operation of selected application programs.
5. Word processor MS Word.
6. Computer networks – LAN.
7. Computer networks – Internet, WWW, FTP, e-mail, browsing for information.
8. Spreadsheet MS Excel.
9. Databases – MS Access.
10. E-mail.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects	10	
Self-instruction: preparation for passing tests and exams	5	
Total workload	**61**	**2**
Workload related to direct teaching activities:	31	1
Workload related to practice-oriented activities:	55	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

14.	Course unit:							N2022/12/BS/14/CS2
COMPUTER SCIENCE – module 2								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15			2			30	2
2	15			2			30	2

III/2. Learning outcomes and syllabus

Learning outcomes – semester 2		Field-specific
LO1	Can effectively use basic application programs (prepare multimedia presentations).	K_U09
LO2	Can algorithmize and implement simple computing problems using a computer.	K_U12

Assessment methods and criteria				
LO1	Can effectively use basic application programs (prepare multimedia presentations).			
Assessment methods	Assessment of classes, labs/simulators/project, presentation or tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Makes significant errors in presentations with model components.	Creates presentations using model components, makes minor errors.	Creates presentations with various components different from models, may make minor errors.	Proficiently creates presentations with various components that differ from model examples.
LO2	Can algorithmize and implement simple computing problems using a computer.			
Assessment methods	Assessment of classes, labs/simulators/project, presentation or tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Algorithmization	Makes significant errors in algorithmization which is similar to model computing problems.	Can perform algorithmization of computing problems similar to model ones, may make slight errors.	Can perform algorithmization of computing problems that differ from model examples, may make some minor errors.	Can proficiently perform algorithmization of computing problems that differ from model examples.
Criterion 2 Implementation.	Makes significant errors in implementation which is similar to model computing problems.	Can perform implementation of computing problems similar to model ones, may make slight errors.	Can perform implementation of computing problems that differ from model examples, may make some minor errors.	Can proficiently perform implementation of computing problems that differ from model examples.

Syllabus

SEMESTER 2	COMPUTER SCIENCE	LAB CLASSES	30 HOURS

1. Graphic presentation – MS PowerPoint.
2. Algorithms.
3. Conditional instruction IF with complex conditions, use of logical operators, embedded instructions.
4. loop FOR.
5. DO/LOOP.
6. Index variables.
7. Loops – exercises, procedures and functions, declaration, use.
8. Loops – exercises, complex variables (vector), cooperation with a spreadsheet.
9. Embedded loops, complex variables (tables).
10. Operations on data files.
11. Project – a problem-based task.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	1	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects	10	

Self-instruction: preparation for passing tests and exams	5	
Total workload	**61**	**2**
Workload related to direct teaching activities:	31	1
Workload related to practice-oriented activities:	55	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
not applicable.

V. Recommended reading
1. Levine J., Levine-Young M., *The Internet for dummies*, Wiley, 2011.
2. MacDonald M., *Excel 2013. The missing manual*, O'Reilly Media, 2013.
3. Harvey G., *Excel 2013. All-in-one for dummies.*, Wiley, 2013.
4. Vaccaro G., *Advanced Microsoft Excel 2013*, Infinite Skills, 2013.
5. MacDonald M., *Access 2013. The missing manual.* , O'Reilly Media, 2013.
6. Vaccaro G., *Learning Microsoft Access 2013*, Infinite Skills, 2013.

VI. Extra reading
1. Walkenbach J., *Excel 2013 Bible*, Wiley, 2013.
2. Walkenbach J., *Excel 2013 Formulas*, Wiley, 2013.
3. Alexander M., Kusleika D., *Access 2013 Bible*, Wiley, 2013.
4. Meyer A., Steele D.J., *Access Solutions. Tips, tricks and secrets from Microsoft Access MVPs*, Wiley, 2010.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

15.	Course unit:							N2022/35/BS/15/A
AUTOMATION								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
5	15	1		1	15		15	2

I. Course unit aims

This course unit will impart basic knowledge of the construction and operation of analogue, digital and computer systems of automatic control, control algorithms and methods of controller tuning, criteria and methods for assessing the correct operation of a control system, and the use of uptodate software for an analysis of automatic control systems.

II. Preliminary requirements

Fundamental knowledge of physics, ability to solve simple differential equations.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 5		Field-specific
LO1	Describes and characterizes control systems (e.g. ship's course, propeller settings); understands static and dynamic characteristics, knows how to describe an automatic control system and its components using an operator transfer function; knows basic concepts of digital technology in automatic control and some shipboard applications.	K_W01; K_W06; K_W08; K_U11; K_K01
LO2	Analyses basic linear elements of automatic control systems and can explain changes in properties of these elements with changes in their parameters.	K_W01; K_W05; K_U11; K_U12
LO3	Can make a computer-based simulation of automatic control elements and systems; understands and explains algorithms of continuous controllers.	K_W06; K_U09; K_U10; K_U12
LO4	Can list and explain criteria for control quality and apply these criteria to verify control systems.	K_W01; K_W06; K_U10; K_U11
LO5	Distinguishes stable and non-stable control systems and solves simple stabilization problems.	K_W01, K_W06; K_U11
LO6	Has skills of self-instruction and effective use of information resources: technical specifications, operator manuals, catalogues, the Internet; understands the need for continuous learning in professional development due to fast advancements in the automation of navigation, ship position and course control etc.	K_W35; K_U01, K_U06; K_K01

Assessment methods and criteria				
LO1	Describes and characterizes control systems (e.g. ship's course, propeller settings); understands static and dynamic characteristics, knows how to describe an automatic control system and its components using a transfer function; knows basic concepts of digital technology in automatic control and some shipboard applications.			
Assessment methods	Oral assessment, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know or understand the principle of operation of a control system.	Understands the principle of operation of a control system.	Knows the structure, components and explains the principle of operation of linear and non-linear automatic control systems.	Analyses the functioning of linear and non-linear, continuous and digital automatic control systems.
LO2	Analyses basic linear elements of automatic control systems and can explain changes in properties of these elements with changes in their parameters.			
Assessment methods	Oral and written assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Cannot solve a simple problem of an automatic control system.	Can solve a simple problem of an automatic control system, assisted by a teacher.	Can solve, unassisted, a simple problem of an automatic control system.	Can solve, unassisted, a complex problem of an automatic control system, and analyse the results.
LO3	Can make a computer-based simulation of automatic control elements and systems; understands and explains algorithms of continuous controllers.			
Assessment methods	Oral assessment at a computer station.			
Criteria/Grade	2	3	3.5−4	4.5−5

Criterion 1 The scope of knowledge and its understanding.	Cannot use a computer simulation program.	Can model some elements of an automatic control system, assisted by an instructor.	Can model most elements of an automatic control system, assisted by an instructor, and a simple automatic control system – without assistance.	Can model each automatic control system element, unassisted, or a whole simple or complex; can analyse the results.
LO4	Can list and explain criteria for control quality and apply these criteria to verify control systems.			
Assessment methods	Oral assessment, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know what control quality criteria are.	Knows what control quality criteria are, can give examples.	Knows some control quality criteria, can characterize them in part.	Can choose a control quality criterion for an automatic control system to perform a task.
LO5	Distinguishes stable and non-stable control systems and solves simple stabilization problems.			
Assessment methods	Oral assessment, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 ability to identify a problem of automatic control system.	Does not know the concept o stability of an automatic control system.	Knows the concept of stability of an automatic control system; can distinguish step responses from stable and non-stable systems.	Knows the concept of stability of an automatic control system; can sketch step responses of stable and non-stable automatic control systems.	can interpret consequences of non-stability for automatic control systems.
Criterion 2 Ability to identify a problem in an automatic control system.	Cannot solve a simple stability problem of an automatic control system.	Can check the stability problem of an automatic control system, assisted by an instructor.	Can solve, unassisted, a relatively difficult problem of automatic control system stability.	Can solve a difficult problem of automatic control system stability.
LO6	Has skills of self-instruction and effective use of information resources: technical specifications, operator manuals, catalogues, the Internet; understands the need for continuous learning in professional development due to fast advancements in the automation of navigation, ship position and course control etc.			
Assessment methods	Oral assessment, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Ability to use source information.	Does not understand basic information in automatic control documentation.	Uses automatic control documentation in Polish in a basic scope.	Uses automatic control documentation in Polish and English, to a wide extent.	Proficiently uses technical documentation.
Criterion 2 Effective participation in class, skill of self-instruction and understanding of the need for continuous progressional development.	Does not demonstrate proper activity in class, or ability to acquire and deepen knowledge independently.	demonstrates activity necessary for effective learning.	is engaged in the learning process; identifies and solves a problem, with slight teacher's assistance.	works on his/her own, demonstrates will to deepen knowledge; initiates actions, develops critical thinking and understands the need of professional upgrading.

Syllabus

SEMESTER 5	AUTOMATION	LECTURES	15 HOURS

1. Basic concepts of automation. Structure, principle of operation, and block diagram of a ship's heading automatic control system.
2. Signal conversion in automation. Operator and spectral transfer functions, time-varying characteristics of elements and systems.
3. Characteristics and properties of basic linear elements.
4. Analogue continuous controllers – characteristics, properties, settings.
5. Requirements for control systems (stability and control quality).
6. Basic concepts of digital technology in automation.
7. Marine computer automatic control systems.

SEMESTER 5	AUTOMATION	LAB CLASSES	15 HOURS

1. Operational analysis of remote control systems of propulsion units with fixed and controllable pitch propellers operated from the bridge.
2. testing of analogue and digital controller properties.
3. Analysis of a continuous follow-up/constant-value control system.
4. Synthesis of combinatorial logic automata.
5. Synthesis of sequential logic automata.
6. Modeling of heading control system in MATLAB.
7. Intelligent automatic control devices.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects	5	
Self-instruction: preparation for passing tests and exams	5	
Total workload	**60**	**2**
Workload related to direct teaching activities:	35	1
Workload related to practice-oriented activities:	35	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
Nie dotyczy.

V. Recommended reading
1. Aranda J., Armada M.A., de la Cruz M., *Automation for the Maritime Industries*, PGM, Madrid 2004, [https://www.researchgate.net/publication/263580947_Automation_for_the_Maritime_Industries].
2. Yakimchuk A., *Ship Automation for marine Engineers & ETOs*, 2nd edition, Witherby, 2021.

VI. Extra reading
1. Ogata K., *Modern Control Engineering*, Prentice-Hall International, Inc, 1997.
2. Kohavi Z., *Switching and Finite Automata Theory*, Tata-McGraw-Hill, 1978.
3. Taylor D.A., *Marine Control Practice*, Butterworths, 1987.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

16.	Course unit:							N2022/12/BS/16/EE1
ELECTRONICS AND ELECTROTECHNOLOGY – module 1								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1		1	15		15	2
3	15	1		1	15		15	2

I. Course unit aims

In this course unit students will get familiar with fundamental laws applicable in electrical and electronic engineering; subjects taught include the construction of and safe operation principles referring to basic electrical and electronic equipment used in marine technology; the course also aims at establishing a basis for professional course units lectured in further years of studies.

II. Preliminary requirements

Knowledge of basic laws applying to electricity and magnetism as comprised in the physics syllabus of a secondary school, ability to use basic tools of mathematics.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 2		Field-specific
LO1	Has fundamental knowledge of concepts and laws of electricity.	K_W01; K_W05
LO2	Has skills needed to use fundamental laws of electricity in calculations of basic electrical elements and circuits.	K_U10; K_U12
LO3	Has basic theoretical knowledge of the structure, conversion, transmission and measurement of electrical signals.	K_W01; K_W05
LO4	Knows how to measure and analyse electrical signals.	K_U10; K_U12
LO5	Has basic knowledge of the principles of operation, construction, and use of basic electrical circuits and devices.	K_W01; K_W05
LO6	Is able to analyse the operation, measure parameters and determine characteristics of basic electrical circuits and devices.	K_U10; K_U12

Assessment methods and criteria				
LO1	Has fundamental knowledge of concepts and laws of electricity.			
Assessment methods	Written exam, oral exam, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of electrical concepts.	Has no or insufficient knowledge of basic concepts and definitions related to the subject.	Has mastered basic knowledge of concepts and definitions related to the subject.	Knows and can characterize/discuss basic concepts and definitions; knows and can characterize/discuss basic and broadened concepts and definitions.	Knows and can analyse concepts and definitions and indicate their use in marine technology; has in-depth knowledge and proficiently analyses and indicates possible applications in marine technology.
Criterion 2 Knowledge of laws applied in electrical engineering	Has no or insufficient knowledge of the laws related to the subject.	Has mastered basic knowledge of laws related to the subject.	Knows and can characterize/discuss basic laws of electricity; knows and can characterize/discuss basic and broadened laws of electrical engineering.	Knows and can analyse concepts and definitions, indicate their use in marine technology; has in-depth knowledge and proficiently analyses and indicates their possible applications in marine technology.
LO2	Has skills needed to use fundamental laws of electrotechnology in calculations of basic electrical elements and circuits.			
Assessment methods	Assessment of classes, lab and simulator classes for a pass, report(s).			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Ability to apply fundamental laws of electricity for calculations of basic	Has no or insufficient knowledge of basic concepts, definitions	Has mastered knowledge of basic concepts, definitions and	Knows and can use knowledge of basic and derived concepts, definitions and laws for an analysis of basic circuits;	Knows and can use knowledge of concepts, definitions and laws, and their interrelations in marine technology; has in-

electrical elements and circuits.	and laws related to the subject.	laws related to the subject.	knows and can use knowledge of basic concepts, definitions and laws for an analysis of basic circuits in marine technology.	depth knowledge and proficiently analyses and indicates possible applications in marine technology.
LO3	Has basic theoretical knowledge of the structure, conversion, transmission and measurement of electric signals.			
Assessment methods	Written exam, oral exam, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Basic theoretical knowledge of the structure, conversion, transmission and measurement of electrical signals.	Has no or insufficient knowledge of the structure, conversion, transmission and measurement of electrical signals.	Has mastered basic knowledge of the structure, conversion, transmission and measurement of electric signals.	Knows and can characterize/discuss basic concepts of the structure, conversion, transmission and measurement of signals; knows and can characterize/discuss basic and broadened concepts of the structure, conversion, transmission and measurement of signals occurring in marine technology.	Knows and can analyse concepts of the structure, conversion, transmission and measurement of signals occurring in marine technology; has in-depth knowledge and proficiently analyses concepts of the structure, conversion, transmission and measurement of signals occurring in marine technology.
LO4	Knows how to measure and analyse electrical quantities.			
Assessment methods	Assessment of classes, lab and simulator classes for a pass, report(s).			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Skills of measuring and analysing electrical quantities.	Has no or insufficient skills of measuring and analysing electrical quantities.	Has mastered basic skills of measuring and analysing electrical quantities.	Has mastered basic skills of measuring and analysing electric quantities; has mastered well basic skills of measuring and analysing electrical quantities occurring in marine technology.	Has mastered very well basic skills of measuring and analysing electrical quantities occurring in marine technology; has in-depth knowledge and can proficiently analyse concepts related to measurements and analysis of electrical quantities occurring in marine technology.
LO5	Has basic knowledge of the principles of operation, construction, and use of basic electrical circuits and devices.			
Assessment methods	Written exam, oral exam, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of the principles of operation, construction, handling basic circuits and devices.	Has no or insufficient basic knowledge of the principles of operation, construction, and handling of basic circuits and devices.	Has mastered basic knowledge of the principles of operation, construction, and handling of basic circuits and devices.	Knows and can characterize/discuss extended concepts of the principles of operation, construction and handling of basic circuits and devices.	(Proficiently) knows and can analyse concepts of the principles of operation, construction and handling of circuits and devices (used in marine technologies.
LO6	Is able to analyse the operation, measure parameters and determine characteristics of basic electrical circuits and devices.			
Assessment methods	Assessment of classes, lab and simulator classes for a pass, report(s).			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Ability to analyse the operation, measure parameters and determine characteristics of basic electrical circuits and devices.	Has no or insufficient basic skills of analysing the operation, measuring parameters and determining characteristics.	Has mastered basic skills of analysing the operation, measuring parameters and determining characteristics of circuits and devices.	Has mastered (well) skills of analysing the operation, measuring parameters and determining characteristics of circuits and devices.	Has mastered (very well/proficiently) skills of analysing the operation, measuring parameters and determining characteristics of circuits and devices/used in marine technology.

Syllabus

SEMESTER 2	ELECTRONICS	LECTURES	15 HOURS

1. Electrical signals.
2. RLC elements.
3. Semi-conductor elements.
4. Spectral analysis of signals.
5. Propagation of radio waves.
6. Amplitude modulation.
7. Frequency and phase modulation.
8. Demodulation.
9. Amplifiers.
10. Negative feedback.
11. Generators.
12. Power supply units.

SEMESTER 2	ELECTRONICS	LAB CLASSES	15 HOURS

1. Selected lab equipment (generators, oscilloscopes, analogue and digital meters).
2. Testing RLC resonance circuits.
3. Testing semiconductor elements.
4. Oscilloscope measurements.
5. Testing a stabilized power supply unit.
6. Simulation tests of amplitude/frequency/phase modulation.
7. Testing generators.
8. Testing broadband and narrow-band amplifiers.
9. Testing an operating amplifier.
10. Simulation tests of filters.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	3	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**54**	**2**
Workload related to direct teaching activities:	33	1
Workload related to practice-oriented activities:	30	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

16.	Course unit:							N2022/23/BS/16/EE2
ELECTRONICS AND ELECTROTECHNOLOGY – module 2								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1		1	15		15	2
3	15	1		1	15		15	2

III/2. Learning outcomes and syllabus

Learning outcomes– semester 2		Field-specific
LO1	Has basic knowledge of concepts, laws and principles electrical and electronic engineering.	K_W01; K_W05
LO2	Has skills of using fundamental laws of electrical and electronic engineering for calculus analysis of basic electronic elements and circuits.	K_U10; K_U12
LO3	Has a basic theoretical knowledge of the structure, conversion, transmission and measurement of electrical signals.	K_W01; K_W05
LO4	Has skills of measuring, analysing and converting electrical signals.	K_U10; K_U12
LO5	Has fundamental knowledge of the principles of operation, construction, and use of basic electronic circuits and devices.	K_W01; K_W05
LO6	Has skills of analysing the operation, measuring parameters and determining basic characteristics of basic electronic circuits and devices.	K_U10; K_U12

Assessment methods and criteria				
LO1	Has basic knowledge of concepts, laws and principles of electrical and electronic engineering.			
Assessment methods	Written exam, oral exam, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of electrical and electronic engineering concepts.	Has no or insufficient knowledge of basic concepts and definitions related to the subject.	Has mastered basic knowledge of concepts and definitions related to the subject.	Knows and can characterize/discuss basic concepts and definitions; knows and can characterize/discuss basic and broadened concepts and definitions.	Knows and can analyse concepts and definitions and indicate their use in marine technology; has in-depth knowledge and proficiently analyses and indicates possible applications in marine technology.
Criterion 2 Knowledge of laws applied electrical and electronic engineering.	Has no or insufficient knowledge of the laws related to the subject.	Has mastered basic knowledge of laws related to the subject.	Knows and can characterize/discuss basic laws electricity; knows and can characterize/discuss basic and broadened laws of electrical engineering.	Knows and can analyse concepts and definitions, indicate their use in marine technology; has in-depth knowledge and proficiently analyses and indicates their possible applications in marine technology.
LO2	Has skills of using fundamental laws of electrotechnology and electronics for calculus analysis of basic electronic elements and circuits.			
Assessment methods	Assessment of classes, lab and simulator classes for a pass, report(s).			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Ability to apply fundamental laws of electrical and electronic engineering for calculations of basic electronic elements and circuits.	Has no or insufficient knowledge of basic concepts, definitions and laws related to the subject.	Has mastered knowledge of basic concepts, definitions and laws related to the subject.	Knows and can use knowledge of basic concepts, definitions and laws for an analysis of basic circuits; knows and can use knowledge of basic and derived concepts, definitions and laws for an analysis of basic circuits in marine technology.	Knows and can use knowledge of basic and derived concepts, definitions and laws, and their interrelations in marine technology; has in-depth knowledge and proficiently analyses and indicates possible applications in marine technology.
LO3	Has a basic theoretical knowledge of the structure, conversion, transmission and measurement of electric signals.			
Assessment methods	Written exam, oral exam, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Basic theoretical knowledge of the structure, conversion,	Has no or insufficient knowledge of the structure,	Has mastered basic knowledge of the structure, conversion,	Knows and can characterize/describe basic concepts of the structure, conversion, transmission and	Knows and can analyse concepts of the structure, conversion, transmission and measurement of

transmission and measurement of electrical signals.	conversion, transmission and measurement of electrical signals.	transmission and measurement of electrical signals.	measurement of signals; knows and can characterize/discuss basic and broadened concepts of the structure, conversion, transmission and measurement of signals occurring in marine technology.	signals occurring in marine technology; has in-depth knowledge and proficiently analyses concepts of the structure, conversion, transmission and measurement of signals occurring in marine technology.
EK4	Has skills of measuring, analysing and converting electric signals.			
Assessment methods	Assessment of classes, lab and simulator classes for a pass, report(s).			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Skills of measuring, analysing and converting electrical signals.	Has no or insufficient basic skills of measuring, analysing and converting electrical signals.	Has mastered basic skills of measuring, and analysing electrical signals.	Has mastered (satisfactorily/well) basic skills of measuring, analysing and converting electrical signals, occurring in marine technology.	Has mastered very well basic skills of measuring, analysing and converting electrical signals used in marine technology; has in-depth knowledge and can proficiently analyse concepts related to measurements, analysis and conversion of complex signals occurring in marine technology.
LO5	Has fundamental knowledge of the principles of operation, construction, and use of basic electronic circuits and devices.			
Assessment methods	Written exam, oral exam, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of the principles of operation, construction, handling basic electronic circuits and devices.	Has no or insufficient basic knowledge of the principles of operation, construction, and use of basic circuits and devices.	Has mastered basic knowledge of the principles of operation, construction, and use of basic circuits and devices.	Knows and can characterize/discuss basic and extended concepts of the principles of operation, construction and use of basic circuits and devices.	(Proficiently) knows and can analyse concepts of the principles of operation, construction and handling of circuits and devices (used in marine technologies.
LO6	Has skills of analysing the operation, measuring parameters and determining basic characteristics of basic electronic circuits and devices			
Assessment methods	Assessment of classes, lab and simulator classes for a pass, report(s).			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Ability to analyse the operation, measure parameters and determine characteristics of basic electronic circuits and devices.	Has no or insufficient basic skills of analysing the operation, measuring parameters and determining characteristics.	Has mastered basic skills of analysing the operation, measuring parameters and determining characteristics of circuits and devices.	Has mastered (well) skills of analysing the operation, measuring parameters and determining characteristics of circuits and devices.	Has mastered (very well/proficiently) skills of analysing the operation, measuring parameters and determining characteristics of circuits and devices/used in marine technology.

Syllabus

SEMESTER 3	ELECTROTECHNOLOGY	LECTURES	15 HOURS

1. General: voltage, intensity, electromotive force of a source of voltage; direct current (DC) circuits – Ohm's and Kirchoff's laws; energy and power in DC circuits.
2. Marine batteries: types, principle of operation and use/maintenance.
3. AC circuits – basic concepts, RLC circuits, reactance, impedance, active/reactive power, complex and apparent power, AC effective (rms) and mean values, electromagnetic induction and self-induction.
4. Three-phase circuits: inland and shipboard power grids, their parameters types of connection, power of three-phase receivers.
5. Electrical measurements: notations, principle of operation of basic measuring instruments; measurement of electrical parameters of RLC elements in electric circuits.
6. DC machines: construction and principle of operation, types and basic characteristics of DC machines.
7. AC machines: asynchronous machine, construction and principle of operation, its motoring operation; synchronous machine, construction and principle of operation, generator operation.

8. Transformers: construction and principle of operation, working modes of transformers.
9. Marine electrotechnology.
   9.1. Generation and distribution of electric power on a ship.
   9.2. Emergency power supply, starting up an emergency generating set.
10. Protection against electrocuting: risks and protective measures in: a) grounded networks; b) insulated networks.

SEMESTER 3	ELECTROTECHNOLOGY	LAB CLASSES	15 HOURS

1. Electrical safety instruction, lab rules and regulations.
2. Measurements of electrical quantities in DC circuits.
3. Measurements of electrical quantities in AC circuits.
4. Testing of a DC motor.
5. Testing of asynchronous squirrel-cage and slip-ring motors.
6. Testing of synchronous generators and their protection device.
7. Protection against electrocuting.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	3	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**54**	**2**
Workload related to direct teaching activities:	33	1
Workload related to practice-oriented activities:	30	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
Not applicable.

V. Recommended reading
1. Thomas L. Floyd, *Electric Circuits Fundamentals*, Prentice Hall, 2009.
2. J.J. Cathey, S.A. Nasar, *Schaum's Outline of Basic Electrical Engineering*, McGraw Hill Professional, 1997.
3. Stephen Chapman, *Electric Machinery Fundamentals*, McGraw-Hill Companies, Incorporated, 2005.
4. Irving M. Gottlieb, *Electric Motors and Control Techniques*, McGraw-Hill Education, 1994.
5. Mukund R. Patel, *Shipboard Electrical Power Systems*, CRC Press, 2012.
6. René Borstlap, Hans Ten Katen, *Ships Electrical Systems*, Dokmar Maritime Publishers, 2011.
7. Horowitz P., Hill W., *The art of Electronics*, Press Syndicate of the University of Cambridge, New York.

VI. Extra reading
1. Mohan N., *Power Electronics: A First Course*, Wiley Global Education, 2011.
2. Mohan N., *Electric Machines and Drives*, Wiley Global Education, 2011.
3. McGeorge H.D., *Marine Electrical Equipment and Practice*, Newnes, 1993.
4. Laughton M.A., Warne D.F., *Electrical Engineer's Reference Book*, Newnes, 2002.
5. Basis P., *Introduction to electronics: A Basic Approach*, Persons Education US, 2013.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

17.	Course unit:							N2022/11/BS/17/MCEG
MACHINE CONSTRUCTION AND ENGINEERING GRAPHICS								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1	1	1	15	15	15	3

I. Course unit aims

Students will acquire basic knowledge of machine construction and its documentation, and skills needed to present a construction as a sketch or in an electronic form, using CAD technique, and skills in basic calculations of the strength of axles, shafts, rivet joints and bearings.

II. Preliminary requirements

The scope of a secondary school and elements of mathematics, physics and computer science.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 1		Field-specific
LO1	Can make basic strength calculations of axles, shafts, riveted joints and bearings.	K_W04; K_W05; K_W06
LO2	Can draw a technical drawing of a machine component.	K_U04; K_U09; K_U12; K_U13

Assessment methods and criteria				
LO1	Can make basic strength calculations of axles, shafts, riveted joints and bearings.			
Assessment methods	Project, presentation.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Cannot make basic calculations.	Can check basic strength requirements for axles, shafts, riveted joints and bearings.	Can determine strains of bars from known external forces; can determine external forces from known bar strain.	Can design a machine component based on criteria and design limits.
LO2	Can draw a technical drawing of a machine component.			
Assessment methods	Project, presentation.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Cannot make a basic technical drawing.	Can dimension a machine component, can make projections, auxiliary views, details, cross-sections, revolved sections**,** broken out sections of machine components**.**	Can draw a technical sketch of a machine component.	Can make a technical drawing using CAD technique.

Syllabus

SEMESTER 1	MACHINE CONSTRUCTION AND ENGINEERING GRAPHICS	LECTURES	15 HOURS

1. Principles of rectangular projection.
2. Cross-sections and intersection of solids, axonometry.
3. Simplified representation.
4. Sequence of dimensions recording.
5. Temporary and permanent joints.
6. Characteristics of working and assembly drawings.
7. Use of CAD programs for creating and edition of construction drawings.
8. The concept of a machine, classification of machines by use.
9. Princples of operation and types of energy.
10. Principles of construction.
11. Axles and shafts, bearings, couplings and brakes, gears.
12. Strength of materials.
13. Fatigue strength of machine components.

SEMESTER 1	MACHINE CONSTRUCTION	CLASSES	15 HOURS

1. Simple machines – analysis and calculations.
2. Calculating the strength of riveted joints.
3. Calculating the strength of axles and shafts.
4. Calculating dimensions of bearings.
5. Calculating dimensions of cylindrical wheels.
6. Standardization and principles of coupling selection.

SEMESTER 1	ENGINEERING GRAPHICS	LAB CLASSES	15 HOURS

1. Exercises in making projections, auxiliary views, details, cross-sections, revolved sections**,** broken out sections of machine components.
2. Dimensioning of machine components.
3. Presentation of a contruction sketch.
4. Use of a CAD program for recording a design.
   4.1. Program interface.
   4.2. Disk operations.
   4.3. Creation and editing of objects.
   4.4. Dimensioning of objects.
   4.5. Preparation of a drawing for printing.
5. Analysis of technical documentation of machines.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	6	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	30	
Self-instruction: execution of projects	15	
Self-instruction: preparation for passing tests and exams	3	
Total workload	**99**	**3**
Workload related to direct teaching activities:	51	1.5
Workload related to practice-oriented activities:	66	1.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
not applicable

V. Recommended reading
1. Cecil Jensen, Jay D. Helsel, Dennis R. Short – Engineering Drawing & Design, 7th Edition, McGraw-Hill Professional, 2007.
2. Basic Rules for Technical Drawing and CAD – Introduction to CAD Standards – CAD Manual, 2018.
3. Engineering Drawing Standard – International Standards ISO.

VI. Extra reading
Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

FIELD-OF-STUDY SUBJECTS

18.	Course unit:	N2022/11/FS/18/N1

NAVIGATION – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		2	30		30	2
2	15	1		2	15		30	1
3	15	2	1	4	30	15	60	5
4	15	2	1	1	30	15	15	3
5	15	2		3	30		45	3
8	12	1	1	2	12	12	24	3

I. Course unit aims

This course unit is aimed at the teaching of methods of determining and controlling ship's position, conducting safe ocean, coastal or restricted water navigation, principles of voyage planning and execution, as well as implementation of proper keeping of a navigational watch and bridge teamwork.

II. Preliminary requirements

The scope of a secondary school.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules separately as the acquired knowledge, skills and attitudes.

Learning outcomes – semester I		Field-specific
LO1	Has systematic knowledge of the fundamentals of navigation.	K_W11; K_W24
LO2	Has skills of using navigational instruments and charts for solving practical problems of a navigator, acquired by active participation in lab classes.	K_U11; K_U15
LO3	Acquires, integrates and interprets information, makes calculations.	K_U18
LO4	Is engaged in self-instruction.	K_U01; K_U06; K_K01

Assessment methods and criteria				
LO1	Has systematic knowledge of the fundamentals of navigation.			
Assessment methods	Written exam, spoken exam; in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of the fundamentals of navigation	Does not define, distinguish or describe correctly basic navigational issues.	Correctly defines and distinguishes basic issues of navigation.	Correctly defines and distinguishes basic issues of navigation; demonstrates understanding of these issues.	In detail defines, distinguishes and describes with understanding basic navigational issues.
LO2	Has skills of using navigational instruments and charts for solving practical problems of a navigator, acquired by active participation in lab classes.			
Assessment methods	Positive assessment of lab classes, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Practical skill of reading out and plotting basic navigational parameters on a chart.	Does not have basic skills of chartwork; plotted and read out values are burdened with significant errors.	Has a correct chartwork technique, allowing to obtain results with errors within acceptable limits.	Has a good chartwork technique, allowing to obtain satisfactory results.	Has an excellent chartwork technique, allowing to obtain accurate results; is precise in plotting and reading out the data.
LO3	Aquires, integrates and interprets information, makes calculations.			
Assessment methods	Spoken exam, home assignments, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Acquisition, integration and interpretation of navigational information.	Cannot acquire, integrate and interpret basic navigational information.	Acquires and integrates a basic scope of navigational information.	Correctly acquires, integrates and interprets basic navigational information.	Acquires, integrates and interprets an extended scope of navigational information; draws conclusions and formulates opinions.

Criterion 2 Correct calculations of basic navigational parameters.	Basic navigational calculations are incorrect.	Makes basic navigational calculations correctly.	Makes navigational calculations in an extended scope correctly; makes comments and graphical solutions.	Solves a navigational problem comprehensively; analyses complex cases.
LO4	Is engaged in self-instruction.			
Assessment methods	Home assignment, presentation, assessment of assignments and class performance.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Effective participation in class, involvement in work assigned.	Does not demonstrate sufficient activity in the class.	Demonstrates activity necessary for effective learning.	Is engaged in the learning process; identifies and solves a problem with slight assistance of an instructor.	Works independently, is willing to broaden his/her knowledge; develops own initiatives and critical thinking.
Criterion 2 Ability to use resources and search for information, preparation of project work/home assignment.	Does not use learning resources, project work and home assignment done with significant errors.	Uses available materials to a limited extent; project work and home assignment done to a sufficient elementary standard.	Selects relevant source materials; performs project work as required.	Finds an extended range of information, uses drawings and descriptions; perfectly prepares project work and home assignment.

Syllabus

SEMESTER 1	NAVIGATION	LECTURES	30 HOURS

FUNDAMENTALS OF NAVIGATION (22 HOURS)

1. The shape and dimensions of the Earth, reference and coordinate systems, horizon and visible horizon.
   1.1. Basic lines and planes on Earth surface.
   1.2. Geodetic reference coordinate systems – local and geocentric.
   1.3. Coordinate systems on an ellipsoid and sphere.
   1.4. Geographic coordinates. Difference of latitude, difference of longitude.
   1.5. Nautical units of measures, reference to the SI system.
   1.6. Departure. Sailing along a meridian of longitude/a parallel of latitude.
2. Measuring distances.
   2.1. Impact of the current and wind on the ship. Terms: course over ground, course through water, true course, drift, leeway.
   2.2. Determination of distance covered, measurement of speed through water and over gound.
3. Determination of direction, course, bearing and heading angle.
   3.1. Systems of expressing directions: cardinal points, half-cardinal points, quarter cardinal points and points.
4. Magnetism of the Earth and the ship, magnetic variation, deviation.
   4.1. Courses and bearings: compass, magnetic, gyrocompass; gyrocompass error.
5. Conversion of compass and gyrocompass directions to true directions.
6. Determination of: variation, total correction of a magnetic compass, and gyrocompass error.
7. The use of the List of Lights.
   7.1. Characteristics of navigational lights.
   7.2. Visible horizon, horizon, distance to the visible horizon, luminous range of navigational lights and visibility of objects.

DEVIATION (8 HOURS)

1. Magnetic compass.
2. Deviation of a magnetic compass.
   2.1 Magnetic properties of marine steel, types of ship's magnetism, types of soft steel in ship's hull.
   2.2 P, Q and R components of ship's magnetic field intensity.
   2.3 Semi-circular, circular and permanent deviation.
   2.4 Archibald Smith's formula, deviation coefficients of a ship on an even keel: A, B, C, D and E.
   2.5 Heeling deviation.
3. Methods of determining compass deviation, curve of deviation, table of deviation.
4. Compensation of compass deviation.
5. Compass position on a ship, compass requirements.

SEMESTER 1	NAVIGATION	LAB CLASSES	30 HOURS

FUNDAMENTALS OF NAVIGATION (22 HOURS)

1. Solving navigational problems on a paper navigational chart.
   1.1. calculation of differences of latitude and of longitude.
   1.2. Preliminary chartwork – use of a set-square, dividers, parallel rulers, plotting and reading out point coordinates on a navigational chart, determination of distance and speed, plotting and reading out directions.
   1.3. Conversion of units of measures used in navigation.
2. Sailing along a meridian of longitude/a parallel of latitude, departure and its change to a difference of longitude.
3. Directions: course, bearing and heading angle (relative bearing).

3.1. Conversion of compass and gyrocompass directions to true directions.
3.2. Determination of: variation, total correction of a magnetic compass, and gyrocompass error.

DEVIATION OF A MAGNETIC COMPASS (8 hours)

1. Magnetic compass.
2. Semi-circular, quadrantal and permanent deviation.
3. Methods of determining compass deviation, curve of deviation, table of deviation.
4. Compensation of compass deviation.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	8	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**78**	**2**
Workload related to direct teaching activities:	64	1.5
Workload related to practice-oriented activities:	38	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

18.	Course unit:	N2022/12/FS/18/N2

NAVIGATION – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		2	30		30	2
2	15	1		2	15		30	1
3	15	2	1	4	30	15	60	5
4	15	2	1	1	30	15	15	3
5	15	2		3	30		45	3
8	12	1	1	2	12	12	24	3

III/2. Learning outcomes and syllabus

Learning outcomes – semester 2		Field-specific
LO1	Has basic knowledge of maritime cartography standards and is well familiar with marine aids to navigation.	K_W11;K_W13; K_W14; K_W27
LO2	Has skills acquired by doing exercises on simulators, necessary for solving practical problems of a watch officer.	K_U12; K_U15; K_U26
LO3	Acquires information from navigational charts and publications, integrates and interprets the information to assure safe navigation.	K_U01; K_U18; K_U27

Assessment methods and criteria				
LO1	Has basic knowledge of maritime cartography standards and is well familiar with marine aids to navigation.			
Assessment methods	Home assignments, presentation, in-semester tests.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of sea cartography	Does not know criteria, characteristics and applications of sea cartographic representation; does not know principles of updating standard navigational charts.	Lists criteria and characteristics of sea cartographic representations; has basic knowledge of principles of updating standard navigational charts.	Correctly lists criteria, characteristics and applications of sea cartographic representations; correctly describes principles of updating standard navigational charts.	Has a comprehensive and detailed knowledge of sea cartography and updating standard navigational charts.
Criterion 2 Knowledge of the aids to navigation	Cannot name, distinguish or describe marine aids to navigation.	Correctly describes characteristics of the marine aids to navigation.	Satisfactorily describes and names navigational marks.	Precisely describes, names and distinguishes navigational seamarks and landmarks.
LO2	Has skills acquired by doing exercises on simulators, necessary for solving practical problems of a watch officer.			
Assessment methods	Assessment of classes, lab classes and simulators.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Skill of classifying and identifying light characteristics.	Does not demonstrate basic skills in classifying or identifying light characteristics.	Classifies and identifies light characteristics with minor errors.	Classifies and identifies light characteristics correctly.	Classifies and identifies light characteristics fully, with sufficient details.
Criterion 2 Skill of classifying and identifying IALA aids to navigation.	Does not demonstrate basic skills in classifying or identifying IALA aids to navigation.	Classifies and identifies IALA aids to navigation with minor errors.	Classifies and identifies IALA aids to navigation correctly, does not assess the corresponding safety of navigation.	Classifies and identifies IALA aids to navigation fully, with sufficient details; properly assesses the corresponding safety of navigation.
LO3	Acquires information from navigational charts and publications, integrates and interprets the information to assure safe navigation.			
Assessment methods	Reports, in-semester tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Ability to acquire, integrate, and interpret cartographic	Cannot acquire, integrate, and interpret basic cartographic	Can acquire and interpret basic cartographic information contained on navigational charts to	Can acquire, integrate and interpret cartographic information	Is proficient in acquiring, integrating and interpreting cartographic

information from navigational charts.	information contained on navigational charts.	the extent required for the safety of navigation.	contained on navigational charts.	information contained on navigational charts.
Criterion 2 Ability to acquire, integrate, and interpret cartographic information from navigational nautical publications.	Cannot acquire, integrate, and interpret basic cartographic information contained basic information from nautical publications.	Can acquire basic information from nautical publications; demonstrates minimum required skills of using such information.	Can acquire, integrate and use satisfactorily information from nautical publications.	Can acquire, integrate and interpret proficiently information from nautical publications; is fully skilful in using such information.

Syllabus

SEMESTER 2	NAVIGATION	LECTURES	15 HOURS

NAUTICAL CARTOGRAPHY

1. Marine paper and electronic charts.
   1.1. Preparation, editing and publishing navigational charts in paper and digital forms.
   1.2. Marine thematic and auxiliary charts.
   1.3. Basic information on charts: numbering, title, legend, scale, dating, datum, height reference levels.
   1.4. Use of navigational charts: aids to navigation, IALA system of aids to navigation**.** Principles of using *Admiralty Notices to Mariners, Cumulative List of Admiralty Notices to Mariners, Annual Summary of Admiralty Notices to Mariners* and Notices to Mariners issued by *BHMW* (Polish Hydrographic Bureau of the Navy). Principles of chart correction. Navigational warnings.
2. Cartographic representations and their classification.
   2.1. Cylindrical projections (*Mercator projection, Gauss-Krüger projection*).
   2.2. Azimuthal projections: normal, oblique, transverse, and gnomonic and stereographic.
   2.3. Conical projections.
3. Meridional parts.

SEMESTER 2	NAVIGATION	LAB CLASSES	30 HOURS

NAUTICAL CARTOGRAPHY

1. Use of charts, List of Lights and other publications, aids to navigation, chart correction.
   1.1. Identification of navigational light characteristics – simulator exercises.
   1.2. Identification of IALA aids to navigation – simulator exercises.
   1.3. List of lights and fog signals.
   1.4. Calculations: distance to the apparent horizon (sea line), visibility range of marks and luminous range of navigational lights.
   1.5. Updating the contents of British charts based on *Notices to Mariners* and *Admiralty Notices to Mariners.*
   1.6. Using sailing directions (Pilot's books), *Catalogue of Admiralty Charts and Publications*.
2. Using routeing charts.
3. Solving navigational problems on a paper chart.
   3.1. Symbols and abbreviations on British charts.
   3.2. Reading the texts on British charts.
   3.3. Identification of lights and aids to navigation on a chart.
   3.4. Readout and plotting of sectors, directional lights, leading marks.
   3.5. Use of charts of other countries.
   3.6. Chartwork – plotting and reading out point coordinates, determination of distance, plotting and reading out directions.
4. Construction of a map graticule in Mercator projection – graphical and analytical methods. Meridional part.
   4.1 The use of plotting sheets.

Student workload− semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	6	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	2	

Total workload	**55**	**1**
Workload related to direct teaching activities:	47	0.5
Workload related to practice-oriented activities:	36	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

18.	Course unit:	N2022/23/FS/18/N3

NAVIGATION – module 3

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		2	30		30	2
2	15	1		2	15		30	1
3	15	2	1	4	30	15	60	5
4	15	2	1	1	30	15	15	3
5	15	2		3	30		45	3
8	12	1	1	2	12	12	24	3

III/3. Learning outcomes and syllabus

Learning outcomes – semester 3		Field-specific
LO1	Understands the application of plane and spherical trigonometry in navigation and celestial navigation, understands definitions.	K_W01
LO2	Has mastered the use of most common methods of spherical trigonometry for solving navigational problems; understands problems and is able to define their essence.	K_U11; K_U12
LO3	Identifies a navigational problem in great circle, rhumb line or composite sailing, chooses the right method of solving and assess its usefulness in various navigational situations.	K_W11; K_W15
LO4	Makes calculations concerning great circle navigation, rhumb line/composite sailing, can use computational tools, including computer applications.	K_U11; K_U12
LO5	Demonstrates a detailed knowledge of ocean, coastal/offshore and restricted waters navigation; distinguishes relevant methods and techniques of safe ship conduct, identifies navigational problems, knows solving algorithms.	K_W11; K_W13; K_W15
LO6	Demonstrates detailed knowledge of determining ship position and assessing position accuracy.	K_W15; K_W26
LO7	Performs dead reckoning of ship's track for assumed hydrometeorological conditions and using methods and techniques of terrestrial navigation determines a dead reckoning position, estimated position, probable position and a fix.	K_U12; K_U15
LO8	Has skill of extracting qualitative information from quantitative data; solves simple and complex problems in complex navigational tasks using proper algorithms and analyses them from navigational safety perspective.	K_U01; K_U15; K_U18
LO9	Has a skill of self-instruction and independent work.	K_U06; K_U13; K_K01

Assessment methods and criteria				
LO1	Understands the application of plane and spherical trigonometry in navigation and celestial navigation, understands definitions.			
Assessment methods	Oral exam, written exam, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know basic theorems and cannot indicate applications of plane and spherical trigonometry in navigational calculations.	Knows basic theorems and understands applications of plane and spherical trigonometry in navigational calculations.	Knows basic theorems and understands applications of trigonometry in navigational calculations; identifies special cases of spherical triangle solutions.	Has knowledge of practical spherical trigonometry used in solving navigational problems above required standards.
LO2	Has mastered the use of most common methods of spherical trigonometry for solving navigational problems; understands problems and is able to define their essence.			
Assessment methods	In-semester test, a portfolio of navigational problems			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Choice of a method of solution and correctness of calculations.	Despite teacher's assistance, cannot solve a spherical triangle.	Understands a navigational problem and can use proper formulas for: sines, cosines, semiversuses, and Neper's analogies; solves a problem with a calculator.	Can solve spherical triangles independently, also their special cases; illustrates solutions graphically.	Demonstrates considerable skill of solving problems, can analyse them and indicate alternative methods of calculations.
Criterion 2 Correct calculations.	Makes major errors in calculations, does not understand a problem.	Makes correct calculations in general, few mistakes occur.	Makes correct calculations, achieving	Makes very accurate calculations, following a

			required accuracy of the results.	model procedure, provides comments.
LO3	Identifies a navigational problem in great circle, rhumb line or composite sailing, chooses the right method of solving and assess its usefulness in various navigational situations.			
Assessment methods	Oral exam, written exam, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know great circle/rhumb line and composite sailing.	Demonstrates basic knowledge of problems of know great circle/rhumb line and composite sailing.	Demonstrates good understanding of the problems, indicates a right method for solving a specific case.	Has extensive and systematic knowledge, justifies the use of particular method, analyses restrictions.
LO4	Makes calculations concerning great circle navigation, rhumb line/composite sailing, can use computational tools, including computer applications.			
Assessment methods	In-semester test, a portfolio of navigational problems.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Choice of a method for solving a navigational problem.	Does not distinguish methods, does not understand their restrictions; does not identify a navigational error.	Distinguishes methods for solving a problem and lists restrictions of use.	Chooses a right method, illustrates it graphically; identifies an error made or assumed approximation of calculations.	Explains perfectly the rules of method application; assesses the applicability of methods in various navigational cases; gives examples illustrated graphically.
Criterion 2 Correct calculations of great circle and rhumb line sailing.	Calculations made are burdened with major errors, also factual; does not understand problems.	Makes basic navigational calculations, uses an algorithm.	Makes correct calculations, achieving required accuracy of results; describes solutions verbally and illustrates graphically.	Makes very accurate calculations, following a model procedure, provides comments.
LO5	Demonstrates a detailed knowledge of ocean, coastal/offshore and restricted waters navigation; distinguishes relevant methods and techniques of safe ship conduct, identifies navigational problems, knows solving algorithms.			
Assessment methods	Oral exam, written exam, tests.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 The scope of knowledge and its understanding.	Does not identify problems of ocean, coastal and restricted water navigation in reference to ship's safety; does not understand principles of maintaining ship's safe course over ground (COG) in these areas in various hydro-meteorological conditions.	When assisted, properly characterizes basic problems of ocean, coastal and restricted water navigation; can discuss problems of navigation in the wind and current conditions, knows algorithms for solving such problems.	Understands problems of ocean, coastal and restricted water navigation; uses proper algorithms and methods for solving problems of navigating in wind and current conditions; can assess the safety of planned COG and speed over ground (SOG).	Well identifies problems of navigation, properly chooses methods and techniques, uses correct algorithms of safe ship navigation; predicts actions taking into account the effect of variable hydrometeorological conditions; well understands the determination, dead reckoning and estimation of safe COG and SOG.
LO6	Demonstrates detailed knowledge of determining ship position and assessing position accuracy.			
Assessment methods	Oral exam, written exam, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know and understand methods of ship position determination.	Characterizes the basics of ship position determination methods.	More extensively characterizes methods of ship position determination methods and estimates their accuracy.	Has a details and systematic knowledge of ship position determination methods and correctly assesses their accuracy.
LO7	Performs dead reckoning of ship's track for assumed hydrometeorological conditions and using methods and techniques of terrestrial navigation determines a dead reckoning position, estimated position, probable position and a fix.			
Assessment methods	Assessment of classes, assessment of student's activity at labs classes, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Practical chartwork skill of determining a DR position and a fix.	Does not have a chartwork skill; improperly plots directions, lines of	Has a good chartwork skill, is able to get results within error margin.	Has a good chartwork skill, is able to get results within error margin; carefully plots	Has a perfect chartwork skill, is able to get precise results; plots neatly, uses

	position, incorrectly reads out or plots coordinates, makes errors in range measurement.		and correctly uses symbols.	clear symbols and required values only.
LO8	has skill of extracting qualitative information from quantitative data; solves simple and complex problems in complex navigational tasks using proper algorithms and analyses them from navigational safety perspective.			
Assessment methods	Assessment of classes, assessment of student's activity at labs classes, tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Correct identification of navigational tasks.	Does not identify a basic navigational problem.	Can make a basic scope of navigational calculations, following an algorithm; makes a general analysis of navigational safety.	makes an extended scope of navigational calculations, following an algorithm; can discuss in detail issues of navigational safety.	Comprehensively solves a navigational problem; analyses complex cases; indicates alternative solutions for assuring navigational safety.
LO9	Has a skill of self-instruction and independent work.			
Assessment methods	Home assignments, reports, activity assessment.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Effective attendance, willingness to perform assigned tasks (attitude).	Does not demonstrate sufficient activity in class.	Demonstrates activity needed for effective learning.	Is engaged in the process of learning; identifies and solves a problem with slight instructor's assistance.	Works independently, is willing to get an insight into a subject studied, shows initiative and critical thinking.
Criterion 2 Skill of using resources and seeking information, execution of home assignment.	Does not use information sources, fails to make home assignments, even its minimum scope.	To some extent uses available information sources; makes the basic scope of home assignments.	Can choose a proper publication, uses basic descriptions and drawings; makes extended scope of home assignment.	Finds needed information, uses complete descriptions and drawings; perfectly performs home assignments.

Syllabus

SEMESTER 3	NAVIGATION	LECTURES	30 HOURS

1. FUNDAMENTALS OF SPHERICAL TRIGONOMETRY (5 HOURS)
   BASIC THEOREMS, BASIC CASES OF SOLVING SPHERICAL TRIANGLES
   1.1. The spherical triangle.
   1.2. Formulas for sines, cosines and semiversuses.
   1.3. Neper's analogies.
   1.4. Right spherical triangle.
2. RHUMB LINE AND GREAT CIRCLE SAILINGS, DEAD RECKONING NAVIGATION (5 HOURS)
   2.1. Plane sailing. The plane sailing triangle, navigational triangle and Mercator triangle.
   2.2. Simple and composite dead reckoning.
   2.3. Issues of plane sailing.
   2.4. Elements of a great circle.
   2.5. A great circle and a rhumb line on Mercator and gnomonic charts.
   2.6. A gnomonic chart used for determining great circle elements.
   2.7. Composite sailing.
3. THE LINE OF POSITION AND THE POSITION (20 HOURS)
   3.1. Dead reckoning navigation. Dead reckoning plot of ship's track.
   3.2. Ship's DR position and estimated position.
   3.3. The effect of wind and current during navigation. Problems of navigation in wind and current conditions.
   3.4. Navigational parameters and their lines of position.
   3.5. Principles of selecting objects and the measurement technique using traditional and uptodate navigational equipment.
   3.6. A fix/running fix. Determination of a fix from one or more objects (by cross bearings).
   3.7. Use of lines of position for determining the limits of navigational dangers.
   3.8. Total set and drift..
   3.9. Navigational passage planning.
4. ACCURACY OF LINES OF POSITION AND SHIP'S POSITION
   4.1. Navigational measurements and accuracy.
   4.2. Errors and assessment of line of position accuracy.

4.3. Methods of ship position accuracy assessment.
4.4. Accuracy analysis of ship's position obtained by various navigational methods.
4.5. IMO's norms and standards of ship position accuracy assessment.
4.6. Errors of methods and projections in maritime navigation.

SEMESTER 3	NAVIGATION	CLASSES	15 HOURS

1. FUNDAMENTALS OF SPHERICAL TRIGONOMETRY
   Practical calculations used in navigation and celestial navigation using navigational tables and a calculator.
   1.1. A spherical triangle.
   1.2. Formulas for sines, cosines and semiversuses.
   1.3. Neper's analogies.
   1.4. Right spherical triangle.
2. Solving 1st and 2nd problem of rhumb line sailing.

SEMESTER 3	NAVIGATION	LAB CLASSES	60 HOURS

1. RHUMB LINE AND GREAT CIRCLE SAILING, DEAD RECKONING SAILING, USE OF CALCULATOR, TABLES AND GNOMONIC CHARTS FOR DETERMINING GREAT CIRCLE ELEMENTS (15 HOURS)
   1.1. Solving problems of plane (rhumb line) sailing.
   1.2. Simple and complex/composite mathematical calculations.
   1.3. Calculating elements of a great circle with formulas and tables.
   1.4. Plotting a great circle on a Mercator chart.
   1.5. Use of a gnomonic chart for determining great circle elements.
   1.6. Composite sailing.
   1.7. Automation of rhumb line and great circle computing.
2. SOLVING NAVIGATIONAL PROBLEMS ON A PAPER NAVIGATIONAL CHART (45 HOURS)
   2.1. Plotting a DR position allowing for wind and current.
   2.2. Determination of times/moments when a minimum distance to an object occurs.
   2.3. Plotting lines of position.
   2.4. Determination of a fix or running fix.
   2.5. Solving complex navigational tasks on charts.
   2.6. Use of lines of position for the determination of navigational dangers.
3. ACCURACY OF LINES OF POSITION AND SHIP'S POSITION
   3.1. Determination of navigational measurement errors at various confidence levels.
   3.2. Determination of position accuracy using the error circle method at 95% level of confidence, for various numbers of lines of position and navigational methods.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	60	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	20	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**120**	**5**
Workload related to direct teaching activities:	94	2.5
Workload related to practice-oriented activities:	80	2.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

18.	Course unit:	N2022/24/FS/18/N4

NAVIGATION – module 4

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
I	15	2		2	30		30	2
II	15	1		2	15		30	1
III	15	2	1	4	30	15	60	5
IV	15	2	1	1	30	15	15	3
V	15	2		3	30		45	3
VIII	12	1	1	2	12	12	24	3

III/4. Learning outcomes and syllabus

Learning outcomes – semester IV		Field-specific
LO1	Has knowledge of mathematics, physics, astronomy, and navigation necessary to formulate and solve typical simple tasks related to calculation of elements of astronomical position line and their plotting.	K_W01; K_W13
LO2	Can acquire information from navigational publications and aids and from other sources, integrate and interpret it, draw conclusions and formulate opinions.	K_U01; K_U12
LO3	Can analyse and choose a proper method for solving a given problem concerning celestial navigation methods in use.	K_U11; K_U15

Assessment methods and criteria				
LO1	Has knowledge of mathematics, physics, astronomy, and navigation necessary to formulate and solve typical simple tasks related to calculation of elements of astronomical position line and their plotting.			
Assessment methods	Tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of celestial navigation methods of position determination.	Cannot identify celestial bodies, calculate elements of astronomical position line (APL) for each method used and plot these elements.	Can identify celestial bodies, calculate elements of APL for each method used and plot these elements.	Can choose a proper method of calculating APL elements and a fix.	can analyse obtained results and use them practically in navigation.
LO2	Can acquire information from navigational publications and aids and from other sources, integrate and interpret it, draw conclusions and formulate opinions.			
Assessment methods	Home assignments, assessment of Classes and lab classes.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Use of the nautical almanac for calculations.	Cannot use the nautical almanac for making basic celestial navigation calculations.	Can use the nautical almanac for making basic celestial navigation calculations and knows simplified methods for calculating APL elements.	Can analyse and practically use obtained results.	Can build an algorithm for computing coordinates of a (position) fix and use an appropriate computer software.
LO3	Can analyse and choose a proper method for solving a given problem concerning celestial navigation methods in use.			
Assessment methods	Tests during the semester, reports.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Skill of performing astronomical calculations.	Cannot use a proper navigational instrument and publications for astronomical calculations.	Can use a proper navigational instrument and publications for astronomical calculations.	Can analyse and use obtained results practically.	Can analyse obtained results and use them in combination with other available navigation methods to obtain an astronomical position.

Syllabus

SEMESTER 4	NAVIGATION	LECTURES	30 HOURS

1. General knowledge of the solar system. The celestial sphere – basic concepts.
2. Horizon, celestial equator, ecliptic coordinate systems. Zenith and polar projections. Azimuthal-equidistant projection.

3. A spherical triangle – parallactic, its graphic and analytic solving. Motion of celestial bodies as a function of time and position of observation.
4. Time science: sidereal time, equation of sidereal time, solar true and mean time. Dependence of time on longitude. Equation of solar time. Universal and zone time. Time zones and International Date Line.
5. Chronometer and ship's time service.
6. Layout and use of the nautical almanac.
7. The construction and theory of the sextant. Measurement of celestial body altitude (method, error assessment and elimination). Corrections of sextant altitudes of celestial bodies.
8. Projection of a celestial body on the earth sphere surface. The concept of astronomical position circle (APC) and astronomical position line (APL). Method of direct plotting of APC.
9. Methods of determining an APL, based on: altitude, longitude, latitude.
10. Layout and use of Sight Reduction Tables – HD 605.
11. Identification of celestial bodies – stars and planets. Use of tables and identifiers. Preparation for the morning and evening astronomical observations.
12. Position from simultaneous and non-simultaneous observations of celestial bodies and its accuracy.
13. Diurnal cycle of astronomical observations.
14. Astronomical methods of calculating the total error of magnetic compass and gyrocompass error and gyro compass correction.
15. Procedure algorithms for celestial navigation calculations.

SEMESTER 4	NAVIGATION	CLASSES	15 HOURS

1. Analytical and graphical solving of spherical parallactic triangles: La Hier projection and the use of navigational calculator.
2. Equation of sidereal time and its use. Systems of calculating solar time.
3. The Nautical Almanac: calculation of local hour angles and declinations of celestial bodies as a function of time and position of observation, calculation of times of occurrence of various astronomical phenomena for UTC and zone time, position of observation, corrections of sextant altitudes of celestial bodies.
4. Calculation and plotting of APL by the altitude method (plotting sheet).
5. Identification of celestial bodies – stars and planets by the analytical, graphical and tabulation methods.
6. Calculation and plotting of APL by the latitude method: φ_B from upper and lower meridian passage and from the measurement of Polaris altitude (plotting sheet).
7. Calculation and plotting of APL by the reduction to the meridian and longitude methods (plotting sheet).
8. A fix from simultaneous and non-simultaneous observations of celestial bodies.
9. Diurnal cycle of observations.

SEMESTER 4	NAVIGATION	LAB CLASSES	15 HOURS

1. Zenith projection. Systems of azimuth calculation. Polar projection. Dependence of hour angle on longitude.
2. Geometrical and trigonometric relationships in the apparent diurnal motion of celestial bodies. A virtual planetarium.
3. ABC tables (ABC components for the transformation of coordinates), and their use.
4. Sextant: measurement of celestial body altitude and sextant error calculation.
5. Navigational tables TN-89: sextant altitude corrections.
6. HD/HO tables and their use.
7. Identification of celestial bodies: use of identifiers.
8. Algorithmization of celestial navigation calculations.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**82**	**3**
Workload related to direct teaching activities:	77	2
Workload related to practice-oriented activities:	45	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

18.	Course unit:	N2022/35/FS/18/N5

NAVIGATION – module 5

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		2	30		30	2
2	15	1		2	15		30	1
3	15	2	1	4	30	15	60	5
4	15	2	1	1	30	15	15	3
5	15	2		3	30		45	3
8	12	1	1	2	12	12	24	3

III/5. Learning outcomes and syllabus

Learning outcomes – semester 5		Field-specific
LO1	Discusses and explains causes of tides and tidal streams; understands the impact of these phenomena on the ship and marine environment, and relates them to the safety of navigation.	K_W01; K_W02
LO2	Distinguishes, identifies and characterizes types of tides and tidal streams; assesses the influence of hydrometeorological conditions on the phenomenon.	K_W11; K_W12; K_W30
LO3	Applies acquired synthesis skills for the identification, choice of a method and solving simple and complex navigational problems relating to tides and tidal streams.	K_W13; K_U02
LO4	Acquires source information, determines tide and tidal stream prediction; understands an assumed level of accuracy and restrictions of the calculation method used, interprets obtained results.	K_ U01; K_U11; K_U18
LO5	Has skills of self-instruction and efficient use of information resources, including international sources of information on tides and tidal streams; understands the need of continuous learning for professional development due to the pace of changes in standards and technologies of navigational information conveyance.	K_U06; K_K01
LO6	Knows formal requirements for voyage planning; knows navigational and meteorological sources of information required for passage planning.	K_W02; K_W11; K_W13; K_W14; K_W26
LO7	Knows the process of ship passage planning and monitoring; knows watchkeeping and emergency procedures and can modify a voyage plan depending on the circumstances.	K_W12; K_W13; K_W15
LO8	Can obtain needed information from publications, data bases and other sources, integrate and interpret it, draw conclusions and, eventually develop a voyage plan.	K_U01; K_U04
LO9	Can use computer programs allowing for weather conditions for voyage planning.	K_U09; K_U10; K_U27
LO10	Can make a navigational plan of a voyage: choose a route, prepare charts and publications relevant for a sea passage, get familiar with natural and manmade navigational obstructions, collect information on the weather conditions along the passage route, get familiar with general navigational requirements in various sailing areas.	K_U04; K_U19; K_K02

Assessment methods and criteria				
LO1	Discusses and explains causes of tides and tidal streams; understands the impact of these phenomena on the ship and marine environment, and relates them to the safety of navigation.			
Assessment methods	Tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know or understand causes of tides and tidal streams.	Understands causes of tides and tidal streams, demonstrated slight misunderstanding of the problems in question.	Well understands problems, relates them to the safety of navigation.	Has an extended and systematic knowledge, knows how to utilize recommended reading.
LO2	Distinguishes, identifies and characterizes types of tides and tidal streams; assesses the influence of hydrometeorological conditions on the phenomenon.			
Assessment methods	Tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Cannot discuss and distinguish types of tides and tidal streams.	Characterizes the basics of tides and tidal streams, distinguishes their types.	Characterizes to a greater extent the topic, understands the effect of hydro-meteorological conditions on the actual	Has a detailed and systematic knowledge, demonstrates the use of recommended reading.

			magnitude of the phenomenon.	
LO3	Applies acquired synthesis skills for the identification, choice of a method and solving simple and complex navigational problems relating to tides and tidal streams.			
Assessment methods	A test during the semester, portfolio of navigational tasks to be performed.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Skill of identifying a navigational problem.	Does not identify a navigational problem, does not identify threats to ship's safety.	Identifies a navigational problem relating to tides and tidal streams.	Directed, properly evaluates the effect of a problem on navigational safety.	Identifies a navigational problem independently, indicating its navigational safety aspect.
Criterion 2 Choice of a method for solving a navigational problem.	Does not distinguish methods, does not understand their limitations.	Distinguishes methods of solving a problem, explains principles of using a method, knows computing algorithms.	In addition, identifies limitations of the methods, assumes an acceptable error or approximation of calculations, illustrates them graphically.	Assesses the applicability of methods in various navigational scenarios; gives examples.
LO4	Acquires source information, determines tide and tidal stream prediction; understands an assumed level of accuracy and restrictions of the calculation method used, interprets obtained results.			
Assessment methods	Tests during the semester, home assignments.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Skill of utilizing source information.	Cannot find basic information on tides and tidal streams.	Basically uses international publications and other information resources.	Is mostly independent in using international publications and other information resources, including electronic data carriers.	proficiently and profoundly uses international publications and other information resources.
Criterion 2 Correct calculations of tide/tidal stream predictions.	Cannot make correct calculations, which creates risk to ship's safety.	Makes navigational calculations to a basic extent, using an algorithm.	Makes calculations independently, uses verbal descriptions and graphical solutions; interprets obtained results.	Makes comprehensive calculations perfectly, analyses complex cases.
LO5	Has skills of self-instruction and efficient use of information resources, including international sources of information on tides and tidal streams; understands the need of continuous learning for professional development due to the pace of changes in standards and technologies of navigational information conveyance.			
Assessment methods	Home assignments, passing of tutorial and lab classes; assessment of student's performance and involvement.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Effective use of the teaching activities, skill of self-instruction, understanding of the need for professional development.	In class, does not demonstrate proper activity, or skill of self-learning and deepening the knowledge.	Demonstrates activity required in effective learning.	Demonstrates involvement in the learning process; identifies and solves a problem, slightly assisted by the teacher.	works independently, demonstrates willingness to deepen knowledge; enhances initiative, critical thinking and need of professional improvement.
LO6	Knows formal requirements for voyage planning; knows navigational and meteorological sources of information required for passage planning.			
Assessment methods	Tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Distinguishes only single elements of a voyage plan.	Develops a practical voyage plan for a given route.	Uses information sources necessary for voyage planning; develops a practical voyage plan for a given route.	Uses all available and required by regulations information sources necessary for voyage planning; develops a practical voyage plan for a given route.
LO7	Knows the process of ship passage planning and monitoring; knows watchkeeping and emergency procedures and can modify a voyage plan depending on the circumstances.			
Assessment methods	Tests during the semester, reports.			
Criteria/Grade	2	3	3.5−4	4.5−5

Criterion 1	Cannot prepare and monitor correctly a voyage plan for a given route.	Uses basic sources of information for monitoring and recording a voyage; updates navigational publications.	Can monitor and record a voyage as per international standards; can update navigational publications.	Knows and uses all methods of route monitoring; follows watchkeeping procedures; can keep a ship's log book, manage navigational publications, modify a voyage plan and design alternative routes.
LO8	Can obtain needed information from publications, data bases and other sources, integrate and interpret it, draw conclusions and, eventually develop a voyage plan.			
Assessment methods	Tests during the semester, reports.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Use of information sources.	Uses only a minimum amount of information.	uses and fills out forms from various sources.	Uses computer methods for voyage planning.	Uses information acquired from related course units for voyage planning (computer science, automation); acquires information from English or other language sources.
LO9	Can use computer programs allowing for weather conditions for voyage planning.			
Assessment methods	Reports.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Skill of using computer programs.	Cannot use programs for weather routing optimization.	Knows general principles of using programs for enhancing weather based navigation.	Knows basic meteo programs for voyage planning and route optimization; knows how to co-operate with weather service centres.	Can use various meteo programs for voyage planning and optimization; knows how to co-operate with weather service centres.
LO10	Can make a navigational plan of a voyage: choose a route, prepare charts and publications relevant for a sea passage, get familiar with natural and manmade navigational obstructions, collect information on the weather conditions along the passage route, get familiar with general navigational requirements in various sailing areas.			
Assessment methods	home assignments, reports, passing lab classes.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Is able to make basic plotting and calculations relating to voyage planning.	Develops a voyage plan for coastal, and restricted waters, and ocean routes, incorporating the selection of relevant charts and publications, navigational calculations and plotting.	Develops a voyage plan for coastal, and restricted waters, and ocean routes, incorporating the selection of relevant charts and publications, navigational calculations and plotting, and information on vessel traffic, pilotage and environment protection.	Develops a voyage plan for coastal, and restricted waters, and ocean routes, incorporating the selection of relevant charts and publications, navigational calculations and plotting, and all information on vessel traffic, pilotage and environment protection, including an emergency plan.

Syllabus

SEMESTER 5	NAVIGATION	LECTURES	30 HOURS

TIDES AND TIDAL STREAM (12 HOURS)

1. Basic definitions relating to tides. Tidal curve and its components. Chart datum (tidal and non-tidal areas). Charted versus actual depths.
2. The origin of tides. An outline of equilibrium theory of tides. Tide-generating forces. The tidal ellipse. Rotary motion of the Earth. Motions of the Moon and the Sun and the tide phenomenon (change of declination, change of phases, change of distance). Classification and characteristics of tides: spring, neap, and semidiurnal, diurnal and mixed tides. Diurnal tide diagrams.
3. Dynamics of tides. Length and speed of tidal wave propagation. Influence of seabed and shore configuration shape on the tide phenomenon. Depth changes. Wave interference. A standing wave formed due to the effect of tide forces. The phenomenon of resonance. Amphidromic systems. Shallow water effects. Tidal wave in rivers. Effect of hydrometeorological conditions on the tide phenomenon. The standing wave.
4. Simplified method of harmonic tide analysis. Harmonic components, astronomical arguments, harmonic constants.
5. Publications containing information on tides; tide tables, navigational charts. Tide charts – methods of calculation, accuracy of predictions.

6. Tidal currents (streams) – types and characteristics. Rotary and reversing currents. Semidiurnal, diurnal and mixed currents. Tidal current diagrams. Effect of seabed and shore configuration on tidal streams.
7. Publications containing information on tidal streams: tables, atlases, tidal current charts, navigational charts – principles of use.
8. Accuracy of tide and tidal current predictions.

VOYAGE PLANNING (15 HOURS)

1. Formal requirements for voyage planning.
   1.1. Recommendations contained in Chapter V of the SOLAS Convention, Regulation 34, according to Annex 25 of IMO Resolution A. 893 (21), referring to gathering all information relevant to the contemplated voyage or passage, detailed planning of the whole voyage or passage from berth to berth, plan execution and monitoring.
   1.2. Recommendations contained in the STCW Convention concerning officers and the crew, ship's equipment, ISM system, and those concerning voyage planning and watch officer duties.
2. Sources of information necessary for passage planning.
   2.1. Charts.
   2.2. Publications.
   2.3. Notices to Mariners.
   2.4. Radio navigational warnings.
   2.5. Ship's data.
3. The contents and correction of nautical publications such as Sailing Directions, Lists of Radio Signals, Ocean Passages for the World, distance tables, IMO Ship's Routeing, Mariner's Handbook, Guide to Port Entry.
4. The process of planning and monitoring a vessel passage.
   4.1. Watch officer's duties at various stages of voyage execution, including marine environmental considerations.
   4.2. Watchkeeping and emergency procedures.
   4.3. Requirements for methods and frequency of position determination at various voyage stages.
5. Planning an ocean voyage and open sea passages.
   5.1. Choice of a route taking into account the type of sailing.
   5.2. Search and rescue.
6. Voyage planning in restricted waters.
   6.1. Bridge team management.
   6.2. Methods of monitoring ship's position in coastal and pilotage-covered areas (limiting danger lines/no-go areas, trans-its/ranges, leading lines, parallel indexing, blind pilotage techniques).
   6.3. Position monitoring by shore and fairway coordinates.
7. Modification of a voyage plan during its execution. Contingency plan.
8. Reporting systems.
9. Log books.

HYDROMETEOROLOGICAL CONDITIONS RESTRICTING THE CHOICE OF SHIP'S TRACK (3 HOURS)

1. *Routeing Charts* – choice of a route and description of the expected weather.
2. Weather routes.
3. Navigation in ice-affected waters – planning a voyage in areas covered by sea and river ice – interpretation of charts.
4. Forecasting ship's icing based on nomograms.
5. Use of land-based weather routing service centres.

SEMESTER 5	NAVIGATION	LAB CLASSES	45 HOURS

TIDES AND TIDAL STREAMS (20 HOURS)

1. Use of Admiralty Tide Tables and navigational charts. Tidal and nontidal areas, chart datum, determination of the rise of tide, tidal levels. Tide curve and its components; high water, low water, tidal range, mean diurnal range, tidal height at any moment, tide rise, duration of tide, tidal period. Tide prediction.
2. ATT – standard ports. Time of prediction (zone time, summer time). Duration of tide rise and fall, ranges. Mean diurnal range. Area depth at high water and low water. Anchoring. Calculation of tidal height between high and low water. Present water depth, reduction to soundings. Determination of the time of required tidal height. Approach to a port, passage over shallow water, attempt to refloat without assistance. Correction of: light elevation, charted heights, bridge clearance etc.
3. Tide prediction for secondary ports. Tidal calculations.
4. Simple harmonic methods of tidal prediction – graphical and with a calculator. Automation of tidal calculations. Tidal programs for a PC (BA version – DB 550 and DB 560).
5. Calculation of tidal height in the open sea, co-tidal and co-range charts.
6. Determination of tidal stream parameters: set and rate, duration, stand of the tide. Information on tidal streams on navigational charts. Use of atlases, tables, diagrams, sailing directions.
7. Use of the Internet as a source of information on tides and tidal streams (hydrographic services), PC software for the prediction of tides and tidal currents.

VOYAGE PLANNING (25 HOURS)

1. Use of the sources of information necessary for voyage planning.
   1.1. Navigational charts, routing charts, sailing directions, lists of lights and fog signals, list of radio signals, tide tables and atlases of tidal currents.
   1.2. *Ocean Passages for the World, IMO Ship's Routeing, Mariner's Handbook, Guide to Port Entry*.

1.3. *Notices to Mariners*.
1.4. Radio navigational warnings.
1.5. Ship's particulars.
2. Planning an ocean voyage: a passage across the Atlantic between given positions.
2.1. Choice of charts and publications.
2.2. Choice of a route accounting for the type of sailing, and operational requirements.
2.3. Total distance and time of a passage for an assumed speed of the vessel.
2.4. Possibilities of receiving weather reports/forecasts and navigational warnings.
2.5. Reporting systems.
3. Practical drawing up of a passage plan, e.g. through the English Channel, using *Mariner's Routeing Guide* chart, and relevant navigational charts and publications.
4. Voyage planning in coastal and restricted water navigation.
4.1. Choice of charts and publications.
4.2. Choice of a route, allowing for under keel clearance, position fixing possibilities, indications of ship's dangerous bearings, traffic separation schemes, etc.
4.3. Distances between waypoints and times to reach them for an assumed ship's speed.
4.4. Tide and tidal current prediction for a given area.
4.5. Planning ship's speed reduction.
4.6. Determination of reporting points in relation to vessel traffic, pilotage, environment protection (VTS, MARPOL).
4.7. Indication of a position for changing the chart.
5. Independent preparation of berth-to-berth voyage plan, including all relevant charts and navigational aids. Plotting courses on a paper chart, with all necessary information and a contingency plan included.
6. Updating of navigational charts and publications.
7. Watchkeeping documentation.
8. Automation of navigational calculations.
9. Computer programs with weather conditions functionality for voyage planning. Choice of a route taking into account hydrometeorological conditions.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	45	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**98**	**3**
Workload related to direct teaching activities:	77	1.5
Workload related to practice-oriented activities:	60	1.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

18.	Course unit:	N2022/48/FS/18/N6

NAVIGATION – module 6

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		2	30		30	2
2	15	1		2	15		30	1
3	15	2	1	4	30	15	60	5
4	15	2	1	1	30	15	15	3
5	15	2		3	30		45	3
8	12	1	1	2	12	12	24	3

III/6. Learning outcomes and syllabus

Learning outcomes – semester 8		Field-specific
LO1	Knows legal aspects concerning ECDIS systems, sources of data and types of electronic chart systems, configuration and functions of ECDIS systems; has a systematic knowledge of navigation, allowing to solve complex problems.	K_W06; K_W11; K_W13; K_W15; K_W23
LO2	Has a fundamental knowledge of technical standards and requirements for ECDIS.	K_W26; K_W27; K_W28
LO3	Can acquire information from specialized literature, ECDIS data bases and other sources, integrate and interpret it, draw conclusions and formulate opinions.	K_U01; K_U18
LO4	Can analyse information delivered by an ECDIS system.	K_U12; K_U15
LO5	Understands the need of continuous self-instruction – upgrading professional and personal competences by getting familiar with interactions between various components of navigation.	K_U06; K_K01; K_K03

Assessment methods and criteria				
LO1	Knows legal aspects concerning ECDIS systems, sources of data and types of electronic chart systems, configuration and functions of ECDIS systems; has a systematic knowledge of navigation, allowing to solve complex problems.			
Assessment methods	Written exam, oral exam, assessment of Classes and simulator classes.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Cannot interpret ECDIS data or solve complex navigational problems.	Knows basic legal aspects and standards of ECDIS; interprets data from devices and sensors co-operating with ECDIS; characterizes some types of electronic chart systems, alarms, warnings and data presented by ECDIS; correctly solves problems combining various navigation issues, including proper chartwork.	Knows basic legal aspects and standards of ECDIS; interprets data from devices and sensors co-operating with ECDIS; characterizes basic types of electronic chart systems, alarms, warnings and data presented by ECDIS; correctly solves problems combining various navigation issues, including proper chartwork.	Knows basic legal aspects and standards of ECDIS; knows a configuration and functions of an ECDIS system; characterizes basic types of electronic chart systems; knows assumptions for data bases, interprets alarms, warnings and data presented by ECDIS; precisely solves problems combining various navigation issues, including proper chartwork.
LO2	Has a fundamental knowledge of technical standards and requirements for ECDIS.			
Assessment methods	Written exam, assessment of simulator classes, ‘quick’ tests.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Understanding of technical standards.	Cannot interpret ECDIS system data.	Reads out ECDIS data and monitors the functioning of the system and its principal parameters.	Updates chosen data, records and monitors the functioning of ECDIS; understands the role of back-up function.	Updates the data, records and monitors the functioning of ECDIS; understands the role of back-up function.
LO3	Can acquire information from specialized literature, ECDIS data bases and other sources, integrate and interpret it, draw conclusions and formulate opinions.			
Assessment methods	Assessment of simulator classes, project, presentation.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Cannot interpret ECDIS data.	Knows and distinguishes basic data referring to planning, monitoring, and recording of a voyage by an ECDIS system.	Knows and distinguishes basic data referring to planning, monitoring, and recording of a voyage by an ECDIS system, control of system functioning, presentation of additional	Knows and distinguishes data referring to planning, monitoring, and recording of a voyage by an ECDIS system, control of system functioning, presentation of

			information and updating of an ECDIS system.	additional information and updating of an ECDIS system.
LO4	Can analyse information delivered by an ECDIS system.			
Assessment methods	Assessment of simulator classes, project, presentation.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Understanding of technical standards.	Cannot interpret ECDIS system data.	Knows and distinguishes basic data referring to planning, monitoring, and recording of a voyage by an ECDIS system.	Knows and distinguishes basic data referring to planning, monitoring, and recording of a voyage by an ECDIS system.	Knows and distinguishes data referring to planning, monitoring, and recording of a voyage by an ECDIS system.
LO5	Understands the need of continuous self-instruction – upgrading professional and personal competences by getting familiar with interactions between various components of navigation.			
Assessment methods	Assessment of simulator classes, project, presentation, assessment of student's performance and involvement.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not demonstrate interest in the subject taught.	Uses basic sources of information to interpret information obtained from an ECDIS system.	Combines information from an ECDIS system with other fields of navigation and uses it during classes.	Proficiently combines information from an ECDIS system with other fields of navigation and uses it during classes.

Syllabus

SEMESTER 8	NAVIGATION	LECTURES	12 HOURS

1. ECDIS
   1.1. Legal aspects and standardization of ECDIS systems.
   1.2. Characteristics of basic types of electronic charts (ECDIS, RCDS and ECS).
   1.3. Data base created for ECDIS (WEND, RECC).
   1.4. Devices and sensors co-operating with ECDIS.
   1.5. Alarms, warnings and wrong interpretation of presented data.

SEMESTER 8	NAVIGATION	CLASSES	12 HOURS

1. ECDIS
   1.1 Presentation of ECDIS data (ENC/SENC and RNC/SRNC). Basic navigational functions of ECDIS.
   1.2 Standard display and presentation of additional navigational information.
   1.3 Voyage planning, monitoring and recording in ECDIS systems.
   1.4 Data protection, management, and updating, recording of navigational data, control of correct operation of ECDIS, back-up functions.
   1.6. ARCS, AVCS, TADS services.

SEMESTER 8	NAVIGATION	LAB CLASSES	24 HOURS

1. ECDIS AND COMPLEX NAVIGATIONAL TASKS ON A NAVIGATIONAL CHART
   1.1. ECDIS data presentation.
   1.2. SENC data presentation.
   1.3. Sailing directions for the planned and executed route. Standard display and presentation of additional navigational information.
   1.4. Devices and sensors connected to ECDIS. The use of radar and ARPA.
   1.5. Voyage planning using ECDIS.
   1.6. Ship's track control on a planned route.
   1.7. Voyage recording.
   1.8. Use of raster charts in route monitoring and planning.
   1.9. Data updating, navigational data recording, control of correct operation of ECDIS.
   1.10. Pilot navigation using ECDIS.
2. Complex navigational tasks.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures	12	

Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	36	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	12	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**70**	**3**
Workload related to direct teaching activities:	52	1.5
Workload related to practice-oriented activities:	48	1.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. *Admiralty Manual of Navigation*, BR 45 Volume 1, The Principles of Navigation, Ed. 2008.
2. *Admiralty Manual of Tides*, NP. 120, A.T. Doodson and H.D. Warburg. London 1941. Rep. 1980.
3. Bowditch N. *American Practical Navigation*, Vol. 1 & 2, Edition 2019, updated June 2021.
4. Dutton's Navigation and Piloting Naval Institute Press, 1988.
5. House D.J., *Navigation for Masters*, Witcher Co. Ltd., London, 1998.
6. ICS – Bridge Procedure Guide, Edition January 2022.
7. IHO S – 52, Appendix 2. Coulour and Symbol Specification for ECDIS, 3rd Edition. IHO 2004.
8. IMO – MSC.232(82) Adoption of the revised performance standards for ECDIS, 5 December 2006.
9. IMO Resolution A.817/19. Performance Standards for Electronic Chart Display System (ECDIS), London 1998.
10. SOLAS – Chapter V – Regulation 34, ANEX 24, Res. IMO A.893(21) 'Guidelines for Voyage Planning'.
11. Larkin F.J. *Basic Costal Navigation*, 2nd edition.
12. Mixter G.W., *Primer of Navigation: With Problems in Practical Work and Complete Tables*, W.W. Norton & Company, 1995.
13. Naval Training Command, United States. Bureau of Naval Personnel, 1978.
14. Nicholls's Concise Guide Vol. 1,2, Brown, Son Ferguson Ltd., Glasgow, 1984, 1987.
15. Symbols and Abbreviations used on Admiralty Charts. Chart 5011, Hydrographic Office, current edition.
16. Switft A.J., *Bridge Team Management a Practical Guide*, The Nautical Institute London, 2004.
17. Tables Navigational TN-89, Gdynia, 1989.

VI. Extra reading
1. *Australian Tides Manual* – Special Publication No 9. Australian Hydrographic Office.
2. *Canadian Tidal Manual* – Proudman Oceanographic Laboratory (Natural Environment Research Council).
3. Cotter C.H., *Elements of Navigation and Nautical Astronomy*, Hardcover July 1992.
4. *Easy tides* – on-line tidal prediction from UKHO.
5. *How to Keep Your Admiralty Charts Up-To-Date*, NP. 294. 2005.
6. IHO S – 52, Appendix 3. Glossary of ECDIS-related Terms, 3nd Edition. IHO, 1997.
7. NOAA, *Our restless tides.*
8. Simpson A., Navigation Guide Vol. 1, 2, 1991.
9. Stewart B., *Introduction to Physical Oceanography* – revised 2009.
10. *Tides online* – NOAA, National Ocean Service, Centre of Operational Oceanographic Products and Services.
11. *Total tides* **–** British Admiralty.
12. UCAR – University Corporation for Atmospheric Research; COMET Program MetEd – *Introduction to ocean tide.*

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

19.	Course unit:							N2022/12/FS/19/MO1
METEOROLOGY AND OCEANOGRAPHY – module 1								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	2	1		30	15		1
3	15	2		1	30		15	3

I. Course unit aims

This course unit aims at imparting fundamental knowledge of the atmosphere and the ocean, processing taking place in them, and teaching skills of recognizing and interpreting meteorological and hydrological phenomena and processes, analysing meteorological information and diagnosing weather situation in view of navigation safety.

II. Preliminary requirements

The scope of a secondary school.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 2		Field-specific
LO1	Has a systematic general knowledge of the functioning of the atmosphere and the ocean and interactions between them.	K_W01; K_W02
LO2	Has a fundamental knowledge relating to measuring instruments used in meteorological observations at sea (psychrometers, aneroids, anemometers, etc.) is able to use them.	K_W02; K_W24
LO3	Knows basic principles of performing meteorological and hydrological observations, the organization of meteorological networks and systems broadcasting weather forecasts.	K_U27
LO4	Can apply observation scales (Beaufort, sea state, visibility, ice compactness, cloudiness, etc.) and nomograms, psychrometric tables, and international meteorological terminology.	K_W02; K_W26
LO5	Is aware of the influence of the atmosphere and the ocean on navigation safety and the environment.	K_W34; K_K05
LO6	Knows general circulation of the atmosphere, structure of low- and high-pressure systems.	K_W02

Assessment methods and criteria				
LO1	Has a systematic general knowledge of the functioning of the atmosphere and the ocean and interactions between them.			
Assessment methods	Written exam, oral exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know the structure and fundamental laws of the functioning of the atmosphere and the ocean.	Knows the structure of the atmosphere and the ocean.	Knows the structure of the atmosphere and the ocean, can name phenomena occurring in them; can describe most of phenomena occurring in the atmosphere and the ocean.	Knows phenomena occurring in the atmosphere and the ocean and their influence on ship safety; can predict and avoid dangerous phenomena and their impact on ship safety.
LO2	Has a fundamental knowledge relating to measuring instruments used in meteorological observations at sea (psychrometers, aneroids, anemometers, etc.) is able to use them.			
Assessment methods	Tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know measuring instruments used in meteorological observations.	Can characterize basic measuring instruments.	Knows measuring instruments and principles of measurement performance; can handle basic meteorological measuring instruments.	can handle basic meteorological measuring instruments and make use of attached instructions; knows limitations of measuring instruments, their construction and principle of operation; utilizes all their functions.
LO3	Knows basic principles of performing meteorological and hydrological observations, the organization of meteorological networks and systems broadcasting weather forecasts.			
Assessment methods	Written exam, oral exam			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know basic principles	Can explain a n observation	Can characterize weather broadcasting systems;	Evaluates the usefulness of information received onboard;

	of performing meteorological and hydrological observations.	network and how to perform observations.	selects stations broadcasting weather information appropriate for a shipping area.	fully plans the reception of weather information onboard for a whole voyage, knows principles of transmission, and weather forecast broadcasting systems.
LO4	Can apply observation scales (Beaufort, sea state, visibility, ice compactness, cloudiness, etc.) and nomograms, psychrometric tables, and international meteorological terminology.			
Assessment methods	Assessment of classes, lab and simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know basic observation scales.	Knows basic observation scales and nomograms.	Knows where to find basic observation scales, nomograms, tables; uses meteorological aids to a basic extent.	Uses the international meteorological terminology and know its aim; can assign each scale to a phenomenon being described and confidently uses these scales.
LO5	Is aware of the influence of the atmosphere and the ocean on navigation safety and the environment.			
Assessment methods	Written exam, oral exam			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Cannot indicate the influence of hydrometeorological phenomena on the ship.	Can indicate the influence of extreme phenomena on the safety of navigation and the environment.	Combines extreme phenomena with the weather; partly knows the origin of phenomena and attempts at predicting them.	Uses formulas and calculates extreme weather conditions (storm surge, tsunami, seiche); predicts the influence of weather on the ship and environment; formulates conclusions and knows principles of ship protection.
LO6	Knows general circulation of the atmosphere, structure of low- and high-pressure systems.			
Assessment methods	Tests during the semester, written exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know general circulation of the atmosphere or the structure of pressure systems.	Knows general circulation of the atmosphere or the structure of pressure systems.	Knows general circulation of the atmosphere; defines air masses, permanent and local winds; knows the structure of low- and high-pressure systems.	Knows general circulation of the atmosphere; defines air masses, permanent and local winds; knows the structure of low- and high-pressure systems; can predict variability of weather in atmospheric front areas.

Syllabus

SEMESTER 2	METEOROLOGY AND OCEANOGRAPHY	LECTURES	30 HOURS

1. Observed and measured weather constituents.
2. Composition of the atmosphere.
3. States of atmospheric equilibrium.
4. Pressure lows and highs. Frontogenesis and frontolyzes.
5. General circulation of the atmosphere.
6. Winds on the Earth's sphere, local winds.
7. Fogs, mist and haze.
8. Weather services for shipping. Reception and interpretation of weather information onboard.
9. Synoptic analysis.
10. Shipboard meteorological instruments.
11. Principles of meteorological measurements and observations.
12. The Oceans and their division, ocean floor characteristics, sediments.
13. Physical and chemical properties of sea water.

SEMESTER 2	METEOROLOGY AND OCEANOGRAPHY	CLASSES	15 HOURS

1. Meteorological networks and sources of weather information.
2. Principles of meteorological observations.
3. Observed and measured weather constituents.
4. Atmospheric pressure.
5. Air temperature.

6. Air humidity. Psychrometric measurements.
7. Wind. True wind measurements.
8. Beaufort scale, sea state – Douglas scale.
9. Visibility.
10. Types of clouds.
11. Weather phenomena. Current weather.
12. Model of a synoptic station.
13. Notations used on weather charts.
14. Prediction of changes of weather conditions in atmospheric fronts.
15. Making entries in the ship's logbook and hydro-meteorological observation logbook.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	4	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**55**	**1**
Workload related to direct teaching activities:	47	0.5
Workload related to practice-oriented activities:	19	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

19.	Course unit:							N2022/23/FS/19/MO2
METEOROLOGY AND OCEANOGRAPHY – module 2								
Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	2	1		30	15		1
3	15	2		1	30		15	3

III/2. Learning outcomes and syllabus

Learning outcomes – semester 3		Field-specific
LO1	Has knowledge of tropical cyclones, knows principles of avoiding stormy cyclone zones and principles of weathering.	K_U19; K_K05
LO2	Can interpret ice information for shipping.	K_U19; K_U27
LO3	Can interpret wave information.	K_U19; K_U27
LO4	Has knowledge of short-term sea level changes; can calculate sea level parameters.	K_U19; K_U11
LO5	Has knowledge of sea currents and their impact on the ship.	K_U19; K_U27
LO6	Can interpret text and graphical weather information and draw up weather telegrams.	K_W06; K_W02

Assessment methods and criteria				
LO1	Has knowledge of tropical cyclones, knows principles of avoiding stormy cyclone zones and principles of weathering.			
Assessment methods	Assessment of the lab class, written exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know the structure, areas of occurrence, behaviour of tropical cyclones; cannot determine routes bypassing a cyclone; does not know principles of weathering in a cyclone.	Has basic knowledge of cyclone behaviour; knows principles of navigation in areas where tropical cyclones occur.	Has basic knowledge of cyclone behaviour; can choose a proper route in an area where tropical cyclone occurs; knows principles of weathering in a cyclone-affected area.	Has knowledge of cyclone behaviour; can choose a proper route in an area where tropical cyclone occurs; interprets a situation and predicts cyclone behaviour; knows principles of weathering in a cyclone-affected area.
LO2	Can interpret ice information for shipping.			
Assessment methods	Assessment of the lab class, written exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know the classification of ice phenomena; cannot utilize ice information.	Knows basic classification of ice phenomena; makes a general analysis of ice charts and bulletins; knows principles of predicting and preventing ship's icing.	Knows classification of ice phenomena; properly uses ice charts and bulletins; can use nomograms of icing prediction; knows principles of counteracting ship's icing.	Knows classification of ice phenomena; properly interprets ice charts and bulletins; can use nomograms and models of icing prediction; knows principles of counteracting ship's icing in various situations.
LO3	Can interpret wave information.			
Assessment methods	Assessment of the lab class, written exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not know the characteristics of waves, theories of wave development and dissipation; cannot calculate wave parameters, predict the development of waves.	Knows the characteristics of waves and general assumptions of theories explaining the generation and behaviour of waves; calculates basic quantities related to waves.	Knows the characteristics of waves and assumptions of theories explaining the generation and behaviour of waves; calculates quantities related to waves; can predicts how waves will develop.	Knows the characteristics of waves; explains theories behind wave generation and action; calculates quantities related to waves; can predicts how waves will develop; uses nomograms for predicting wave development.
LO4	Has knowledge of short-term sea level changes; can calculate sea level parameters.			
Assessment methods	Assessment of the lab class, written exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Cannot describe short-term oscillations of sea	Characterizes in general short-term oscillations of sea level	Describes the essence and character of short-term oscillations of sea	Describes the essence and character of short-term oscillations of sea level; can

	level or calculate their parameters.	and calculates their basic parameters.	level; can calculate their parameters; knows criteria of the open ocean and shallow water.	calculate their parameters; knows criteria of the open ocean and shallow water; interprets the impact of short-term sea level oscillations on the ship.
LO5	Has knowledge of sea currents and their impact on the ship.			
Assessment methods	Assessment of the lab class, written exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Does not have knowledge of sea currents.	Has basic knowledge of sea currents.	Knows the classification, characteristics and areas sea current occurrence; can calculate sea current parameters.	Knows the classification, characteristics and areas sea current occurrence; can calculate sea current parameters; knows criteria of shallow water for currents and the effect of shallow water on the set and drift of current.
LO6	Can interpret text and graphical weather information and draw up a weather telegram.			
Assessment methods	Assessment of the lab class, written exam.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1	Cannot interpret weather information; cannot draw up a weather report.	In a limited manner interprets text and graphical weather information; knows principles of drawing up a weather telegram.	Properly interprets text information and weather charts; draws up a weather telegram.	Properly interprets text information and weather charts; properly chooses sources of weather information; can prepare an information reception program for a selected route of the ship; draws up a weather telegram.

Syllabus

SEMESTER 3	METEOROLOGY AND OCEANOGRAPHY	LECTURES	30 HOURS

1. Tropical synoptic meteorology; Inter-tropical Convergence Zone; trade winds, monsoons.
2. Tropical cyclones. Structure and areas of origin, weather conditions.
3. Stages of a tropical cyclone development, classification of cyclones.
4. A tropical cyclone as a navigational danger. Avoiding a danger. Bypassing a storm field. Weathering in a tropical cyclone.
5. Ice phenomena on the seas.
6. Ice service, transmission of information on ice phenomena, Baltic Sea Ice Code.
7. Characteristics of waves. Wind-induced waves. Theories of wave origin, development and dissipation.
8. Impact of waves on ship motions.
9. Prediction of wave fields, interpretation of wave charts and weather bulletins.
10. Ocean currents. Classification, occurrence, characteristics.
11. Sea level oscillations – long-term, seasonal, short-term.
12. Storm surges and negative surges, seiches, tsunamis.

SEMESTER 3	METEOROLOGY AND OCEANOGRAPHY	LAB CLASSES	15 HOURS

1. A tropical cyclone as a navigational danger. Bypassing a storm field.
2. Weathering in a tropical cyclone.
3. Drawing up meteo telegrams.
4. Interpretation of ice charts and bulletins.
5. Ship icing. Prediction of ship icing. Predicting possibilities of ship icing based on nomograms.
6. Baltic Sea Ice Code.
7. Calculation of wind-induced current (set, speed).
8. Analysis and interpretation of weather information text (waves, visibility, phenomena).
9. Analysis and interpretation of weather charts (surface analysis, pressure and wave charts)
10. Routing charts, choice of a route, description of predicted weather.
11. Making entries in the ship's logbook and hydro-meteorological observation logbook.
12. Hydrometeorological publications and aids.

13. Hydrometeorological advisory programs.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	8	
Total workload	**72**	**3**
Workload related to direct teaching activities:	49	2
Workload related to practice-oriented activities:	30	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training record book for deck cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. Frampton R. et al., *Meteorology for Mariners*, 5th Edition 2017, UK Meteorological Office.
2. Burch D., *Modern Marine Weather*, 2nd Edition, Starpath Publications, 2008.
3. Lutgens F.K., Tarbuck E.D., *The Atmosphere: An Introduction to Meteorology*, Prentice Hall/Pearson Education, 2010.
4. Stewart R.H., *Introduction to Physical Oceanography*, Department of Oceanography, Texas A & M University, 2008.
5. Thurman H.V., Trujillo A.P., *Introductory oceanography*, Prentice Hall, 2004.

VI. Extra reading
1. MANICE (*Manual of Standard Procedures for Observing and Reporting Ice Conditions*), Canadian Ice Service – Environment Canada, Assistant Deputy Minister Meteorological Service of Canada, Revised Ninth Edition, June 2005.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

20.	Course unit:	N2022/11/FS/20/ENA1

ELECTRONIC NAVIGATION AIDS – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2	1	1	30	15	15	2
2	15	1		2	15		30	2
3	15	1		1	15		15	2
4	15	1		1	15		15	2
5	15	1		1	15		15	2

I. Course unit aims

This course unit is aimed at teaching students the principle, operation and effective use of navigational and radar systems and equipment carried onboard a ship, pointing at their limitations, accuracy and specific manner of displaying navigational information.

II. Preliminary requirements

The scope of a secondary school curriculum, elements of navigation, fundamentals of electronics, physics, mathematics, automation, and navigation safety.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes, separately for each semester.

Learning outcomes– semester 1		Field-specific
LO1	Has knowledge of the construction, principle of operation, applicability, handling and configuration of navigational equipment.	K_W05; K_W06; K_W13; K_W24
LO2	Has skills of using, handling and configuring navigational equipment.	K_U01; K_U12; K_U18; K_U26
LO3	Has basic knowledge of the technical standards related to the use of receivers of navigational systems.	K_W28

Assessment methods and criteria				
LO1	Has knowledge of the construction, principle of operation, applicability, handling and configuration of navigational devices.			
Assessment methods	Written exam.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Construction of gyroscopes and gyro compasses.	Does not know the construction, does not understand phenomena of rigid body physics.	Knows an overall construction, understands basic phenomena of rigid body physics.	Knows technological construction, understands basic phenomena of rigid body physics.	Knows technological construction, understands technical drawings, and advanced phenomena of rigid body physics.
Criterion 2 Knowledge of log construction	Does not have a minimum knowledge of log construction.	Has a basic knowledge, knows how to start up a log, but cannot calibrate it.	Has basic knowledge, knows how to start up and calibrate a log.	Has extended knowledge, knows how to start up and calibrate a log.
Criterion 3 Knowledge of standards, accuracy and limitations of navigational systems	Does not have knowledge of standards, accuracy and limitations of navigational systems.	Has knowledge of standards and accuracy of navigational systems.	Has knowledge of limitations of navigational systems.	Has knowledge of standards, accuracy and limitations of navigational systems.
Criterion 4 Knowledge of standards, accuracy and limitations of echosounders.	Does not have knowledge of standards, accuracy and limitations of echosounders.	Has knowledge of standards and accuracy of echosounders.	Has knowledge of limitations of echosounders.	Has knowledge of standards, accuracy and limitations of echosounders.
Criterion 5 Knowledge of the construction of logs and echosounder configuration.	Has no knowledge as required.	Has a basic knowledge of the topic, can start up an echosounder, but cannot calibrate it.	Has a basic knowledge, can start up an echosounder, and calibrate it.	Has an extended knowledge, can start up an echosounder and calibrate it.
LO2	Has skills of using, handling and configuring navigational equipment.			

Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Use of gyro compasses.	Cannot use gyro compasses.	Knows the basics of gyro compass use.	Is quite proficient in using gyro compasses.	Can use fully the functions of navigational gyro compasses.
Criterion 2 Handling and configuration of autopilots.	Cannot handle or configure receivers of navigational systems.	Can handle or configure receivers of navigational systems in a basic scope.	Is quite proficient in handling or configuring receivers of navigational systems.	Can fully handle or configure receivers of navigational systems.
Criterion 3 Skills of handling and calibrating speed logs.	Does not have the skills.	Can start up a speed log, but cannot calibrate it.	Can start up a speed log and calibrate it.	Has extended knowledge; can start up a speed log and calibrate it.
Criterion 4 Knowledge of the construction of logs and echosounder configuration.	Does not have the relevant knowledge.	Has a basic knowledge, knows how to start up an echosounder, but cannot calibrate it.	Has basic knowledge, knows how to start up and calibrate an echosounder.	Has extended knowledge, knows how to start up and calibrate an echosounder.
LO3	Has basic knowledge of the technical standards related to the use of receivers of navigational systems.			
Assessment methods	Tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of technical standards.	Does not have knowledge defined as LO3	Knows IEC and PN standards.	Knows IEC and PN standards and interprets them.	Knows IEC and PN standards and interprets and refers them to European standards.
Criterion 2 Knowledge of relevant standards.	Does not have knowledge defined as LO3.	Knows relevant IMO standards.	Knows IMO standards and uses them in combination with technical documentation.	Knows IMO standards and uses them in combination with technical documentation in the English language.

Syllabus

SEMESTER 1	BASIC NAVIGATION SYSTEMS	LECTURES	30 HOURS

1. Physical phenomena used for direction determination in compasses.
2. Construction and principle of operation of gyro compasses.
3. Construction, principle of operation and handling of autopilots.
4. Ship's speed measurement – construction and principle of operation of logs.
5. Depth measurement – construction and principle of operation of echosounders.
6. Horizontal detection of underwater objects – construction and principle of operation of a sonar and multibeam echosounder.
7. Digital and analogue methods for logging data from navigational devices – construction and principle of operation of a voyage data recorder (VDR).
8. Equipment for inertial navigation, principles of operation and main applications.
9. Systems and equipment of dynamic positioning.
10. Classification society requirements for navigational equipment.
11. Parameters of the electromagnetic wave used in navigation.
12. Time standards and time scales in radio navigation systems.
13. Position line in radio navigation and classification of radio navigation systems.
14. Position reference systems.

SEMESTER 1	BASIC NAVIGATION SYSTEMS	CLASSES	15 HOURS

1. Construction of a gyro compass and gyro compass sphere.
2. Calibration of gyro compass indications.
3. Characteristics and principles of autopilot regulation.
4. Accuracy assessment of autopilot control.
5. Construction and principles of operation/maintenance of logs – correction of log indications.
6. Construction and principles of operation/maintenance of marine echosounders.
7. Interpretation of marine echosounder indications.

SEMESTER 1	BASIC NAVIGATION SYSTEMS	LAB CLASSES	15 HOURS

1. Fundamental statistics in data analysis (statistic mean values: arithmetic, geometric, weighted) median, mode.
2. Principles of depth and distance measurements; errors and limitations.
3. Construction, principle of operation and accuracy: MEMS gyroscopes, optical gyroscopes; applications of both types in navigation systems.
4. Methods of adjustment of course control systems (autopilots).
5. Major methods of information exchange between navigational devices – NMEA protocol.
6. Analytical and geometric form of position lines, analytical and graphical position determination.
7. Error models, mean squared error, parallelogram of uncertainty, error circle, error ellipse.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects	5	
Self-instruction: preparation for passing tests and exams	5	
Total workload	**87**	**2**
Workload related to direct teaching activities:	62	1
Workload related to practice-oriented activities:	45	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

20.	Course unit:	N2022/12/FS/20/ENA2

ELECTRONIC NAVIGATION AIDS – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2	1	1	30	15	15	2
2	15	1		2	15		30	2
3	15	1		1	15		15	2
4	15	1		1	15		15	2
5	15	1		1	15		15	2

III/2. Learning outcomes and syllabus

Learning outcomes – semester 2		Field-specific
LO1	Has knowledge and skills of using, handling and configuring navigational system receivers for planning and execution of a sea voyage; knows limitations and accuracy of navigational systems.	K_W15;K_U12; K_U18; K_U26
LO2	Has knowledge of properties and propagation of electromagnetic waves, radio wave parameters, time standards and time scales, reference systems and phenomena affecting the movement of a satellite in the Earth's gravitational field; knows the construction and principle of operation of navigational systems.	K_W06; K_W13; K_W24
LO3	Can acquire information from publications, data bases and other sources, integrate and interpret it, draw conclusions and formulate opinions on efficient use of navigational systems in practice.	K_U01

Assessment methods and criteria				
LO1	Has knowledge and skills of using, handling and configuring navigational system receivers for planning and execution of a sea voyage; knows limitations and accuracy of navigational systems.			
Assessment methods	Tests during the semester, assessment of the lab classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Use of navigational system receivers.	Cannot use navigational system receivers.	Has mastered basic use of navigational system receivers.	Is quite proficient in using navigational system receivers.	Can make full use of the functions of navigational system receivers.
Criterion 2 Operation and configuration of navigational system receivers.	Cannot operate or configure navigational system receivers.	Can operate or configure navigational system receivers in a basic scope.	Is quite proficient in handling and configuring navigational system receivers.	If very proficient in handling and configuring navigational system receivers.
Criterion 3 Knowledge of standards, accuracy and limitations of navigational systems.	Does not have knowledge of standards, accuracy and limitations of navigational systems.	Has knowledge of standards and accuracy of navigational systems.	Has knowledge of limitations of navigational systems.	Has knowledge of standards, accuracy and limitations of navigational systems.
LO2	Has knowledge of properties and propagation of electromagnetic waves, radio wave parameters, time standards and time scales, reference systems and phenomena affecting the movement of a satellite in the Earth's gravitational field; knows the construction and principle of operation of navigational systems.			
Assessment methods	Written assessment test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 knowledge of properties and propagation of electromagnetic waves, radio wave parameters, time standards and time scales, reference systems.	Does not have knowledge defined as LO3.	Has knowledge of properties and propagation of electromagnetic waves.	Has knowledge of properties and propagation of electromagnetic waves; knows time standards and time scales.	Has knowledge of properties and propagation of electromagnetic waves; knows time standards and time scales, and reference systems.
Criterion 2 Knowledge of phenomena affecting satellites.	Does not have knowledge defined as LO4.	Knows laws governing the movement in a gravitational field.	Knows elements of a satellite orbit.	Knows laws governing the movement in a gravitational field and elements of a satellite orbit.
LO3	Can acquire information from publications, data bases and other sources, integrate and interpret it, draw conclusions and formulate opinions on efficient use of navigational systems in practice.			
Assessment methods	Tests during the semester, assessment of the lab classes			

Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Use of publications and technical specification of navigational systems.	Cannot acquire and interpret basic information on requirements and use of navigational equipment.	Can interpret independently information found in operational manuals of navigational devices to operate such devices properly.	Can interpret independently information found in operational manuals of navigational devices to operate such devices properly; can compare the information with technical requirements drawn up for such devices, also in English.	Proficiently uses acquired publications and documentation, also in English; properly interprets information to ensure safe operation of navigational devices.

Syllabus

SEMESTER 2	SATELLITE RADIO NAVIGATION SYSTEMS	LECTURES	15 HOURS

1. Movement of a man-made satellite in Earth's gravity field.
2. Satellite GPS system – structure, principle of operation, accuracy.
3. GLONASS satellite system – structure, principle of operation, accuracy.
4. Galileo satellite system – structure, principle of operation, accuracy.
5. Differential GNSS (DGNSS) – methods, principles of operation, accuracy.
6. Pilot radio short-range navigation systems – structure, principle of operation, accuracy.
7. Hyperbolic Loran-C system – structure, principle of operation, range, accuracy, corrections.
8. European navigational system Eurofix – structure, principle of operation, range, accuracy.
9. Radio direction finding.
10. Integrated navigation systems, use of multi-function monitors.
11. Automatic Identification System (AIS).
12. Radio navigation publications in Polish and English, Admiralty List of Radio Signals (ALRS).
13. Use of radio navigation system receivers.

SEMESTER 2	SATELLITE RADIO NAVIGATION SYSTEMS	LAB CLASSES	30 HOURS

1. Radio navigation publications in Polish and English, Admiralty List of Radio Signals (ALRS).
2. Procedure of switching on and basic adjustment of radio navigation system receivers.
3. Presentation of information in radio navigation system receivers.
4. Control of correct performance of radio navigation system receivers.
5. Methods of enhancing the accuracy of vector parameters of ship state determined by radio navigation system receivers.
6. Programming track parameters and conduct of navigation in radio navigation system receivers.
7. Programming working parameters and navigation using an integrated transceiver set DGNSS/AIS.
8. Accuracy assessment of Loran-C receivers' indications.
9. Accuracy assessment of GNSS receivers' indications.
10. Accuracy assessment of indications of position and true course from a GPS compass.
11. VHF band radio direction finding.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	5	
Self-instruction: execution of projects	2	
Self-instruction: preparation for passing tests and exams	5	
Total workload	**59**	**2**
Workload related to direct teaching activities:	47	1
Workload related to practice-oriented activities:	35	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

20.	Course unit:	N2022/23/FS/20/ENA3

ELECTRONIC NAVIGATION AIDS – module 3

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2	1	1	30	15	15	2
2	15	1		2	15		30	2
3	15	1		1	15		15	2
4	15	1		1	15		15	2
5	15	1		1	15		15	2

III/3. Learning outcomes and syllabus

Learning outcomes – semester 3		Field-specific
LO1	Has a systematic theory-based general knowledge of navigational equipment for radiolocation.	K_W05; K_W17; K_W26
LO2	Can analyse the functioning and assess, in the scope required from navigators, existing technical solutions of radars, interpret a radar image and adjustment processes.	K_U18; K_U19; K_U26

Assessment methods and criteria				
LO1	Has a systematic theory-based general knowledge of navigational equipment for radiolocation.			
Assessment methods	tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 systematic theory-based general knowledge of navigational radiolocation equipment.	Does not have any knowledge of radiolocation.	Has a basic knowledge of radiolocation.	Has an advanced knowledge of radiolocation.	Has a full required knowledge of radiolocation.
LO2	Can analyse the functioning and assess, in the scope required from navigators, existing technical solutions of radars, interpret a radar image and adjustment processes.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Analysis of functioning and assessment, as required, of existing technical solutions of radars, interpretation of a radar image and adjustment processes.	Cannot handle radar equipment.	Can handle radar equipment.	Can handle radar equipment and knows its capabilities and limitations.	Can handle radar equipment and knows its capabilities and limitations; can properly interpret a radar image.

Syllabus

SEMESTER 3	RADIOLOCATION	LECTURES	15 HOURS

USE OF RADAR EQUIPMENT – TRAINING AT THE OPERATIONAL LEVEL

1. IMO performance standards for radar equipment.
2. Basic phenomena and issues of radiolocation.
3. Construction and operation of a marine navigational radar.
4. Interpretation of radar display.
5. Errors and accuracy of radar measurements.
6. Radar diagnostics and preliminary identification of faults.
7. Digital processing and its impact on radar display.
8. Devices co-operating with a navigational radar.

SEMESTER 3	RADIOLOCATION	LAB CLASSES	15 HOURS

USE OF RADAR EQUIPMENT – TRAINING AT THE OPERATIONAL LEVEL

1. Impact of adjustment control on radar image.
2. Orientation and display.
3. Radar performance parameters.
4. Distortions and clutters of radar image. False echoes.
5. Echo identification.
6. Radar measurements.

7. Technical diagnostics of the radar.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	5	
Self-instruction: execution of projects	5	
Self-instruction: preparation for passing tests and exams	2	
Total workload	**44**	**2**
Workload related to direct teaching activities:	32	1
Workload related to practice-oriented activities:	22	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

20.	Course unit:	N2022/24/FS/20/ENA4

ELECTRONIC NAVIGATION AIDS – module 4

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2	1	1	30	15	15	2
2	15	1		2	15		30	2
3	15	1		1	15		15	2
4	15	1		1	15		15	2
5	15	1		1	15		15	2

III/4. Learning outcomes and syllabus

Learning outcomes – semester 4		Field-specific
LO1	Has knowledge of technical standards and norms, limitations and principle of using radar systems.	K_W13; K_W15; K_W16: K_W17; K_W23: K_W24
LO2	Can use radar systems effectively to acquire and analyse information on collision situations, and radar navigation, and makes proper and effective decisions.	K_U01; K_U12; K_U18; K_U24; K_U28
LO3	Has skills for teamwork and leadership of a watchkeeping team, precisely assigns tasks and supervises their execution.	K_W12; K_K03; K_K04

Assessment methods and criteria				
EK 1	Has knowledge of technical standards and norms, limitations, and principle of using radar systems.			
Assessment methods	Written exam.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of issues relating to the use of radar systems.	Does not know basic standards and principles of using radar systems in practice.	Knows basic standards and principles of using radar systems in practice.	Knows standards and principles of using radar systems in practice, and can interpret properly their indications in reference to other systems.	Knows standards and principles of using radar systems in practice, and can interpret properly their indications in reference to other systems, taking into account limitations of these systems.
LO2	Can use radar systems effectively to acquire and analyse information on collision situations, and radar navigation, and makes proper and effective decisions.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Correctness of a radar plot.	Cannot make a correct radar plot with required accuracy in a set time.	Can make a radar plot and a radar report in a set time and plan and execute a proper anti-collision manoeuvre, and check its effectiveness.	Can verify the effect of a planned manoeuvre on other target movements and plan a return manoeuvre.	Can use the plotting method properly in complex collision situations.
Criterion 2 Proper interpretation of information.	Cannot interpret properly information presented in a plot.	Can identify dangerous targets and properly determine the amount of planned anti-collision manoeuvre.	Can interpret properly information presented in a plot from the viewpoint of COLREGs compliance	Can assess properly the effect of plot accuracy on the safety of decisions made.
Criterion 3 Correct radar measurements.	Cannot identify targets displayed on a radar screen.	Can Cannot identify targets displayed on a radar screen and measure the range and bearing.	Can choose correctly targets for measurements in view of accuracy of a specific radar position.	Can make an optimal choice of targets to be measured, and comprehensively analyses complex cases.
Criterion 4 Correctness of the ship's position fixing on the chart.	Does not identify a navigational problem in a basic scope.	Can determine the ship's position (a fix) with required accuracy.	Makes navigational calculations in an extended scope, properly interprets a navigational situation.	Comprehensively solves a navigational problem and analyses complex cases.

LO3	Has skills for teamwork and leadership of a watchkeeping team, precisely assigns tasks and supervises their execution.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Bridge teamwork.	Cannot distribute properly tasks concerning keeping a navigational watch and monitor their execution, or properly execute assigned tasks.	Can execute properly assigned tasks only when supervised.	Can execute assigned tasks independently and properly distribute such tasks when in charge of a navigational watch.	Can execute assigned tasks independently and properly distribute such tasks when in charge of a navigational watch, and properly monitor their execution.

Syllabus

SEMESTER 4	NAVIGATION AND RADAR PLOTTING	LECTURES	15 HOURS

1. Radar plotting in relative and true motion.
2. Target data report.
3. Planning and monitoring the effectiveness of anti-collision manoeuvres on a radar plot.
4. Factors affecting plotting accuracy.
5. Use of radar equipment for ship position fixing and control.
6. Plotting aids: EPA and ATA – principle of operation and applicability.
7. Use of rarad equipment and COLREGs compliance to avoid collisions and close quarter situations.

SEMESTER 4	NAVIGATION AND RADAR PLOTTING	LAB CLASSES	15 HOURS

1. Making radar plotting in relative and true motion.
2. Construction of a plotting triangle.
3. Determination of the closest point of approach (CPA) and time to CPA.
4. Determination of ship's course, speed and aspect.
5. Target data report.
6. Fallaciousness of relative motion.
7. Planning an anti-collision manoeuvre.
8. Control of anti-collision manoeuvre effectiveness.
9. Use of radar equipment for radar position fixing.
10. Parallel lines technique.
11. Use of radar equipment with COLREGs compliance.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**60**	**2**
Workload related to direct teaching activities:	35	1
Workload related to practice-oriented activities:	30	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

20.	Course unit:	N2022/35/FS/20/ENA5

ELECTRONIC NAVIGATION AIDS – module 5

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2	1	1	30	15	15	2
2	15	1		2	15		30	2
3	15	1		1	15		15	2
4	15	1		1	15		15	2
5	15	1		1	15		15	2

III/5. Learning outcomes and syllabus

Learning outcomes – semester 5		Field-specific
LO1	Has knowledge of technical requirements, principles of use and limitations of automatic radar plotting aids (ARPA).	K_W13; K_W15; K_W16: K_W17; K_W23:K_W24
LO2	Can use ARPA effectively for acquisition and analysis of collision situation data, and makes right and effective anti-collision and navigational decisions.	K_U01; K_U12; K_U18; K_U24; K_U28
LO3	Has skills of commanding a navigational watch, precisely assigns tasks to watchkeepers and supervises their execution.	K_W12; K_K03; K_K04

Assessment methods and criteria				
LO1	Has knowledge of performance standards, principles of use and limitations of automatic radar plotting aids (ARPA).			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of the use of automatic radar plotting aid systems.	Does not know basic performance standards and principles of using ARPA systems on the navigational bridge.	Knows performance standards and basic functions of ARPA systems.	Knows performance standards, limitations basic and additional functions of ARPA systems, as well as principles of their use.	Knows performance standards, limitations basic and/additional functions of ARPA systems, principles of their use as well as principles of their co-operation within the integrated bridge system
LO2	Can use ARPA effectively for acquisition and analysis of collision situation data, and makes right and effective anti-collision and navigational decisions.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Use of ARPA for collision avoidance.	Cannot obtain and interpret properly information on a collision situation around own ship.	Can obtain information on a collision situation around own ship, interpret it properly, and use for planning an anti-collision manoeuvre.	Can obtain information on a collision situation around own ship, interpret it properly, and use for planning an anti-collision manoeuvre properly taking into account ARPA errors and limitations.	Can obtain information on a collision situation around own ship, interpret it properly, and use for planning an anti-collision manoeuvre according CnOLREGs, and properly taking into account ARPA errors and limitations,
Criterion 2 Use of ARPA for safe navigation.	Cannot switch on and use properly basic ARPA facilities systems.	Can switch on and use properly basic ARPA facilities systems.	Can switch on and use basic ARPA facilities systems and properly interpret limitations of these systems.	Can switch on and use basic and additional ARPA facilities systems and properly interpret limitations of these systems, and use them as part of the integrated bridge system.
LO3	Has skills of commanding a navigational watch, precisely assigns tasks to watchkeepers and supervises their execution.			
Assessment methods	Assessment of classes, lab/simulator classes			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Navigational watch commanding	Cannot assign properly navigational tasks to watchkeepers.	Can assign properly navigational tasks to watchkeepers.	Can assign properly navigational tasks to watchkeepers and supervise the execution of tasks.	Can assign properly navigational tasks to watchkeepers and supervise the execution of tasks, and assess performance of watchkeepers.

Syllabus

SEMESTER 5	ARPA	LECTURES	15 HOURS

1. IMO performance standards for ARPA.
2. Principle of operation, basic functions, handling an ARPA.
3. Acquisition and interpretation of ARPA data.
4. Tracking system – principle of operation, capabilities and limitations, time delays of information obtained.
5. Testing, errors and limitations of ARPA equipment.
6. Risk of overconfidence in ARPA data.
7. Ground-stabilized radar display using ARPA facilities.
8. ECDIS-AIS-ARPA co-operation.
9. Use of radar equipment incorporating the COLREGs for collision avoidance and close quarter situations.

SEMESTER 5	ARPA	LAB CLASSES	15 HOURS

1. Familiarization with the navigational bridge and operation of navigational devices of the simulator.
2. Switching on and handling of an ARPA.
3. Output data presentation modes.
4. Manual and automatic target acquisition.
5. Trial manoeuvre facilities.
6. ARPA errors, sources and principles of identification.
7. Errors in the interpretation of tracked echo data.
8. Ground-stabilized radar display using ARPA facilities.
9. Operating tests of ARPA, principles of fault identification.
10. Use of radar equipment according the COLREGs rules.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**54**	**2**
Workload related to direct teaching activities:	34	1
Workload related to practice-oriented activities:	30	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training

The scope of practical training programme included in the executed course units is defined in *On board Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading

1. Ackroyd N., Lorimer R., *Global navigation – a* GPS *user's guide*, 2nd edition, Lloyd's of London Press LTD, London 1994.
2. Bole A.G., Nicholls C.E., Dineley W.O., *Navigation Control Manual*, Routledge, 2013.
3. Bole A.G., *Radar and* ARPA *Manual*, Butterworth-Heinemann Elsevier, Great Britain 2007.
4. IMO – *Radar Navigation, Radar Plotting and use of* ARPA, Radar Navigation at Operational Level (Model course 1.07).

5. Jones C., *Electronic Navigation Helmsman Guides*, Helmsman Books, 1992.
6. Norris A., RADAR and AIS, *Integrated Bridge Systems*, Vol. 1, The Nautical Institute, 2008.
7. Sonnenberg G.J., *Radar and electronic navigation*, Butterworths, 1988.
8. Stephen F. Appleyard, *Marine Electronic Navigation*, Routledge, 2006.
9. Tetley L., Calcutt D., *Electronic Navigation Systems*, Butterworth-Heinemann, 2001.

VI. Extra reading

1. Helwig A., Offermans G., Stout C., Schue C., *eLoran System Definition and Signal Specification*, (ILA-40), Nov 2011.
2. Hoffman-Wellenhof B., Legat K., Wieser M., *Navigation: principles of positioning and guidance*, Bernhard Hofmann-Wellenhof, Klaus Legat, Manfred Wieser, Wien 2003.
3. Hurn J., *Differential* GPS *(Global Positioning System) explained: an expose of the surprisingly simple principles behind today's most advanced positioning technology*, Sunnyvale: Trimble Navigation, 1993.
4. James Bao-yen Tsui, *Fundamentals of global positioning receivers: a software approach*, Willey, 2005.
5. Richards M.A., Schreer J.A., Holm W.A., *Principles of Modern Radar*, SciTech Publishing, Inc., 2010.

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

21.	Course unit:							N2022/23/FS/21/GIS
GEOGRAPHIC INFORMATION SYSTEMS								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
3	15	1		1	15		15	1

I. Course unit aims

This course unit aims at teaching principles of operation and effective use geographic information systems. The knowledge of GIS systems enables management, creation and analyses of geographic data.

II. Preliminary requirements

The scope of a secondary school, fundamentals of navigation, mathematics, computer science.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 3		Field-specific
LO1	Knows principles and methods of using GIS systems in navigation.	K_W06; K_W27
LO2	Knows basic models of spatial data.	K_W01; K_W24
LO3	Knows the process of creating geo-information systems, e.g. methods of acquiring spatial data and software used in spatial information systems.	K_W23
LO4	Can make simple spatial analyses using ArcGIS software.	K_U09; K_U12
LO5	Can develop a numerical navigational chart based on delivered data.	K_U09; K_U27

Assessment methods and criteria				
LO1	Knows principles and methods of using GIS systems used in navigation.			
Assessment methods	Written exam.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know principles and methods of the use of GIS systems in navigation.	Knows the basics of GIS system functioning.	Understands the essence of GIS system functioning. (3.5 +) knows areas of GIS applications in navigation.	4 + can indicate GIS systems used in navigation. 4.5 + Knows principles and methods of the use of GIS systems in navigation.
LO2	Knows basic models of spatial data.			
Assessment methods	Written exam.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know basic models of spatial data.	Understands the essence of developing models of spatial data.	3 + Knows theoretical bases for building individual models; can indicate differences between spatial models.	4 + Can identify areas of application of various models of spatial data. 4.5 + has broad knowledge of mathematical tools used for the construction of spatial data models.
LO3	Knows the process of creating geo-information systems, e.g. methods of acquiring spatial data and software used in spatial information systems.			
Assessment methods	Written exam.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know the process of creating geo-information systems.	Can state and briefly characterize the stages of creating geo-information systems.	3 + understands a logical sequence in the process of creating geo-information systems. 3.5 + knows methods of spatial data acquisition.	4 + Knows software used in spatial information systems. 4.5 + Knows basic methods of spatial data processing.
LO4	Can make simple spatial analyses using ArcGIS software.			
Assessment methods	Reports, project, presentation.			
Criteria/Grade	2	3	3.5–4	4.5–5

Criterion 1	Cannot make simple spatial analyses using ArcGIS software.	Can indicate tools in ArcGIS for making basic analyses.	3 + Understands the essence of operation of particular analysis tools. 3.5 + can prepare spatial data for an analysis.	4 + can make analyses using default setups; can prepare data deliberately and make simple spatial analyses in ArcGIS.
LO5	Can develop a numerical navigational chart based on delivered data.			
Assessment methods	Reports, project, presentation.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot prepare a conception of work on the development of a numerical navigational chart.	Can assign a proper reference system to data for the development of a numerical navigational chart.	3 + Can display data in a specified cartographic representation. 3.5 + Can make a simple conversion of data to a format required by ArcGIS.	4 + Can assign proper symbolization to data; can develop properly a numerical navigational chart based on delivered data.

Syllabus

SEMESTER 3	GEOGRAPHIC INFORMATION SYSTEMS	LECTURES	15 HOURS

1. The essence of geographic information systems. Basic concepts, standards and GIS data bases.
2. Principles and example applications of GIS in navigation.
3. Design of geo-information systems.
4. Raster and vector models of GIS data. Layers, objects, attributes.
5. Methods of information acquisition and selection. Digitalization and quality assessment of data.
6. Spatial analyses. Generalization and visualization. Legal regulations and technical standards.
7. GIS software – categories of GIS programs, types of GIS systems, types of GIS-supporting programs, characteristics of GIS packages, future of GIS software, overview of GIS software packages.

SEMESTER 3	GEOGRAPHIC INFORMATION SYSTEMS	LAB CLASSES	15 HOURS

1. Familiarization with basic tools of ArcGIS program – brief instruction.
2. Creation of digital maps.
3. Incorporation of tabular data into maps.
4. Addresses and other methods of position determination on a map.
5. Data presentation using graphic symbols.
6. Description of maps using text and graphics.
7. Data presentation using diagrams.
8. Choice of projection. Composition of a map.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	5	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**43**	**1**
Workload related to direct teaching activities:	34	0.5
Workload related to practice-oriented activities:	20	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
Not applicable.

V. Recommended reading
1. Burrough P., McDonnell A., *Principles of Geographical Information Systems*, Oxford University Press, New York 2004.
2. Korte, G.B., *The* GIS *book: understanding the value and implementation of geographic information systems*, OnWord Press, Santa Fe 1997.
3. Li, Songnian. *Advances in web-based* GIS, *mapping services and applications*, Taylor & Francis Group, London 2011.
4. Longley, Paul A., *Geographic information systems and science*, John Wiley & Sons, 2001.
5. Foody, Giles M. Red., *Uncertainty in remote sensing and* GIS, Wiley, Chichester 2002.
6. Jennings, N., *A Python primer for* ArcGIS®, Nathan Jennings, cop. 2011.

VI. Extra reading
1. Li Z., Zhu Q., Gold Ch., *Digital Terrain Modeling. Principles and methodology*, CRC PRESS, Boca Raton 2005.
2. El-Sheimy N., Valeo C., Habib A., *Digital Terrain Modelling. Acquisition, manipulation, and applications*, Artech House, Boston 2005.
3. Gorr, Wilpen L., GIS *tutorial for crime analysis*, Esri Press, Redlands 2012.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

22.	Course unit:							N2022/11/FS/22/TS
TRANSPORT SYSTEMS								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1			15			1

I. Course unit aims
This course unit aims at teaching students how to organize the carriage of cargo and passengers, choose the means of transport appropriate for predicted transport tasks, manage transport infrastructure and means of transport, and to operate reporting and traffic management systems.

II. Preliminary requirements
not applicable

III. Learning outcomes and syllabus
The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 1		Field-specific
LO1	Has basic knowledge necessary to understand social, economic, legal and organizational factors affecting the functioning of transport systems.	K_W22; K_W29; K_W34
LO2	Can analyse the functioning of transport systems and assess existing technical solutions of particular transport subsystems.	K_U02; K_U13
LO3	Has skills of acquiring information from publications, data bases and other sources; properly interprets acquired information.	K_U01; K_U26

Assessment methods and criteria				
LO1	Has basic knowledge necessary to understand social, economic, legal and organizational factors affecting the functioning of transport systems.			
Assessment methods	Various types of written tests during the semester, written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Correct use of reporting and traffic management systems.	Cannot identify elements of transport systems.	Can characterize the essence of transport systems.	Can operate reporting and traffic management systems in navigation.	Is able to manage transport infrastructure and means of transport.
Criterion 2 Understanding principles of choosing proper elements of a transport system.	Cannot interpret principles of creating transport subsystems.	Can present a transport system and its properties.	Can choose properly basic structures of combined transport systems.	Precisely analyses main development models of a transport system.
LO2	Can analyse the functioning of transport systems and assess existing technical solutions of particular transport subsystems.			
Assessment methods	Various types of written tests during the semester, written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Correct choice of proper means of transport.	Cannot choose a means of transport for predicted tasks.	Has a skill of right choice of means of transport for predicted tasks.	Can assess the level of safety in the functioning of particular transport systems.	Has competences to organize and coordinate the carriage of cargo and people.
Criterion 2 Knowledge of criteria for an analysis of functioning of a transport system.	Does not distinguish criteria of transport systems classification.	Can identify classes of a transport system.	Can choose technological elements of a transport system.	Can use methods of transport system assessment and optimizations.
LO3	Has skills of acquiring information from publications, data bases and other sources; properly interprets acquired information.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not demonstrate sufficient activity in class.	Demonstrates activity necessary for effective learning.	Demonstrates satisfactory activity in class; identifies and solves a	Demonstrates an optimal activity in class; is willing to study a subject in depth,

Effective attendance, active participation in class.			problem slightly directed by a teacher.	shows initiative and constructive attitude in solving problems.
Criterion 2 Ability to make use of publications, seek information, and interpret it properly.	Does not use publications, cannot find information outside the class.	Uses available publications and other sources to a limited extent; sometimes draws incorrect conclusions.	Can acquire information from various sources; formulates opinions correctly.	Uses available sources of information perfectly; draws apt conclusions and formulates optimal opinions.

Syllabus

SEMESTER 1	TRANSPORT SYSTEMS	LECTURES	15 HOURS

1. Types and assessment of transport systems.
2. Organization and technology of cargo and passenger carriage.
3. Procedures and documents.
4. Infrastructure management.
5. Management of the means of transport.
6. Identification of standards and safety assessment in transport systems.
7. Operational and dispatching services in transport systems.
8. Reporting and traffic management systems in navigation.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**21**	**1**
Workload related to direct teaching activities:	17	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
Not applicable.

V. Recommended reading
1. Rodrigue J.P., Comtois C., Slack B., *The Geography of Transport Systems* – 3rd Edition, Routledge Taylor & Francis Group, 2013 [https://transportgeography.org/wp-content/uploads/GTS_Third_Edition.pdf].

VI. Extra reading
Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

23.	Course unit:	N2022/12/FS/23/TFO

TECHNICAL FLEET OPERATION

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1			15			1

I. Course unit aims

This course unit is aimed at introducing students to the theoretical fundamentals of the technical fleet operation and transport systems, and imparting the skills of formulating, identifying, analysing and solving qualitative and quantitative problems.

II. Preliminary requirements

The course unit is based on the knowledge acquired in other course units: mathematics and statistics, physics, introduction to economics, transport systems, cargo handling.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 2		Field-specific
LO1	Has basic knowledge of the life cycle of machines, technical objects and systems, and knows and correctly interprets operational terminology.	K_W23
LO2	Formulating and solving engineering tasks, can integrate knowledge of various areas and disciplines and to apply systems approach, taking into account non-technical aspects.	K_U12

Assessment methods and criteria				
LO1	Has basic knowledge of the life cycle of machines, technical objects and systems, and knows and correctly interprets operational terminology.			
Assessment methods	Assessment by a test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of the lectured subject.	Has fragmentary or no knowledge of the lectured subject.	Has basic knowledge of the lectured subject.	Has incomplete but systematic theoretical and factual knowledge of the subject.	Has systematic theoretical and factual knowledge deepened from readings in different sources.
Criterion 2 Knowledge of the terminology of the lectured subject.	Does not know basic concepts and terms of the lectured subject.	Knows basic the terminology of the lectured subject, but interprets it non-professionally, giving only practical examples lectured.	Knows the terminology of the subject lectured, but interprets it using only memorized definitions.	Knows the terminology of the subject lectured, can define and interpret correctly the definitions of most key terms, illustrating them with own examples.
LO2	Formulating and solving engineering tasks, can integrate knowledge of various areas and disciplines and to apply systems approach, taking into account non-technical aspects.			
Assessment methods	Assessment by a test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to analyse acquired information presented graphically.	Cannot present and analyse basic information presented graphically.	Can present and analyse only basic information presented graphically.	Can present and analyse graphic information in the scope lectured, taking into account measures expressed on the axes; Can present and analyse graphic information in the scope lectured, correctly choosing measures on the axes.	Can present and analyse graphic information in the scope lectured, taking into account measures on the axes and various units of these measures; Can present and analyse information presented as graphs or charts, fully describing them and giving own examples.
Criterion 2 Ability to integrate acquired information presented graphically.	Cannot transform basic information from algebraic to graphic form.	Can transform only basic information from algebraic to graphic form.	Can transform basic information from algebraic to graphic form in the lectured scope, taking into account measures expressed on the axes; can integrate measures	Can integrate measures and transform information from algebraic to graphic form in the lectured scope, taking into account measures on the axes and various units of those measures;

			and transform information from algebraic to graphic form in the lectured scope, correctly selecting measures on the axes.	Can integrate measures and transform information from algebraic to graphic form in the lectured scope, fully describing them and giving own examples.

Syllabus

SEMESTER 2	TECHNICAL FLEET OPERATION	LECTURES	15 HOURS

1. Subject, scope and aim of teaching technical fleet operation.
2. Systems approach in operation.
3. Praxeological models of the fleet operation.
4. Technical aspects of the operation of vessels.
5. Economic problems of fleet operation.
6. Processes and systems of use, their identification and quantitative characteristics.
7. Optimized use in transport systems.
8. Factors and processes causing changes of the technical condition of machines and equipment – types of damage.
9. Operational reliability of vessels.
10. Introduction to diagnostics of vessels.
11. Maintenance processes and systems, their identification and quantitative characteristics.
12. Optimization of maintenance in transport systems.
13. Operational management of transport means.
14. Modeling and optimization of operational processes and systems.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	7	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	3	
Total workload	**27**	**1**
Workload related to direct teaching activities:	17	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
Not applicable.

V. Recommended reading
1. Gubbins E. *Managing Transport Operations*, Kogan Page Publishers, 2003.
2. Zeimpekis, V.S., Tarantilis, C.D., Giaglis, G.M., Minis, *Dynamic Fleet Management*, Springer, 2007.

VI. Extra reading
Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

24.	Course unit:							N2022/24/FS/24/SM1
SHIP MANOEUVRING – module 1								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	1	1		15	15		2
5	15	1		1.7	15		25	2

I. Course unit aims

This course unit aims at imparting theoretical and practical foundation for skills of analysing and assessment of ship manoeuvrability and planning and execution of typical ship manoeuvres.

II. Preliminary requirements

The scope of a secondary school, and elements of physics, mathematics, navigation, ship construction and stability, meteorology and oceanography, marine rescue.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 4		Field-specific
LO1	Has basic knowledge of the mechanics of ship motion, particularly vessel manoeuvring motion, including the familiarization and understanding of: a) sources and magnitudes of external forces, b) possibilities and limitations of ship motion control.	K_W01; K_W08
LO2	Can make static and dynamic calculations of manoeuvring motions of ships in typical operational situations.	K_W08; K_U01; K_U11; K_U15

Assessment methods and criteria				
LO1	Has basic knowledge of the mechanics of ship motion, particularly vessel manoeuvring motions, including the familiarization and understanding of: a) sources and magnitudes of external forces, b) possibilities and limitations of ship movement control.			
Assessment methods	Written assessment – open question or multiple choice test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Is not familiar with physical phenomena occurring during ship manoeuvring.	Describes qualitatively physical phenomena related to ship manoeuvring.	Describes quantitatively physical phenomena related to ship manoeuvring.	Is able to make conclusions – explain and predict on the basis of proper graphs and formulas describing elementary manoeuvring behaviour of the ship.
LO2	Can make static and dynamic calculations of manoeuvring movements of ships in typical operational situations.			
Assessment methods	Written assessment – mathematical problems to be solved.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Has no knowledge or elementary skills of using ready mathematical methods.	Knows and correctly uses ready formulas, graphs, methods, for numerical determination of parameters related to ship movement in elementary, directly described, situations.	Can associate and transform (analyse, synthesize) known mathematical relationships to solve a given problem of ship manoeuvring.	Additionally, can assess (discuss, compare, criticize) obtained results and the suitability of the methods used; can estimate a possible change of results due to a change of input data and model parameters (sensitivity analysis, analysis of consequences, analysis of uncertainty).

Syllabus

SEMESTER 4	THEORY OF MANOEUVRING	LECTURES	15 HOURS

1. Ship motion, kinematics of manoeuvring motions (drift angle, instantaneous pivot point, manoeuvring path).
2. Equations of ship motion dynamics, role of motion simulation, approximate methods of determining parameters of the turning circle and stopping manoeuvres
3. Hull forces and moment, hull resistance.

4. Propeller forces and moment (thrust, moment, turning effect), types of propellers.
5. Equation of speed, classification of speed. Main engine control, propulsion power. Passive and active stopping, acceleration.
6. Rudder forces and moment, types of rudder. Unconventional propulsion-steering devices.
7. Fundamental laws of turning circle kinematics (impact of initial speed, condition of loading). Theory of 'kick ahead'. Rudder cycling.
8. Shallow water effects – kinematic and dynamic aspects. Squat of a ship, under keel clearance.
9. Bank effect – kinematic and dynamic aspects.
10. Ship-ship interactions (passing, overtaking, moored ship).
11. Ship-generated wave wash.
12. Wind forces and moment.
13. Wave forces and moment (of first and second order). Ship motions in waves.
14. Current effect.
15. Other dynamical effects: thrusters, fenders.
16. Manoeuvring trials, manoeuvring and information standards, course stability and turning ability.

SEMESTER 4	THEORY OF MANOEUVRING	CLASSES	15 HOURS

PROBLEMS/EXAMPLES OF CALCULATIONS

1. Determination of ship motion resistance and propeller thrust.
2. Solving the equation of steady-state sailing speed.
3. Solving the equation of passive and active stopping.
4. Solving differential equations of ship manoeuvring motions – simulation of selected manoeuvres, determination of manoeuvring space.
5. Determination of squat.
6. Calculations of anchoring and mooring equipment. Determination of loads due to wind, current, waves. Assurance of safe anchoring and/or mooring.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	8	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	8	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**50**	**2**
Workload related to direct teaching activities:	38	1
Workload related to practice-oriented activities:	23	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

24.	Course unit:							N2022/35/FS/24/SM2
SHIP MANOEUVRING – module 2								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	1	1		15	15		2
5	15	1		1.7	15		25	2

III/2. Learning outcomes and syllabus

Learning outcomes – semester 5		Field-specific
LO1	Has basic knowledge of practical methods/procedures for the safe and effective execution of typical manoeuvres (art of manoeuvring).	K_W07; K_W08; K_W11; K_W12; K_W21
LO2	Can plan, prepare and execute on a simulator typical types of ship manoeuvres in various operational, that is navigational and hydrometeorological, conditions.	K_U01; K_U12; K_U15; K_U19; K_U23; K_U26; K_K03; K_K04

Assessment methods and criteria				
LO1	Has basic knowledge of practical methods/procedures for the safe and effective execution of typical manoeuvres (art of manoeuvring).			
Assessment methods	Written assessment – open question or multiple choice test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Is not familiar with manoeuvring techniques used in navigational practice.	Describes qualitatively basic elements of typical manoeuvring operations.	Knows and understands manoeuvring instructions complying with the art of manoeuvring principles for typical manoeuvring operations.	Presents a plan of typical manoeuvring operations depending on the assumed conditions, systematically, fully understanding criteria of safety and effectiveness.
LO2	Can plan, prepare and execute on a simulator typical types of ship manoeuvres in various operational, that is navigational and hydrometeorological, conditions.			
Assessment methods	Assessment of simulator exercise execution.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Puts ship's propulsion-steering machinery at risk of damage, unnecessarily creates additional navigational hazard, does not communicate properly during manoeuvres.	Can use propulsion-steering machinery safely and effectively to achieve the intended effect, can give, supervise and execute manoeuvring commands using Standard Marine Communication Phrases, particularly in English.	Can plan and fully execute (in simulated conditions) an assigned manoeuvring operation, meeting safety criteria, partly failing to meet efficiency criteria.	Skilfully uses the knowledge of phenomena and procedures, to find an optimal solution to manoeuvring problems that arise.

Syllabus

SEMESTER 5	SHIP HANDLING PRACTICE	LECTURE	15 HOURS

1. Introduction to ship handling practice. Assessment of ship motion parameters.
2. Basic manoeuvring (sailing) principles in various area restrictions. Impact of wind and current. Turn at constant rate.
3. Pilot embarkation and disembarkation. Navigation in TSS and VTS covered areas.
4. 'Person overboard' manoeuvres.
5. Anchoring manoeuvres. Holding power of anchor, anchor equipment strength. Anchor application for improving ship manoeuvres
6. Unassisted berthing of a single propeller ship. Mooring lines used for enhancing ship manoeuvres.
7. Berthing and mooring large vessels.
8. Berthing a twin propeller vessel.
9. Harbour towage, co-operation with tugs. Tug effectiveness.

10. Docking. Berthing and mooring in a lock.
11. Ship's mooring.
12. Weathering.
13. Launching and lifting lifeboats/liferafts in waves.
14. Sea towage. Drift of a disabled ship
15. Manoeuvring in ice.

SEMESTER 5	SHIP HANDLING PRACTICE (SIMULATOR)	LAB CLASSES	25 HOURS

PERFORMING VARIOUS MANOEUVRES ON SHIP HANDING SIMULATORS (BRIDGE VISUAL/PC)
1. Manoeuvring characteristics and trials, IMO standards.
2. 'Man overboard' manoeuvres.
3. Pilot embarkation, TSS and VTS systems.
4. Anchoring and lying at anchor.
5. Shallow water channel navigation, instantaneous pivot point, kick ahead, bank effect, shallow water effect).
6. Passing and overtaking in a channel.
7. Basics of unassisted berthing and unberthing of a single propeller ship.
8. Berthing and unberthing of large vessels. Tug assistance.
9. Weathering.
10. Salvage operations in the open sea.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	25	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	12	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	8	
Total workload	**64**	**2**
Workload related to direct teaching activities:	44	1
Workload related to practice-oriented activities:	37	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. Brix J. (red.), *Manoeuvring Technical Manual*, Seehafen Verlag, Hamburg 1993.
2. Brix J. (red.), *Manoeuvring Technical Manual*, Seehafen Verlag, Hamburg 1993.
3. Clark I.C., *Ship Dynamics for Mariners*, The Nautical Institute, London 2005.
4. Lewis E.V. (red.), *Principles of Naval Architecture (vol. III – Motions in Waves and Controllability)*, SNAME, Jersey City 1989.
5. Danton G.L., *The Theory and Practice of Seamanship*. Routledge & Kegan Paul, London 1972.
6. Clark, I.C., *Mooring and anchoring ships. Vol. 1 – Principles and practice*. The Nautical Institute, London 2009.

VI. Extra reading
1. Hensen H., *Manoeuvring Single Screw Vessels Fitted with Controllable Pitch Propellers in Confined Waters*, The Nautical Institute, London 1994.

2. IMO: *Explanatory Notes to the Standards for Ship Manoeuvrability*. IMO MSC/Circ.1053, London, 2002 and *Standards for Ship Manoeuvrability*. Res. IMO MSC.137(76), MSC 76/23/Add.1 – Annex 6, London 2002.
3. Hensen H., *Tug Use in Port (A Practical Guide)*, The Nautical Institute, London 1997.

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

25.	Course unit:							N2022/35/FS/25/MSR
MARITIME SEARCH AND RESCUE								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
5	15	2	1	1	30	15	15	4

I. Course unit aims

This course unit is aimed at teaching the legal basis for the rescue of life and property at sea, organization of search and rescue services in Poland and abroad, life-saving equipment of a ship and skills of using such equipment, and procedures to follow in situations of risk of life at sea; another teaching objective is to impart skills of performing rescue-related calculations and use of an IAMSAR manual during simulated search and rescue operations.

II. Preliminary requirements

The scope of a secondary school, and elements of ship manoeuvring, ship construction and stability, marine communications, and a completed course in personal survival techniques.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge.

Learning outcomes – semester 5		Field-specific
LO1	Demonstrates an extensive knowledge of legal and organizational principles applicable to search and rescue operations.	K_W11; K_W19; K_W20
LO2	Has a practical skill of planning and supervising search and rescue operations, acquired on ECDIS and PISCES simulators and/or field training (drills onboard m/s Nawigator XXI).	K_U16; K_U17
LO3	Is capable of teamwork in emergency situations, is aware of the responsibility for actions taken.	K_K02; K_K03; K_K05

Assessment methods and criteria				
LO1	Demonstrates an extensive knowledge of legal and organizational principles applicable to search and rescue operations.			
Assessment methods	Written exam, report, project, presentation, demonstration.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of the regulations on and principles of performing SAR operations.	Has insufficient knowledge of legal and organizational principles of SAR operations.	Knows some of the regulations; knows basic principles of performing SAR operations.	Demonstrates good knowledge of regulations and principles related to SAR operations.	Comprehensively discusses the organization of SAR operations, has a detailed knowledge of the relevant regulations.
Criterion 2 Correct calculations for refloating a ship aground.	Does not identify the fundamental aspects of a rescue problem.	Makes rescue calculations in a basic scope, following an algorithm.	Makes rescue calculations in an extended scope; uses verbal description and graphic solutions.	Comprehensively solves a rescue problem; analyses complex cases.
Criterion 3 Use of proper terminology, consistency of utterance.	Uses the professional register insufficiently.	Uses a minimum range of professional terminology while discussing an issue.	Uses professional terms satisfactorily while discussing an issue.	Proficiently uses professional terminology; speaks coherently.
LO2	Has a practical skill of planning and supervising search and rescue operations, acquired on ECDIS and PISCES simulators and/or field training (drills onboard m/s Nawigator XXI).			
Assessment methods	Exam/oral answer, assessment of the tutorial, lab class/simulators, project, presentation, demonstration.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skills of using proper rescue procedures in exercises simulating a rescue operation.	Does not demonstrate skills of using rescue procedures to an extent allowing to perform an exercise.	Demonstrates minimum skills of using rescue procedures.	Demonstrates an extended scope of skills of using rescue procedures.	Is proficient in using rescue procedures.
Criterion 2 Effective attendance, willingness to perform	Does not demonstrate sufficient activity during classes.	Demonstrates activity required for effective learning.	Demonstrates satisfactory activity in class.	Demonstrates optimal activity in class; shows

assignments (student's attitude).				willingness and initiative to study a subject in depth.
LO3	Is capable of teamwork in emergency situations, is aware of the responsibility for actions taken.			
Assessment methods	Exam/oral answer, assessment of the tutorial, lab class/simulators			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to organize co-operation in situations of risk to life, property or marine environment.	Does not demonstrate minim skills of teamwork in emergency situations.	Uses his competence of teamwork organization in a limited manner in emergency situations.	Performs well in a team to achieve its goal.	Can use his and other team members' competences effectively to achieve a specific goal; creates an optimal atmosphere of co-operation.
Criterion 2 Observation of professional ethics principles.	Does not have a sufficient level of professional awareness.	Presents a sufficient level of professionalism and professional awareness.	Shows a sufficient degree of professional ethics.	If fully aware of the responsibility for human life, property and marine environment, has qualities of a professional worker.

Syllabus

SEMESTER 5	MARITIME SEARCH AND RESCUE	LECTURES	30 HOURS

1. Introductory issues.
   Legal basis of search and rescue, and salvage at sea.
   Organization of the Polish Maritime Search and Rescue Service, and SAR services worldwide.
2. Ship's life-saving appliances – the SOLAS Convention and International Life Saving Appliances Code.
   Equipment of lifeboats, liferafts and rescue boats.
   Launching systems of lifeboats, life rafts and fast rescue boats.
3. Actions taken in situations of a threat to life, passenger care.
   3.1. Systems and methods of distress alarms at sea.
   3.2. Plan of action in case of threats to the crew and passengers, muster lists, alarms and safety procedures.
   3.3. Passenger care in emergencies.
   3.4. Methods of evacuation from endangered cargo ships.
   3.5. Methods of evacuation from endangered passenger ships and ferries.
   3.6. Behaviour of survivors in survival craft.
   3.7. Principles of person's survival on the sea.
   3.8. Ship's manoeuvres and turns in order to recover a person overboard.
4. Conduct of search and rescue operations at sea.
   4.1. International Convention on Maritime Search and Rescue.
   4.2. International Aeronautical and Maritime Search and Rescue Manual (IAMSAR).
   4.3. Organization, coordination and communications during an SAR operation.
   4.4. Use of aircraft, vessels and shore-based stations in SAR operations.
   4.5. Plans of the co-operation of a passenger ship with SAR service to the satisfaction of the IMO.
   4.6. Principles of distressed ship evacuation by rescue craft.
   4.7. Principles of ship evacuation and personnel transfer by a helicopter. Helicopters in maritime SAR.
   4.8. Manoeuvres and co-operation of vessels and aircraft in an SAR operation.
   4.9. Equipment of shore-based maritime rescue stations and its use in evacuations and SAR operations.
5. Actions in other situations threatening the ship and crew.
   5.1. Actions taken immediately before and after a collision
   5.2. Actions when grounding is imminent and afterwards.
   5.3. Actions taken in case of fire or explosion.
   5.4. *Damage Control Plan.*
   5.5. Actions taken in case of a terrorist or armed attack.
   5.6. Actions taken in situations of threat in a port or on roadsteads.
   5.7. Emergency steering.
   5.8. Assistance to a ship in distress.
6. Organization of fire protection on a ship.
   6.1. Fire protection plan.
   6.2. Fire installations on a ship in the light of the SOLAS Convention requirements.
   6.3. Firefighting equipment.
   6.4. Firefighting tactics on a ship.
   6.5. Fire prevention on a ship.
7. Damage control principles and procedures.
   7.1. Calculations of ship buoyancy after a collision with floating objects.
   7.2. Estimation of pressure on the ground and point of support after grounding.

7.3. Assessment of the possibility of unassisted refloating.
7.4. Precautions taken while beaching.
7.5. System of flooding detection and its pumping out according to SOLAS.
7.6. Assisted or unassisted refloating.
8. Salvage of property at sea.
9.1. The International Convention on Salvage.
9.2. Qualification, types and scope of salvage services.
9.3. Specialist equipment and methods used by salvors.
9.4. Salvage contract and its execution. Appraisal, costs and reward for salvage.
9.5. Ship's crew participation in a salvage operation, role and responsibility of the master.
9.6. Salvage towing. Preparation of ships and crew for towing.
9.7. Equipment for emergency towing of tankers and salvage techniques.
9.8. Salvage of icebound and ice-covered ships.
9. Search and rescue services in Poland and the world.
9.1. Maritime Search and Rescue Service and the National Rescue and Firefighting System.
9.2. Global SAR related systems – AMVER, Cospas-Sarsat, GMDSS, LRiT.

SEMESTER 5	MARITIME SEARCH AND RESCUE	CLASSES	15 HOURS

1. Use of standard ship's documentation in rescue-related buoyancy calculations.
2. Hydraulic calculations related to intact stability.
3. Hydraulic calculations related to hull integrity.
4. Calculations of pressure on the ground and point of support of a grounded ship.
5. Checking grounded ship stability.
6. Calculations of the force required to refloat a vessel.
7. National and world organizations of salvage shipowners.
8. International co-operation of salvage services.
9. Maritime arbitration in Poland and in the world, preventive measures.
10. Crew member fatigue and navigational safety.
11. Organization of shore-based maritime rescue stations in Poland and worldwide.

SEMESTER 5	MARITIME SEARCH AND RESCUE	LAB CLASSES	15 HOURS

1. Computer applications for oil spill identification and combat (PISCES simulator exercises).
2. Organization of an SAR operation – IAMSAR.
3. Organization of an SAR operation: IAMSAR – simulator exercises.
4. Actions in emergency situations, care of passengers (drills onboard m/s Nawigator XXI or on a simulator):
4.1. Action plan in emergency situations, muster lists, crew members' duties.
4.2. Passenger care in emergency situations.
5. *Damage Control Plan & Booklet.*
6. Fire protection plan and life-saving appliances arrangement plan.
7. System of master's decision support on a passenger ship.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	6	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	10	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	8	
Total workload	**84**	**4**
Workload related to direct teaching activities:	66	2.5
Workload related to practice-oriented activities:	40	1.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training

The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading

1. IMO – SAR Convention 1979, 2006 Edition.
2. IMO – Life-Saving Appliances incl. (LSA) Code, 2017 Edition.
3. IMO – *Fire Safety Systems* (FSS) Code, 2015 Edition.
4. IAMSAR Manual – *International Aeronautical and Maritime Search and Rescue Manual*, Vol. I, II, III, Edition IMO/ICAO London/Montreal – 2022 Edition.

VI. Extra reading

1. IMO – SOLAS *Consolidated Edition*, 2020 Edition.
2. MSC.1/Circ.1185 Rev.1 *Guide to Cold Water Survival*, 2012 Edition.
3. Pocket Guide to Recovery Techniques.

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

26.	Course unit:							N2022/24/FS/26/MC1
MARITIME COMMUNICATIONS – module 1								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	2		2	30		30	3
5	15	1		2	15		30	3

I. Course unit aims

This course unit aims at imparting theoretical and practical knowledge meeting the requirements of the Radio Regulations, the STCW Convention and Code and the SOLAS Convention; imparting skills of making use of and handling real equipment and simulators of the GMDSS system.

II. Preliminary requirements

The scope of a secondary school and fundamentals of electronics, computer science, technical navigation, maritime SAR, the safety of navigation and the ship.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes– semester 4		Field-specific
LO1	Knows the organization of the GMDSS system.	K_W18; K_W26
LO2	Knows components of distress and safety communications.	K_U16;
LO3	Has skills of operating radio equipment and using relevant publications.	K_U01
LO4	According to the ICS, he/she has the ability to transmit and receive Morse alphabet signs using light signals and knows the use of the Flag Code.	K_U01

Assessment methods and criteria				
LO1	Knows the organization of the GMDSS system.			
Assessment methods	Written exam.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Functional requirements of the GMDSS system.	Does not know basic functional requirements of the GMDSS system.	knows sources of information on functional requirements of the GMDSS system.	Knows general functions of the GMDSS system.	Knows in detail functional requirements of the GMDSS system.
Criterion 2 Radio documents.	Does not know required radio documents.	Knows types of radio documents and their purpose.	Knows general contents of radio documents.	Knows in detail required radio documents.
Criterion 3 Radio publications.	Does not know required radio publications.	Knows types and purpose of radio publications.	Knows general contents of radio publications and can use them.	Knows in detail required radio publications.
Criterion 4 Radio service duties	Does not know basic duties of the radio service.	Knows basic duties of the radio service.	Knows general duties of the radio service.	Knows in detail duties of the radio service.
Criterion 5 Radio waves and emissions.	Does not know basic principles of using radio waves and emissions.	Knows basic principles of radio wave propagation and emissions in use.	Knows general principles of radio wave propagation and the classification of emissions.	Has a detailed knowledge of issues related to the use of radio waves and emissions.
LO2	Knows components of distress and safety communications.			
Assessment methods	Written exam.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Distress and safety communications frequencies.	Does not know frequencies used for distress and safety and the classification of emissions.	Knows basic frequencies for distress communications.	Knows basic frequencies and principles of their use.	Knows in detail frequencies for distress and safety communications of all GMDSS subsystems, and principles of their use.

Criterion 2 Radio distress service.	Does not know basic duties of radio distress service.	Knows principles of radio watch and methods of distress alerting.	Knows procedures of distress communications.	Knows in detail the duties of distress radio service.
Criterion 3 Radio safety service.	Does not know basic duties of radio safety service.	Knows principles of the reception of safety messages.	Knows procedures of safety communications.	Knows in detail the duties of safety radio service.
Criterion 4 False alarms.	Does not know basic principles of preventing false alarms or their cancellation.	Knows basic principles of cancelling false alarms, does not know how to prevent them.	Knows general principles of preventing false alarms and procedures of cancelling them.	Knows in detail principles of preventing false alarms and procedures of cancelling them.
Criterion 5 Morse code.	Cannot send/receive Morse code signals.	Can send/receive Morse code signals with 7% errors for letters and 3% errors for digits.	Can send/receive Morse code signals with 3% errors for letters and no errors for digits.	Can send/receive Morse code signals without errors as required by the International Code of Signals.
LO3	Has skills of operating radio equipment and using relevant publications.			
Assessment methods	Written exam, Assessment of classes, lab classes and simulators, reports.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Operation of radio equipment.	Cannot operate radio equipment.	Knows basic principles of operating radio equipment.	Knows general principles of operating radio equipment.	Knows detailed principles of operating radio equipment.
Criterion 2 Radio documents.	Does not know required radio documents.	Knows types of radio documents and their purpose.	Knows general contents of radio documents.	Knows in detail the contents of required radio documents.
Criterion 3 Radio publications.	Does not know required radio publications.	Knows types of radio publications and their purpose.	Knows general contents of radio publications and can use them.	Knows in detail the required radio publications.
LO4	According to the ICS, he/she has the ability to transmit and receive Morse alphabet signs using light signals and knows the use of the Flag Code.			
Assessment methods	Written exam, Assessment of classes, lab classes and simulators, reports.			
Criteria/ Grade	2	3	3.5–4	4.5–5
Criterion 1 Morse code.	Is unable to transmit/receive in Morse code.	Can transmit/receive in Morse code with a 7% margin of error for letters and 3% error for numbers.	Can transmit/receive in Morse code with a 3% margin of error for letters and without errors for numbers.	Can transmit/receive in Morse alphabet as required by the ICS without error.
Criterion 2 Flag code.	Does not know the Flag Code.	Knows the basic meanings of the Flag Code.	Knows the use of the Flag Code and the meaning of each flag.	Can use the Flag Code proficiently.

Syllabus

SEMESTER 4	MARITIME COMMUNICATIONS	LECTURES	30 HOURS

1. Legas basis of the organization of marine communications.
2. Tasks and duties of radio service. Occupational safety regulations.
3. International Code of Signals, signalling by flags, use of signals.
4. Functional requirements of the GMDSS system.
5. Division of the seas into GMDSS areas.
6. Frequencies in use.
7. Propagation of radio waves.
8. Documents and publications.
9. Emissions, nomenclature, required band width.
10. Principles of keeping a radio watch.
11. Alerting.
12. Acknowledgement of an alert reception.
13. Distress traffic.
14. Sending and receiving Morse code signals.
15. Systems of radiolocation.
16. Safety communications – medical, maritime safety information, reporting systems.

17. Power supply for radio equipment.
18. Testing radio equipment.

SEMESTER 4	MARITIME COMMUNICATIONS	LAB CLASSES	30 HOURS

1. Use of radiocommunication publications.
2. ICS – flag signalling, use of letter signals.
3. Sending and receiving Morse code signals.
4. VHF radiotelephone communications.
5. MF and HF radiotelephone communications.
6. Inmarsat system communications.
7. Radiotelex communications.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**84**	**3**
Workload related to direct teaching activities:	64	2
Workload related to practice-oriented activities:	45	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

26.	Course unit:							N2022/35/FS/26/MC2
MARITIME COMMUNICATIONS – module 2								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	2		2	30		30	3
5	15	1		2	15		30	3

III/2. Learning outcomes and syllabus

Learning outcomes – semester 5		Field-specific
LO1	Knowledge of the principles of conducting communication.	K_W18
LO2	Knowledge of the subsystems and ship's radio equipment in the GMDSS system.	K_W26
LO3	Knowledge of radio station inspections and competences of radio personnel.	K_W18

Assessment methods and criteria				
LO1	Knowledge of the principles of conducting communication.			
Assessment methods	Written exam, Assessment of classes, lab classes/simulators, reports.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Distress communications.	Does not know basic principles of using distress communications.	Knows basic procedures of distress communications.	Can use procedures of distress communications and radio equipment.	Knows in detail procedures of distress communications for all radio devices of the GMDSS lab.
Criterion 2 Safety communications.	Does not know basic principles of using safety communications.	Knows basic procedures of safety communications.	Can use procedures of safety communications and radio equipment.	Knows in detail procedures of safety communications for all radio devices of the GMDSS lab.
Criterion 3 General communications.	Does not know basic principles of using general communications.	Knows procedures of general communications.	Can use procedures of general communications and real radio equipment.	Knows in detail procedures of general communications.
LO2	Knowledge of the subsystems and ship's radio equipment in the GMDSS system.			
Assessment methods	Written exam, Assessment of classes, lab classes/simulators, reports.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 DSC system.	Does not know principles of operation of DSC system equipment.	Knows the basics of DSC system operation.	Knows general principles of handling DSC system equipment.	Knows in detail the organization of the DSC system and can use the equipment.
Criterion 2 Inmarsat system.	Does not know principles of operation of the Inmarsat system equipment.	Knows the basics of Inmarsat system operation.	Knows general principles of handling Inmarsat system equipment.	Knows in detail the organization of the Inmarsat system and can use the equipment.
Criterion 3 Systems of maritime safety information (MSI).	Does not know principles of operation of the MSI system equipment.	Knows the basics of MSI system operation.	Knows general principles of handling MSI system equipment.	Knows in detail the organization of the MSI system and can use the equipment.
Criterion 4 Antenna systems.	Does not know principles of antenna construction.	Knows basic principles of antenna construction.	Knows general principles of antenna construction and their parameters.	Knows in detail principles of antenna construction and their parameters.
LO3	Knowledge of radio station inspections and competences of radio personnel.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Radio station inspections.	Does not know the goals and tasks of radio inspection.	Knows basic goals of radio inspection.	Knows requirements of radio inspection.	Knows in detail goals and tasks of radio inspection.
Criterion 2 Radio personnel.	Does not know duties and tasks of radio personnel on a ship.	Knows basic tasks of radio personnel.	Knows general duties and tasks of radio personnel.	Knows in detail duties and tasks of radio personnel.

Syllabus

SEMESTER 5	MARITIME COMMUNICATIONS	LECTURES	15 HOURS

1. Distress and safety communications.
2. General communications.
3. Ship's radio equipment in the GMDSS system.
4. Digital selective calling system.
5. Satellite systems.
6. Emergency radiobeacon systems, radar transponders.
7. Narrow-band direct printing (NBDP) system.
8. False alarm safeguards.
9. Transmission systems of maritime safety information.
10. Antenna systems.
11. Radio personnel.
12. Keeping a Radio Logbook.
13. Inspections of a ship's radio station.

SEMESTER 5	MARITIME COMMUNICATIONS	LAB CLASSES	30 HOURS

1. Distress communications in VHF, MF and HF bands.
2. Urgency communications in the VHF, MF and HF bands.
3. Safety communications in the VHF, MF and HF bands.
4. Procedures and principles of INMARSAT system communications.
5. Medical communications – use of the ICS.
6. Reception of weather information using radio facsimiles.
7. Routine communications procedures using all radiocommunication devices.
8. Use of the DSC system in the VHF band.
9. Use of the DSC system in the MF/HF band.
10. Transmission systems of maritime safety information (MSI), reception by NAVTEX, SafetyNET, or via radiotelex in the HF band.
11. Handling life-saving radio devices.
12. Basic fault finding in radio equipment.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	15	
Total workload	**79**	**3**
Workload related to direct teaching activities:	49	1.5
Workload related to practice-oriented activities:	45	1.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. IMO/ICAO – IAMSAR *Manual. International Aeronautical and Maritime Search and Rescue Manual*, vol. III. Mobile Facilities.

2. IMO – *International Code of Signals* (ICS), 2005 Edition.
3. IMO – *International Convention Safety of Life at Sea* (SOLAS) – Consolidated Edition, 2020.
4. IMO – International Convention on Standards of Training, Certification and watchkeeping for Seafarers (STCW) including adopted amendments.
5. IMO – *Maritime English*, 2015 Edition.
6. ITU – International Telecommunication Union, *Manual for use by the Maritime Mobile and Maritime Mobile-Satellite Services*.

VI. Extra reading

1. IMO, Model course 1.25 – *General Operator's Certificate for GMDSS*.

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

27.	Course unit:	N2022/12/FS/27/SN1

SAFETY OF NAVIGATION – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1		0.5	15		7.5	1
3	15	1		0.5	15		7.5	1
4	15		1			15		1
8	12			1			12	1

I. Course unit aims

This course unit will introduce students to the Collision Regulations, their application in various situations, watch keeping procedures, teamwork on the bridge and the use of available measures to assure safe movement of the ship.

II. Preliminary requirements

The scope of a secondary school, elements of navigation, navigational equipment, ship manoeuvring, ship safety and marine traffic engineering.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semesters.

Learning outcomes – semester 2		Field-specific
LO1	Has detailed knowledge of the enforcement of the International Regulations for Preventing Collisions at Sea, responsibility for compliance and principles of departure from the rules.	K_W16
LO2	Has detailed knowledge of consequences of non-compliance with the COLREGs.	K_K02
LO3	Has detailed knowledge of the role and significance of local regulations.	K_W16
LO4	Has detailed knowledge of lights, shapes and sound signals required by the COLREGs.	K_W16
LO5	Can identify a ship by lights, day marks and fog signals.	K_U03
LO6	Has knowledge of distress signals and actions to be taken upon reception of such signals.	K_W16; K_W19

Assessment methods and criteria				
LO1	Has detailed knowledge of the enforcement of the International Regulations of Preventing Collisions at Sea, responsibility for compliance and principles of non-compliance.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 knowledge of the enforcement of the International Regulations of Preventing Collisions at Sea, responsibility for compliance and principles of non-compliance.	Does not have elementary knowledge of the binding and application of the Collision Regulations, responsibility for compliance and principles of non-compliance.	Has basic knowledge of the binding Collision Regulations, basic principles of application, referring to the responsibility for compliance and principles of non-compliance.	has general knowledge of the binding Collision Regulations, knows most principles of their application, responsibility for compliance and principles of non-compliance.	Has detailed knowledge of the binding COLREGs, knows in detail principles of application, responsibility for compliance and principles of non-compliance.
LO2	Has detailed knowledge of consequences of non-compliance with the COLREGs.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 knowledge of consequences of non-compliance with the COLREGs.	Does not have elementary knowledge of consequences of non-compliance with the COLREGs.	Knows basic consequences of non-compliance with the COLREGs.	Knows most of the consequences of non-compliance with the COLREGs, understands their impact on the safety of life and environment.	Knows all consequences of non-compliance with the COLREGs, understands their impact on the safety of life and environment.
LO3	Has detailed knowledge of the role and significance of local regulations.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have elementary knowledge of the role and	Has basic knowledge of establishing, significance and enforcement	Has general knowledge of establishing, significance and enforcement	Has detailed knowledge of establishing, significance and enforcement

knowledge of the role and significance of local regulations.	significance of local regulations.	of local regulations, knows basic principles of their application and basic relevant sources of information.	of local regulations, knows most principles of application and most relevant sources of information on such regulations.	of local regulations, knows in detail principles of application and all relevant sources of information on such regulations.
LO4	Has detailed knowledge of lights, shapes and sound signals required by the COLREGs.			
Assessment methods	Written assessment			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of lights, shapes and sound signals required by the COLREGs.	Does not have elementary knowledge of lights, shapes and sound signals required by the COLREGs.	Has basic knowledge of lights, shapes and sound signals required by the COLREGs.	Has general knowledge of lights, shapes and sound signals required by the COLREGs.	Has detailed knowledge of lights, shapes and sound signals required by the COLREGs.
LO5	Can identify a ship by lights, day marks and fog signals.			
Assessment methods	Written assessment			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to identify a ship by lights, shapes and fog signals.	Cannot identify a ship from her lights, day marks or fog signals.	Can provide basic information about a ship that can be determined from her lights, day marks or fog signals.	Can provide most of the information about a ship that can be determined from her lights, day marks or fog signals.	Can provide all information about a ship that can be determined from her lights, day marks or fog signals.
LO6	Has knowledge of distress signals and actions to be taken upon reception of such signals.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of distress signals and actions to be taken upon reception of such signals.	Does not have elementary knowledge of distress signals and actions to be taken upon reception of such signals.	Knows basic distress signals and basic procedures to be followed upon reception of such signals.	Knows most of the distress signals and most procedures to be followed upon reception of such signals.	Knows all distress signals and all procedures to be followed upon reception of such signals.

Syllabus

SEMESTER 2	SAFETY OF NAVIGATION	LECTURES	15 HOURS

1. Concept, purpose and significance of the International Regulations for Preventing Collisions at Sea (COLREGs).
   1.1. General. Historical background. UpToDate collision regulations.
   1.2. Terms and general definitions as provided in Rule 3.
2. General provisions, responsibility.
   2.1. Responsibility for neglect to comply with the COLREGs.
   2.2. Ordinary sea practice, taking into account circumstances and manoeuvring ability of vessels.
   2.3. Departure from the rules.
   2.4. Local regulations, significance, knowledge and necessity to comply, sources of information.
3. Lights and shapes.
   3.1. Application, vertical and horizontal sectors, colour, visibility range, vertical and horizontal positioning and spacing of lights.
   3.2. Power-driven vessels underway.
   3.3. Towing and pushing.
   3.4. Sailing vessels and vessels under oars underway.
   3.5. Vessels engaged in fishing underway and at anchor, additional lights of a vessel engaged in fishing in close proximity to other vessels engaged in fishing.
   3.6. Vessels not under command and vessels restricted in their ability to manoeuvre.
   3.7. Vessels constrained by draft.
   3.8. Pilot vessels.
   3.9. Anchored vessels and vessels aground.
4. Sound and light signals.
   4.1. Equipment for sound signals.
   4.2. Signals of vessels in sight of one another: manoeuvring signals, signals to attract attention, warning signals.
   4.3. Sound signals in restricted visibility.
   4.4. Significance of signals and methods of transmission.
5. Distress signals.
   5.1. Division, significance, actions after receiving a distress signal.

SEMESTER 2	SAFETY OF NAVIGATION	LAB CLASSES	7.5 HOURS

1. Lights and shapes.
   1.1. Application, vertical and horizontal sectors, colour, visibility range, vertical and horizontal positioning.
   1.2. Power-driven vessels underway.
   1.3. Towing and pushing.
   1.4. Sailing vessels and vessels under oars underway.
   1.5. Vessels engaged in fishing underway and at anchor, additional lights of a vessel engaged in fishing in close proximity to other vessels engaged in fishing.
   1.6. Vessels not under command and vessels restricted in their ability to manoeuvre.
   1.7. Vessels constrained by draft.
   1.8. Pilot vessels.
   1.9. Anchored vessels and vessels aground.
   1.10. Position lights. Exercises on vessel light simulator, identification of vessels based on their lights – type of vessel, performed action, size, angle of observation.
   1.11. Identification of vessels from exhibited shapes.
2. Sound and light signals.
   2.1. Equipment for sound signals.
   2.2. Signals of vessels in sight of one another: manoeuvring signals, signals to attract attention, warning signals.
   2.3. Sound signals in restricted visibility.
3. Distress signals.
   3.1. Division, significance, actions after receiving a distress signal.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	7.5	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	10	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**42**	**1**
Workload related to direct teaching activities:	22.5	0.5
Workload related to practice-oriented activities:	17.5	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

27.	Course unit:	N2022/23/FS/27/SN2

SAFETY OF NAVIGATION – module 2

Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1		0.5	15		7.5	1
3	15	1		0.5	15		7.5	1
4	15		1			15		1
8	12			1			12	1

III/2. Learning outcomes and syllabus

Learning outcomes – semester 3		Field-specific
LO1	Has detailed knowledge of the COLREGs application in order to avoid collisions of vessels.	K_W16
LO2	Has basic knowledge of the use and limitations of bridge technical equipment and vessel's manoeuvrability for avoiding collisions.	K_W08; K_W17
LO3	Can assess a situation on the basis of visible lights or shapes of vessels, heard manoeuvring or warning signals, signals to attract attention or fog signals.	K_U03
LO4	Can apply Collision Regulations to avoid collisions of vessels.	K_U24
LO5	Can use information from available equipment and vessel's manoeuvring data for collision avoidance.	K_U24

Assessment methods and criteria				
LO1	Has detailed knowledge of the COLREGs application in order to avoid collisions of vessels.			
Assessment methods	Written assessment			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 knowledge of the COLREGs application to avoid collisions of vessels.	Does not have elementary knowledge of the COLREGs application to avoid collisions of vessels.	Has basic knowledge of the COLREGs application to avoid collisions of vessels, knows basic principles concerning the avoidance of vessel collisions.	Has general knowledge of the COLREGs application to avoid collisions of vessels, knows most principles concerning the avoidance of vessel collisions.	Has detailed knowledge of the COLREGs application to avoid collisions of vessels, knows all principles concerning the avoidance of vessel collisions.
LO2	Has basic knowledge of the use and limitations of bridge technical equipment and vessel's manoeuvrability for avoiding collisions.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 knowledge of the use and limitations of bridge technical equipment and vessel's manoeuvrability to avoid collisions.	Does not have elementary knowledge of using and of limitations of bridge technical equipment and vessel's manoeuvrability to avoid collisions.	Knows basic principles and methods of using bridge equipment to avoid collisions; is aware of the impact of vessel's manoeuvrability on the performance of collision avoiding manoeuvre.	Knows general principles and methods of using bridge equipment to avoid collisions; basically, knows the impact of vessel's manoeuvrability on the performance of collision avoiding manoeuvre.	Knows in detail principles and methods of using bridge equipment to avoid collisions; knows the overall impact of vessel's manoeuvrability on the performance of collision avoiding manoeuvre.
LO3	Can assess a situation on the basis of visible lights or shapes of vessels, heard manoeuvring or warning signals, signals to attract attention or fog signals.			
Assessment methods	Assessment of the lab classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to assess a situation on the basis of visible lights or shapes of vessels, heard manoeuvring or warning signals, signals to attract attention or fog signals.	Cannot assess a situation on the basis of visible lights or shapes of vessels, heard manoeuvring or warning signals, signals to attract attention or fog signals.	Poorly assesses a situation on the basis of visible lights or shapes of vessels, heard manoeuvring or warning signals, signals to attract attention or fog signals.	Can assess almost correctly, with minor mistakes, a situation on the basis of visible lights or shapes of vessels, heard manoeuvring or warning signals, signals to attract attention or fog signals.	Can assess correctly a situation on the basis of visible lights or shapes of vessels, heard manoeuvring or warning signals, signals to attract attention or fog signals.
LO4	Can apply Collision Regulations to avoid collisions of vessels.			
Assessment methods	Assessment of the lab classes.			
Criteria/Grade	2	3	3.5–4	4.5–5

Application of the Collision Regulations to avoid collisions of vessels.	Cannot apply the Collision Regulations to avoid collisions of vessels.	Poorly applies the Collision Regulations to avoid collisions of vessels.	Can apply almost correctly, with minor mistakes, the Collision Regulations to avoid collisions of vessels.	Can apply correctly the Collision Regulations to avoid collisions of vessels; can take into account all alternatives and their restrictions in use.
LO5	Can use information from available equipment and vessel's manoeuvring data for collision avoidance.			
Assessment methods	Assessment of the lab classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Use of information from available equipment and vessel's manoeuvring data for collision avoidance.	Cannot use information from available equipment and vessel's manoeuvring data for collision avoidance.	Poorly uses information from available equipment and vessel's manoeuvring data for collision avoidance.	Can use almost correctly, with minor mistakes, information from available equipment and vessel's manoeuvring data for collision avoidance.	Can use correctly information from available equipment and vessel's manoeuvring data for collision avoidance.

Syllabus

SEMESTER 3	SAFETY OF NAVIGATION	LECTURES	15 HOURS

1. Look-out.
   1.1. Purpose of look-out, range, types and methods of look-out in various states of visibility.
2. Safe speed.
   2.1. Concept of safe speed and factors determining a safe speed.
3. Risk of collision, action to avoid collision.
   3.1. Appraisal of a risk of collision in various states of visibility.
   3.2. Characteristics of an action taken to avoid collision, checking the effectiveness of the action, meaning of the term 'not to impede'.
4. Narrow channels and traffic separation schemes.
   4.1. Concept and components of a traffic separation scheme, rules of vessel conduct, application of overtaking rules.
5. Vessels in sight of one another.
   5.1. Conditions for the application of collision avoidance rules by vessels in sight of one another.
   5.2. Cautious reliance, coordinated actions, assessment of manoeuvring abilities.
   5.3. Types of vessel encounters, application of the proper collision avoidance rules depending on the type of encounter, identification of stand-on and give-way vessels.
6. Actions by stand-on and give-way vessels.
7. Restricted visibility.
   7.1. Vessels' conduct.
   7.2. Actions depending on the position of another vessel detected by radar or upon hearing a fog signal; close-quarters situation.
   7.3. Course and speed alteration.

SEMESTER 3	SAFETY OF NAVIGATION	LAB CLASSES	7.5 HOURS

1. Proper look-out. Safe speed. Risk of collision. Action to avoid collision.
   1.1. Purpose, conduct and organization of look-out.
   1.2. Safe speed in various conditions, determining a safe speed depending on circumstances.
   1.3. Method of assessing a risk of collision depending on circumstances.
   1.4. Manoeuvres preventing collisions, depending of the risk level and type of vessels encounter, substantial and timely action.
2. Narrow channels and traffic separation schemes.
   2.1. Principles of movement, crossing, joining the traffic, right of way, giving way.
3. Encounters of vessels in sight of one another.
   3.1. Types of encounters, actions, identifying the right of way, giving way.
4. Action by stand-on vessel.
   4.1. Obligation to keep course and speed, obligations at subsequent stages, obligation to take collision avoiding action.
5. Restricted visibility.
   5.1. Action after detecting by radar the presence of another vessel and after hearing a fog signal, differentiating the signals, radar plots.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	7.5	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	10	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**42**	**1**
Workload related to direct teaching activities:	22.5	0.5
Workload related to practice-oriented activities:	17.5	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

27.	Course unit:	N2022/24/FS/27/SN3

SAFETY OF NAVIGATION – module 3

Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1		0.5	15		7.5	1
3	15	1		0.5	15		7.5	1
4	15		1			15		1
8	12			1			12	1

III/3. Learning outcomes and syllabus

Learning outcomes – semester 4		Field-specific
LO1	Has detailed knowledge of the principles of watch organization in all conditions.	K_W31; K_W32
LO2	Has detailed knowledge of watch officer's duties while taking over – handing over – standing a navigational watch.	K_W12
LO3	Has detailed knowledge of actions to be taken in emergency situations.	K_W19
LO4	Is aware of the responsibility for assigned duties; understands the importance of proper performance of emergency procedures concerning the safety of navigation.	K_K05
LO5	Has detailed knowledge of principles of bridge resources management.	K_W31; K_K04
LO6	Can take over, hand over and stand a navigational or port watch correctly.	K_U22

Assessment methods and criteria				
LO1	Has detailed knowledge of the principles of watch organization in all conditions.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 knowledge of the principles of watch organization in all conditions.	Has no elementary knowledge of the principles of watch organization.	Knows basic principles of watch organization.	Knows most principles of watch organization.	Knows all principles of watch organization.
LO2	Has detailed knowledge of watch officer's duties while taking over – handing over – standing a navigational watch.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of watch officer's duties while taking over/handing over/standing a navigational watch.	Does not have elementary knowledge of watch officer's duties while taking over/handing over/standing a watch.	Knows basic principles and duties of an officer while taking over/handing over/standing a watch.	Knows most principles and duties of an officer while taking over/handing over/standing a watch.	Knows all principles and duties of an officer while taking over/handing over/standing a watch.
LO3	Has detailed knowledge of actions to be taken in emergency situations.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of actions to be taken in emergency situations.	Does not elementary knowledge of actions to be taken in emergency situations.	Knows basic principles of actions to be taken in emergency situations.	Knows most principles of actions to be taken in emergency situations.	Knows all principles of actions to be taken in emergency situations.
LO4	Is aware of the responsibility for assigned duties; understands the importance of proper performance of emergency procedures concerning the safety of navigation.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Awareness of the need to observe proper watch-keeping and emergency procedures and the consequences of neglect to perform them.	Does not understand the need to observe watch-keeping procedures.	Has little a Awareness of the need to observe proper watch-keeping and emergency procedures and the consequences of neglect to perform them.	Understands the need to observe proper watch-keeping procedures, realizes most of the consequences of neglect to perform these procedures.	Understands the need to observe proper watch-keeping procedures, realizes all the consequences of neglect to perform these procedures.
LO5	Has detailed knowledge of principles of bridge resources management.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5

Criterion 1 Knowledge of principles of bridge resources management.	Does not have elementary knowledge of principles of bridge resources management.	Knows basic principles of bridge resources management.	Knows most principles of bridge resources management.	Knows all principles of bridge resources management.
LO6	Can take over, hand over and stand a navigational or port watch correctly.			
Assessment methods	Written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skills of handing over/taking over and standing a navigational and port watch.	Cannot correctly take over, hand over and stand a navigational or port watch.	Can take over, hand over and stand a navigational or port watch in a typical situation, occasionally making mistakes.	Can take over, hand over and stand a navigational or port watch correctly in a typical situation.	Can apply perfectly procedures of handing over/taking over and standing a navigational and port watch in any situation.

Syllabus

SEMESTER 4	SAFETY OF NAVIGATION	CLASSES	15 HOURS

WATCH-KEEPING AND BRIDGE RESOURCES MANAGEMENT

1. Rules, procedures and good practices of performing and taking over the navigational watch.
2. Principles to be observed in keeping a navigational watch, assignment of tasks.
3. Watch arrangements on the bridge depending on the conditions.
4. Principles of effective communication on the bridge.
5. Watch organization; assignment of tasks and prioritisation of available resources.
6. Use of information from electronic navigation aids and other navigational equipment for keeping a safe navigational watch.
7. Identification of the present and predicted situation of the vessel on a pressed route, the impact of the external environment.
8. Assessment of a situation and hazards, assessment of the effectiveness of actions taken.
9. Watchkeeping under different conditions and in different areas (clear weather, restricted visibility, in hours of darkness, coastal and congested waters, navigation with pilot on board, ship at anchor).
10. Use of 'blind' pilotage techniques.
11. Reporting procedures and co-operation with a VTS centre.
12. Procedures for emergency situations during a watch.
13. Demonstration of proper firmness and assertiveness.
14. Skills of teamwork and team leadership.
15. Keeping record of vessel movement – entries in the logbook and other documents.
16. Accident: proceedings, documentation, securing the evidence.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	10	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Total workload	**32**	**1**
Workload related to direct teaching activities:	17	0.5
Workload related to practice-oriented activities:	25	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

27.	Course unit:	N2022/48/FS/27/SN4

SAFETY OF NAVIGATION – module 4

Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
2	15	1		0.5	15		7.5	1
3	15	1		0.5	15		7.5	1
4	15		1			15		1
8	12			1			12	1

III/4. Learning outcomes and syllabus

Learning outcomes – semester 8		Field-specific
LO1	Can avoid collisions correctly in all states of visibility and all types of water areas.	K_U24
LO2	Can command the subordinate members of a navigational watch, can assign properly the duties to all watchkeeping personnel.	K_U22; K_K04
LO3	Has a skill of effective communication in matters related to keeping a safe navigational watch.	K_U08
LO4	Can use properly available technical equipment while keeping a navigational watch.	K_U18
LO5	Can work in a team composed of navigational watch personnel.	K_U22; K_K03

Assessment methods and criteria				
LO1	Can avoid collisions correctly in all states of visibility and all types of water areas.			
Assessment methods	Assessment of lab classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to avoid collisions correctly in all states of visibility and all types of water areas, correct application of the COLREGs.	Cannot take proper action to avoid a collision.	Can take action according to the COLREGs to avoid collision in simple situations.	Can take action according to the COLREGs to avoid collision in most situations.	Can take action according to the COLREGs to avoid collision in all situations.
LO2	Can command the subordinate members of a navigational watch, can assign properly the duties to all watchkeeping personnel.			
Assessment methods	Assessment of lab Classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skill of commanding subordinate members of a navigational watch, proper assignment of duties.	Cannot command a navigational watch.	Has some difficulties in commanding a navigational watch, can assign duties to navigational watch personnel.	Can command, with some mistakes, a navigational watch, can assign duties to navigational watch personnel.	Can command a navigational watch effectively, can assign duties to navigational watch personnel and enforce their execution.
LO3	Has a skill of effective communication in matters related to keeping a safe navigational watch.			
Assessment methods	Assessment of lab Classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Effective communication in matters related to keeping a safe navigational watch.	Cannot communicate to the extent needed to keep a safe navigational watch.	Has some difficulties in communicating in matters related to keeping a safe navigational watch.	Can communicate, with some mistakes, in matters related to keeping a safe navigational watch.	Can efficiently communicate in matters related to keeping a safe navigational watch.
LO4	Can use properly available technical equipment while keeping a navigational watch.			
Assessment methods	Assessment of lab Classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skill of using properly available technical equipment while keeping a navigational watch.	Cannot use properly the available technical equipment while keeping a navigational watch.	Has basic skills of using properly the available technical equipment while keeping a navigational watch.	Has basic skills of using properly the available technical equipment while keeping a navigational watch, knows some additional functionalities.	Can proficiently use the functionalities of available equipment while keeping a navigational watch, knows all functionalities of the equipment.
LO5	Can work in a team composed of navigational watch personnel.			
Assessment methods	Assessment of lab Classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot work in a team.	Can work in a team satisfactorily in typical situations.	Can work in a team correctly in typical situations.	Can work in a team perfectly in all situations.

Ability to work in a team composed of navigational watch personnel.				

Syllabus

SEMESTER 8	SAFETY OF NAVIGATION	LAB CLASSES	12 HOURS

1. Risk of collision and action taken to avoid collision, establishing a safe speed, proper look-out.
2. Full appraisal of a situation around the vessel, finding whether a risk of collision exists, taking proper action and checking its effectiveness.
3. Conduct of vessels in sight of one another. Navigation in good visibility, vessels meeting in various encounter situations.
4. Overtaking. Determining a moment to start and complete overtaking, obligations of both vessels.
5. Traffic separation schemes. Conduct of vessels using a traffic separation scheme – performing collision avoiding manoeuvres.
6. Conduct of a stand-on vessel. Encounter with a give-way vessel that fails to take collision avoiding manoeuvres.
7. Restricted visibility. Vessel conduct and manoeuvres in restricted visibility in the open sea, ability to interpret a radar image.
8. Vessel conduct and manoeuvres in restricted visibility in a restricted area.
9. Watch keeping, procedures, being in charge of a navigational watch, assignment of tasks (*Bridge Team Management)*.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	12	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	12	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams		
Total workload	**26**	**1**
Workload related to direct teaching activities:	14	0.5
Workload related to practice-oriented activities:	24	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training

The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading

1. IMO – Collision Regulations Convention (COLREGS), 2003.
2. Cockcroft A.N., Lameijer J.N.F., *A guide to the collision avoidance rules*, Butterworth-Heinemann, latest edition.
3. Swift A.J., *Bridge Team Management*, The Nautical Institute, 2nd Edition.
4. ICS – *Bridge Procedures Guide*, International Chamber of Shipping, 6th Edition, 2022.
5. The Nautical Institute – *Bridge Watchkeeping, a practical guide*, 2nd Edition, 2022.

VI. Extra reading

1. *International Convention on Standards of Training, Certification and Watchkeeping* – STCW 2010.
2. Cahill R.A., *Collisions and their causes*, The Nautical Institute, 3rd Edition

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

28.	Course unit:	N2022/11/FS/28/SCS1

SHIP CONSTRUCTION AND STABILITY – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		1	30		15	2
2	15	1		1	15		15	2
3	15	1	2		15	30		3
4	15	1	2	1	15	30	15	4
8	12	1		1.5	12		18	1

I. Course unit aims

This course unit aims at imparting fundamental principles of ship construction and deck equipment, performing surveys, repairs and maintenance work, and strength/stability calculations, based on the understanding relevant physical processes, explanation of how to interpret applicable regulations, and the skill of using a loading instrument.

II. Preliminary requirements

The scope of a secondary school, specialist terminology in English, elements of mathematics, physics, computer science and machine construction and engineering graphics.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 1		Field-specific
LO1	Knows general arrangement and operational parameters of various ship types; typical solutions of ship's structural nodes and elements.	K_W07; K_W25
LO2	Knows principles of ship classification and inspections of classification societies.	K_W26; K_U28
LO3	Knows properties of materials used in shipbuilding.	K_W07; K_W09; K_W25; K_W26
LO4	Can use ship's construction documentation.	K_U28
LO5	Can calculate an area by the approximate method, for example by trapezoidal approximation.	K_U11

Assessment methods and criteria				
LO1	Knows general arrangement and operational parameters of various ship types; typical solutions of ship's structural nodes and elements.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of ship types.	Does not know ship types.	has a minimum knowledge of operational parameters of ships; can state only basic individual features of general arrangement of various type ships and has difficulties in explaining them.	Knows operational parameters of ships; can state individual features of general arrangement of various type ships and partly explain them.	Perfectly knows operational parameters of ships; can give a comprehensive description of individual features of general arrangement of various type ships and explain their position.
Criterion 2 Knowledge of ship's structural elements.	Does not know the structure of typical hull and superstructure elements.	Can describe the structure of typical elements of the hull and superstructure only, and some solutions of structural nodes; has difficulties in naming properly some structural elements of a ship.	Can describe the structure of typical elements of the hull and superstructure, and typical solutions of structural nodes; can name properly major structural elements of a ship.	Can describe and explain the structure of typical elements of the hull and superstructure only, and typical solutions of structural nodes; can name properly various structural elements of a ship.
LO2	Knows principles of ship classification and inspections of classification societies.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of ship classification principles	Does not know principles of and the need for	Has incomplete knowledge of ship classification and maintenance of their proper technical condition; has a superficial knowledge of	Understands the need for ship classification and proper maintenance; knows the scope of classification	Has a systematic knowledge of ship classification and proper maintenance; knows the scope of classification society activities; can state

	ship classification.	classification society activities; can state some classification regulations; is poorly prepared for teamwork during an inspection.	society activities; can state examples of classification regulations; is well prepared for teamwork during an inspection.	classification regulations and understands their application range; is very well prepared for teamwork during an inspection.
LO3	Knows properties of materials used in shipbuilding.			
Assessment methods	assessment of Classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of properties of materials used in shipbuilding.	Cannot list satisfactorily materials used in shipbuilding, nor their properties.	Has difficulties in stating basic materials used in shipbuilding, and gives only some of their properties.	States basic materials used in shipbuilding, and describes their properties; has some difficulties in specifying their applications.	Proficiently states basic materials used in shipbuilding, describes their properties and typical applications.
LO4	Can use ship's construction documentation.			
Assessment methods	assessment of Classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to use construction documentation.	Does not have skills for using ship construction documentation.	Can identify the type and purpose of a ship based on its construction documentation; principally indicates structural elements on a drawing, has difficulties with dimensions; can read construction drawings of a ship; interprets them with difficulties.	Based on ship construction documentation. Can identify the type and purpose of a ship; on a drawing, indicates basic structural elements and their dimensions; can read and interpret construction drawings of a ship.	Based on ship construction documentation, can perfectly identify the type and purpose of a ship; on a drawing, confidently indicates various structural elements and their dimensions; can read and interpret construction drawings of a ship; proficiently reads and interprets ship construction drawings.
LO5	Can calculate an area by the approximate method, for example by trapezoidal approximation.			
Assessment methods	assessment of Classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to calculate an area by the trapezoid method.	Cannot use the trapezoid method for calculating an area under a curve.	Uses the trapezoid method for calculating an area under a curve, but does not understand theoretical basis; makes errors and does not see them.	Uses the trapezoid method for calculating an area under a curve, understands theoretical basis; corrects errors made.	Perfectly uses the trapezoid method for calculating an area under a curve, well understands theoretical basis and its limitations; can state and apply other methods of approximated integration.

Syllabus

SEMESTER 1	SHIP CONSTRUCTION AND STABILITY	LECTURES	30 HOURS

HULL STRUCTURE

1. Classification societies, range of activity, publications. Class of ship, classification requirements.
2. Basic operational characteristics and parameters.
3. Hull geometry, main dimensions, block coefficient of a ship's hull, body lines, Bonjean Scale.
4. Load lines, freeboard, freeboard mark, draft scales, draft reading.
5. Inspections required by the Load Line Convention.
6. Types of ships, features of general arrangement depending on ship type: bulk carrier, tanker, container ship, general cargo ship, ro-ro ship.
7. Materials used in shipbuilding, types, principles of use, classification requirements.
   7.1. Types of steel.
   7.2. Principles of using steel, aluminium and cast iron.
   7.3. Effect of type of steel on the weight and strength of a structure.
   7.4. Principles of supervision by classification societies.
8. Hull structure, selected structural nodes.
   8.1. Framing systems of the hull.
   8.2. Strake and its stiffening as the primary structural member.
   8.3. Cross section and longitudinal section of a ship.
   8.4. Terminology of structural members.

8.5. Structure of the double bottom, sides, decks, superstructures, bow and stern construction.
9. Layout and structure of bulkheads.
10. Watertight and weathertight doors. Convention requirements for watertightness and weathertightness.
11. Structure of the forepeak and afterpeak.
12. Steering gear and propeller.

SEMESTER 1	SHIP CONSTRUCTION AND STABILITY	LAB CLASSES	15 HOURS

HULL STRUCTURE
1. Classification regulations.
2. Main dimensions, basic operational characteristics and parameters of a ship.
3. Drawing of body lines. Use of approximated integration methods for the calculation of waterplane area.
4. General plans of a bulk carrier, tanker, container ship and a ro-ro ship. Ballast tank arrangement.
5. Hull structure, selected structural nodes, structure of decks, sides, double bottom, bulkheads, forepeak and afterpeak, cross and longitudinal sections.
6. Plan of tanks, scaling of tanks.

Student workload − semester 1	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	8	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**61**	**2**
Workload related to direct teaching activities:	47	1.5
Workload related to practice-oriented activities	23	0.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

28.	Course unit:	N2022/12/FS/28/SCS2

SHIP CONSTRUCTION AND STABILITY – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		1	30		15	2
2	15	1		1	15		15	2
3	15	1	2		15	30		3
4	15	1	2	1	15	30	15	4
8	12	1		1.5	12		18	1

III/2. Learning outcomes and syllabus

Learning outcomes – semester 2		Field-specific
LO1	Knows principles of general and local hull strength; understands sources of loads acting on ship's structure; knows and understands methods of calculating shear forces and bending moments affecting the hull.	K_W07; K_W09; K_W25; K_U20; K_U21
LO2	Can calculate shear forces and bending moments acting of the hull and use a loading instrument for the supervision over general strength of the ship.	K_W07; K_W09; K_W25; K_U20; K_U21
LO3	Is acquainted with the welding work carried out on the ship.	K_W07; K_W09; K_W25; K_U20; K_U28
LO4	Knows the construction and principles of operating deck equipment, ship systems and hull equipment, including watertight doors.	K_W07; K_W09; K_W25; K_U20
LO5	Knows the process of corrosion affecting structural elements of a ship; knows principles of maintenance, surveys and repairs.	K_W07; K_W09; K_W25; K_U02
LO6	Knows the principles, understands the procedures for conducting a ship condition survey, including the Enhanced Survey Programme (ESP).	K_W26; K_U28

Assessment methods and criteria				
LO1	Knows principles of general and local hull strength; understands sources of loads acting on ship's structure; knows and understands methods of calculating shear forces and bending moments affecting the hull.			
Assessment methods	assessment of classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Understanding of loads acting on the ship structure.	Does not understand loads acting on ship structure and cannot discuss shear forces and bending moments acting on the ship.	Understands superficially the physical laws referring to structure loads and strength; hardly explains the mechanism of creating shear forces and bending and torsional moments affecting the hull; partly indicates cause-and-effect relations between ship's loading condition and bending moments; can explain the difference between general and local strengths; hardly interprets 'Information on Longitudinal Strength for the Master'.	Understands the physical laws referring to structure loads and strength; explains the mechanism of creating shear forces and bending and torsional moments affecting the hull; can indicate cause-and-effect relations between ship's loading condition and bending moments; can explain the difference between general and local strengths; can interpret 'Information on Longitudinal Strength for the Master'.	Fully understands the physical laws referring to structure loads and strength; logically and to the point explains the mechanism of creating shear forces and bending and torsional moments affecting the hull; can indicate cause-and-effect relations between ship's loading condition and bending and torsional moments; completely explains the difference between general and local strengths; can interpret 'Information on Longitudinal Strength for the Master'.
LO2	Can calculate shear forces and bending moments acting of the hull and use a loading instrument for the supervision over general strength of the ship.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to calculate shear forces and	Cannot calculate shear forces and bending	Makes with difficulty 'manual' calculations of shear forces and bending moments acting on a box-	Makes 'manual' calculations of bending moments acting on a box-shaped pontoon; is able	Makes correctly 'manual' calculations of bending moments acting on a box-shaped pontoon; can

bending moments acting on the hull.	moments acting on the hull.	shaped pontoon; fails to notice errors made; explains the phases of calculations; can discuss the influence of some factors only on the result of calculations.	to notice and correct possible errors; can choose a proper method of calculations; explains the phases of calculations; can discuss the influence of various factors on the result of calculations.	choose an optimal method of calculations; explains logically the phases of calculations; can discuss substantively the influence of various factors on the result of calculations.
Criterion 2 Use of a loading instrument.	Has not mastered the skill of using a loading instrument.	Superficially understands the significance of supervision over ship strength; can state only one type of loading instrument; can explain an operating algorithm of loading instrument; has problems with interpreting of calculation results; superficially knows the process of loading instrument certification.	Understands the significance of supervision over ship strength; can state types of loading instrument; can explain an operating algorithm of loading instrument; interprets calculation results; knows the process of loading instrument certification.	Fully understands the significance of supervision over ship strength; can state types of loading instrument; can explain substantively an operating algorithm of loading instrument; correctly interprets calculation results; knows the process of loading instrument certification very well.
LO3	Is acquainted with the welding work carried out on the ship.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of welding work performed on ships.	Cannot describe welding work performed on ships.	Has difficulties in describing welding work performed on ships; does not know welding methods.	Describes welding work performed on ships; knows welding methods; states their characteristics and limitations.	Proficiently describes welding work performed on ships; knows welding methods; states their characteristics and limitations; knows equipment used for welding and some safety rules and regulations.
LO4	Knows the construction and principles of operating deck equipment, ship systems and hull equipment, including watertight doors.			
Assessment methods	assessment of Classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of deck equipment, ship systems and hull equipment, including watertight doors.	Does not know deck equipment, ship systems and hull equipment, including watertight doors.	Has difficulties in stating typical deck equipment, ship systems and hull equipment; having difficulties in understanding, can explain their application, principles of operation and the need to maintain them in proper technical condition.	States typical deck equipment, ship systems and hull equipment; understands and can explain their application, principles of operation and the need to maintain them in proper technical condition.	Can state completely typical deck equipment, ship systems and hull equipment; understands and can explain fully their application, principles of operation and the need to maintain them in proper technical condition.
LO5	Knows the process of corrosion affecting structural elements of a ship; knows principles of maintenance, surveys and repairs.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of the corrosion of structural elements of a ship.	Cannot explain the phenomenon of corrosion nor methods of prevention.	Explains in general the phenomenon of corrosion; has difficulties in stating factors affecting corrosions and preventive methods.	Explains correctly the phenomenon of corrosion; gives examples; states many factors affecting corrosions and preventive methods.	Explains correctly the phenomenon of corrosion; gives examples; states all factors affecting corrosions and preventive methods; is well familiar with details of various prevention methods.
Criterion 2 Knowledge of the principles of maintenance work, surveys and	Does not know of the principles of maintenance work, surveys and	Has poor knowledge of the principles of maintenance work, surveys and repairs performed on a ship; has difficulties in	Is familiar with principles of maintenance work, surveys and repairs performed on a ship; states types of	Knows proficiently the principles of maintenance work, surveys and repairs performed on a ship; describes fully types of

repairs performed on a ship.	repairs performed on a ship.	stating types of surveys; cannot state examples regulations; superficially knows the role of classification societies, Port State Control etc.	surveys and examples regulations; knows the role of classification societies, Port State Control etc.	surveys and examples regulations; knows the role of classification societies, Port State Control etc.; understands the role of ship's command.
LO6	Knows the principles, understands the procedures for conducting a ship condition survey, including the Enhanced Survey Programme (ESP).			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knows the principles and procedures for carrying out ship survey on her technical condition.	Does not have knowledge of the principles and procedures relating to the ship condition survey.	Demonstrates basic knowledge of the principles and procedures relating to the ship condition survey.	Understands the principles, knows and discusses the procedures for ship condition survey. Discusses the requirements for Enhanced Survey Programme.	Has a structured, detailed knowledge of the technical inspections to be carried out on the ship. Understands and discusses the importance of Enhanced Survey Programme.

Syllabus

SEMESTER 2	SHIP CONSTRUCTION AND STABILITY	LECTURES	15 HOURS

HULL STRUCTURE AND SEAMANSHIP

1. Hull strength, shear forces, bending moments, torsional moments, hull deflection, local strength. Hull strength in rough seas.
2. Welding work.
   2.1. Preparation of steel for welding.
   2.2. Types of welded joints.
   2.3. Defective welded joints.
   2.4. Supervision of classification societies.
   2.5. Gas (flame) cutting of metal.
3. Hull equipment.
   3.1. Hold and tween deck closures.
   3.2. Mooring equipment: bollards, leads, fairleads and roller fairleads, winches.
   3.3. Anchoring equipment, chain locker.
   3.4. Mooring lines, anchor cables. Securing anchors, stoppering ropes.
   3.5. Knowing of knots, splices, lanyard stoper, marline spike seamanship – task for seagoing service.
   3.6. Mast houses, masts, derricks and cranes.
4. Systems: ballast, bilge, ventilation, sounding.
5. Hull corrosion, preventive methods. Causes of corrosion, methods of corrosion identification and prevention.
6. Ship maintenance, planning of inspections and repairs.
7. Procedures of carrying out the ship condition survey.
8. Enforcement of the Enhanced Survey Programmes.
9. Avoiding the harmful impact of corrosion, material fatigue and incorrect cargo distribution (bulk carriers).
10. Critical points of the ship for safety considerations.

SEMESTER 2	SHIP CONSTRUCTION AND STABILITY	LAB CLASSES	15 HOURS

HULL STRUCTURE AND SEAMANSHIP

1. Calculation of shear forces and bending moments for a box-shaped pontoon.
2. Calculation of a curve of buoyancy using the Bonjean Scale.
3. Computer documentation and software for the control of general and local strengths of a ship.
4. Impact of weight distribution on shear force and bending moment curves – computer-based simulations.
5. Anchoring and mooring equipment.
6. Analysis of ship's ballast system.
7. Carrying out surveys and writing reports on defects and damages on cargo spaces, hold covers and ballast tanks. Assessing the reports and taking action.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	

Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	10	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**55**	**2**
Workload related to direct teaching activities:	35	1
Workload related to practice-oriented activities:	25	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

28.	Course unit:	N2022/23/FS/28/SCS3

SHIP CONSTRUCTION AND STABILITY – module 3

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		1	30		15	2
2	15	1		1	15		15	2
3	15	1	2		15	30		3
4	15	1	2	1	15	30	15	4
8	12	1		1.5	12		18	1

III/3. Learning outcomes and syllabus

Learning outcomes – semester 3		Field-specific
LO1	Knows which physical quantities are used for the assessment of stability of a ship in service; understands their theoretical basis; knows and understands methods used for the assessment of intact stability and ship's equilibrium position; understands limitations of the methods.	K_W09; K_W10; K_W26
LO2	Knows and understands the information contained in ship stability documentation on intact stability; knows criteria of stability assessment and international regulations referring to intact stability; understands the limits of applicability in terms of ship safety.	K_W09; K_W10; K_W26
LO3	Understands the impact of loading condition and cargo operations on the ship equilibrium and stability.	K_W09; K_W10; K_W26
LO4	Uses calculation methods for stability assessment and determination of the position of ship's equilibrium; can make 'manual' calculations.	K_U20; K_U21; K_U28

Assessment methods and criteria				
LO1	Knows which physical quantities are used for the assessment of stability of a ship in service; understands their theoretical basis; knows and understands methods used for the assessment of intact stability and ship's equilibrium position; understands limitations of the methods.			
Assessment methods	Written exam, oral exam, tests and assessment during the semester.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 Knowledge of physical quantities used for the assessment ship stability.	Does not know physical quantities used for the assessment ship stability.	States physical quantities used for the assessment ship stability, making minor errors; explains with difficulty their theoretical basis and interpretations; sees interrelations; knows calculation methods; is aware of most limitations in using such methods.	States physical quantities used for the assessment ship stability; explains their theoretical basis and interpretations; sees interrelations; knows calculation methods; is aware of most limitations in using such methods.	states all physical quantities used for the assessment ship stability; logically explains their theoretical basis and interpretations; sees interrelations; knows calculation methods; is aware of most limitations in using such methods; uses English terminology.
Criterion 2 Knowledge of methods used for the assessment of intact stability.	Does not know methods used for the assessment of stability.	Correctly states methods for the assessment of stability; has difficulties in explaining their theoretical basis; partly understands practical limitations of these methods and the relation between the accuracy obtained and the method of data acquisition.	Correctly states methods for the assessment of stability; explains their theoretical basis; principally understands practical limitations of these methods and the relation between the accuracy obtained and the method of data acquisition.	Correctly states methods for the assessment of stability; logically and comprehensively explains their theoretical basis; understands practical limitations of these methods and the relation between the accuracy obtained and the method of data acquisition.
LO2	Knows and understands the information contained in ship stability documentation on intact stability; knows criteria of stability assessment and international regulations referring to intact stability; understands the limits of applicability in terms of ship safety.			
Assessment methods	Written exam, oral exam, tests and assessment during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge and understanding of the information contained in ship stability	Cannot state elements of stability documentation.	Has difficulties in stating state elements of stability documentation; only partly understands their purpose.	States elements of stability documentation; can explain how they are created; understands their use on a ship.	Proficiently states elements of stability documentation; can explain how they are created; correctly explains the purposes for which particular

documentation on intact stability.				elements are used; understands the responsibility of maritime administration and a classification society.
Criterion 2 Knowledge of international regulations referring to intact stability.	Does not know international regulations referring to ship stability.	Knows superficially international regulations referring to ship stability; states major criteria of stability assessment; only partly understands the relation between criteria satisfaction and ship safety.	Knows well international regulations referring to ship stability; states all criteria of stability assessment, but has difficulties in their physical interpretation; understands the relation between criteria satisfaction and ship safety.	Proficiently knows international regulations referring to ship stability; can indicate relevant conventions and codes; states all criteria of stability assessment, can explain their physical interpretation; understands the relation between criteria satisfaction and ship safety.
LO3	Understands the impact of loading condition and cargo operations on the ship equilibrium and stability.			
Assessment methods	Written exam, oral exam, tests and assessment during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Understanding of the impact of loading condition on the ship stability and equilibrium position.	Does not understand the impact of loading condition on the ship stability and equilibrium position.	Sees cause-and-effect relations between loading condition and ship stability and equilibrium position, but cannot interpret them precisely; understands proper physical laws, but cannot present them clearly and precisely.	Can indicate cause-and-effect relations between loading condition and ship stability and equilibrium position; understands proper physical laws, but has difficulties in explaining them; makes a qualitative estimation, without calculations; can notice and correct possible errors.	Can indicate cause-and-effect relations between loading condition and ship stability and equilibrium position; understands proper physical laws, and can present them clearly and precisely. Can make a correct qualitative estimation, without calculations.
Criterion 2 Understanding of the impact of receiving, discharging and shifting cargo on the equilibrium position and stability, taking into account the specific gravity of outboard water.	Does not understand the impact of cargo operations on the equilibrium position and stability of a ship.	Sees cause-and-effect relations between onboard cargo operations and ship's equilibrium position and stability, but cannot interpret them precisely; understands proper physical laws, but cannot present them clearly and precisely.	Can indicate cause-and-effect relations between onboard cargo operations and ship's equilibrium position and stability; understands proper physical laws; makes a qualitative estimation, without calculations; can notice and correct possible errors.	Can indicate cause-and-effect relations between onboard cargo operations and ship's equilibrium position and stability; understands proper physical laws and can present them clearly and precisely; can make a correct qualitative estimation, without calculations.
LO5	Uses calculation methods for stability assessment and determination of the position of ship's equilibrium; can make 'manual' calculations.			
Assessment methods	Assessment of tutorial classes consisting in calculation problems, tests during the semester			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to make stability calculations, assess quantitatively the impact of loading condition and cargo operations on the stability and position of equilibrium.	Cannot make stability calculations.	Makes stability calculations with difficulty, slowly reads out ship documentation; does not notice errors made; can choose a method of calculation and procedure; can interpret calculation results.	Makes stability calculations using ship documentation; notices possible errors and corrects them; can choose a method of calculation and procedure; can interpret calculation results.	Makes stability calculations correctly, proficiently using ship documentation; can choose an optimal method of calculation and procedure; can interpret calculation results; sees a relation between calculation results and safety regulations.

Syllabus

SEMESTER 3	SHIP CONSTRUCTION AND STABILITY	LECTURES	15 HOURS

STABILITY AND SUBDIVISION

1. Equilibrium of a freely floating ship.
   1.1. Buoyancy and flotation.

1.2. Centre of gravity and centre of buoyancy.
1.3. Use of the Archimedes' principle (principle of buoyancy) and Newton's law of gravitation.
2. Calculation of weight and co-ordinates of the centre of gravity.
2.1. Statical moment of weight in the reference system.
2.2. A table used for the centre of gravity co-ordinates calculation.
3. Alteration of the displacement and the centre of gravity co-ordinates.
3.1. Loading, discharging and shifting of a cargo.
3.2. Free surface correction.
3.3. Effect of suspended weight.
3.4. Effect of icing.
4. Ship's equilibrium affected by a statical external heeling moment.
4.1. Line of action of buoyancy force and gravity force.
4.2. Lever of form stability and lever of weight stability.
4.3. Righting lever.
5. Hull geometry characteristics, hydrostatic curves.
6. Righting arm curve.
6.1. Cross curves of stability as graphs describing the line of action of buoyancy force.
6.2. Methodology of calculation – table used for calculations.
6.3. Typical curves.
6.4. Physical interpretation.
7. Initial transverse metacentre.
7.1. The transverse metacentre.
7.2. Physical and geometric interpretation.
7.3. Calculation stability.
8. Calculation of the angle of heel.
8.1. Methods used for the calculation – heel and change of the heel.
8.2. Heavy derrick operations.
8.3. The angle of loll caused by negative initial metacentric height.
9. The inclination of a ship by an external dynamic moment.
9.1. Work of a righting arm – dynamic stability lever.
9.2. Physical and geometric interpretation.
9.3. Method of calculating a curve of dynamic stability levers.
10. Intact stability criteria. Stability limit curves.
11. Intact Stability Code.

SEMESTER 3	SHIP CONSTRUCTION AND STABILITY	CLASSES	30 HOURS

STABILITY AND SUBDIVISION

1. Calculation of coordinates of centre of gravity and ship's displacement.
2. Calculation of centre of gravity coordinates changes due to operations on masses: adding, removing, shifting.
3. Calculation of free surfaces correction.
4. Calculation of displacement and ship's centre of gravity coordinates in various loading conditions.
5. Calculation of initial metacentric height and righting levers.
6. Calculation of areas under Reed's curve; stability criteria.
7. Weather criterion according to the IMO.
8. Assessment of ship stability at a specific loading condition.
9. Calculation of ship's heel and its correction.
10. Loading a weight using ship's lifting gear. Angle of list.

Student workload – semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**74**	**3**
Workload related to direct teaching activities:	49	1.5
Workload related to practice-oriented activities:	45	1.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

28.	Course unit:	N2022/24/FS/28/SCS4

SHIP CONSTRUCTION AND STABILITY – module 4

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		1	30		15	2
2	15	1		1	15		15	2
3	15	1	2		15	30		3
4	15	1	2	1	15	30	15	4
8	12	1		1.5	12		18	1

III/4. Learning outcomes and syllabus

Learning outcomes – semester 4		Field-specific
LO1	Knows which devices are used for the assessment of ship stability; understands mathematical operations performed by computer programs used in these devices; knows the principles of such equipment certification.	K_W09; K_W10; K_W26
LO2	Can develop a spreadsheet for stability calculations; uses a loading calculator/computer for stability calculations; uses stability documentation for ship stability assessment.	K_U20; K_U21; K_U28
LO3	Knows issues related to the stability of a grounded vessel; can calculate stability curves of a grounded vessel.	K_W09; K_W10; K_W26; K_U20; K_U21; K_U28
LO4	Knows the impact of flooding a watertight compartment on stability safety; knows principles of subdivision and damage stability, and actions to be taken after partial loss of buoyancy.	K_W09; K_W10; K_W26; K_U20; K_U21; K_U28
LO5	Knows essential IMO regulations and recommendations concerning ship stability (incl. damage stability): SOLAS Ch. II-1, LL, 2008 IS Code, and others; can interpret these regulations, and 'Information on Stability for the Master and other stability-related shipboard documents and instructions.	K_W09; K_W10; K_W26; K_U20; K_U21; K_U28

Assessment methods and criteria				
LO1	Knows which devices are used for the assessment of ship stability; understands mathematical operations performed by computer programs used in these devices; knows the principles of such equipment certification.			
Assessment methods	Written exam, oral exam, tests and assessment during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of devices used for ship stability assessment.	Does not know of devices used for ship stability assessment.	States of devices used for ship stability assessment; not exactly understands their principle of operation and limitations.	States of devices used for ship stability assessment; understands their principle of operation and limitations; knows principles of the equipment certification.	States of devices used for ship stability assessment; understands their principle of operation, theoretical basis, mathematical operations and limitations; knows principles of the equipment certification.
LO2	Can formulate a spreadsheet for stability calculations; uses a loading calculator/computer for stability calculations; uses stability documentation for ship stability assessment.			
Assessment methods	Assessment of the ability to perform lab exercises using the loading calculator/computer.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to formulate a spreadsheet for stability calculations.	Cannot formulate a spreadsheet for ship stability calculations.	Principally can formulate a spreadsheet for stability calculations, although makes errors and does not notice them.	Can formulate a spreadsheet for stability calculations, notices errors and corrects them; can interpolate readouts from documentation.	Formulates perfectly a spreadsheet for stability calculations; can interpolate readouts from documentation; places calculation results on diagrams; is inventive in solving various problems.
Criterion 2 Ability to use calculator/computer for ship stability assessment.	Does not demonstrate skills of using a loading calculator/computer.	Has difficulty in modelling a loading condition of a ship on a loading calculator/computer; intuitively uses available options, although does not understand some of them.	Uses a loading calculator/computer; is fully aware of available options; has difficulty in interpreting calculation results; does not see the need to develop functionalities.	Proficiently uses a loading calculator/computer; makes calculations correctly; can interpret them; correctly assesses effects of cargo operations; is inventive in developing functionalities.

Criterion 3 Use of stability documentation for the assessment of ship stability.	Does not demonstrate skills of using stability documentation.	Poorly identifies elements of stability documentation; uses these elements, makes errors.	Correctly identifies elements of stability documentation; chooses them properly to suit the problem being solved.	Proficiently uses stability documentation, understands the role for assessment of ship stability.
LO3	Knows issues related to the stability of a grounded vessel; can calculate stability curves of a grounded vessel.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam/answers, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of issues related to the stability of a grounded ship.	Does not know issues related to the stability of a grounded ship.	Hardly explains physical phenomena affecting the stability of a grounded ship; hardly states risks for the stability due to additional force, taking into account the impact of the marine environment.	Explains physical phenomena affecting the stability of a grounded ship; states risks for the stability due to additional force, taking into account the impact of the marine environment.	Correctly explains physical phenomena affecting the stability of a grounded ship; precisely states risks for the stability due to additional force taking into account the impact of the marine environment' correctly draws conclusions concerning possible refloating the ship.
Criterion 2 Ability to calculate stability characteristics (curves) of a grounded ship.		Makes stability calculations of a grounded ship, but does not notice errors made.	Makes stability calculations of a grounded ship; notices and corrects possible errors.	Perfectly makes stability calculations for a grounded ship.
LO4	Knows impact of flooding a watertight compartment on stability safety; knows principles of subdivision and damage stability, and actions to be taken after partial loss of buoyancy.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam/answers, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Understands the effect of flooding of a watertight compartment on stability safety.	Does not know issues of damage stability.	Can explain the effect of flooding a watertight compartment on ship buoyancy and stability; has problems with explaining the methodology of calculations; knows damage stability criteria; can indicate relevant regulations; is able to understand 'Information on damage stability for the Master'; makes calculation by the constant buoyancy method, but does not notice possible calculating errors.	Can explain the effect of flooding a watertight compartment on ship buoyancy and stability; explains the methodology of calculations; knows damage stability criteria; can indicate relevant regulations and factors of subdivision; is able to understand 'Information on damage stability for the Master'; makes calculation by the constant buoyancy method; can notice and correct possible errors.	Understands aptly explains the effect of flooding a watertight compartment on ship buoyancy and stability; correctly explains the methodology of calculations; knows damage stability criteria; can indicate relevant regulations; understands and aptly explains the significance of factors of subdivision; understands 'Information on damage stability for the Master'; makes calculation correctly by the constant buoyancy method.
Criterion 2 Knowledge of procedures after partial loss of buoyancy.	Does not know procedures after partial loss of buoyancy.	Knows only basic principles of procedures after partial loss of buoyancy.	Knows principles of procedures after partial loss of buoyancy; can make references to ISM procedures.	Knows principles of procedures after partial loss of buoyancy; can make references to ISM procedures; is well prepared for teamwork, and for co-operation with land-based assistance centre.
LO5	Knows essential IMO regulations and recommendations concerning ship stability (incl. damage stability): SOLAS Ch. II-1, LL, 2008 IS Code, and others; can interpret these regulations, and 'Information on Stability for the Master and other stability-related shipboard documents and instructions.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam/answers, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know IMO regulations and	Is familiar with IMO regulations and recommendations on ship	Is well familiar with IMO regulations and recommendations on	Is perfectly familiar with regulations and

Knowledge of IMO regulations and recommendations on ship stability.	recommendations on ship stability.	stability; has problems with their interpretation.	ship stability; interprets them correctly.	recommendations on ship stability; interprets them correctly.
Criterion 2 Knowledge of the contents and application of information on stability for the master and other stability-specific instructions.	Cannot summarize the contents and role of information and instructions on stability.	Is familiar with the purpose, contents and application of Information on Stability for the Master; states examples of operational limits; can state examples of stability instructions.	Is well familiar with the purpose, contents and application of Information on Stability for the Master; states examples of operational limits; understands the process of creating stability-specific information and instructions.	Is very well familiar with the purpose, contents and application of Information on Stability for the Master; states many examples of operational limits; understands the process and need of creating stability-specific information and instructions; understands the role of administration and classification society.

Syllabus

SEMESTER 4	SHIP CONSTRUCTION AND STABILITY	LECTURES	15 HOURS

STABILITY AND SUBDIVISION

1. Stability problem associated with the carriage of bulk grain cargoes and timber deck cargoes.
2. Inclining experiment.
3. Calculation of ship trim and draughts forward and aft.
   3.1. The concept of moment to change trim by one centimetre (MCTC).
   3.2. Use of hydrostatic particulars.
   3.3. Use of Firsov scale.
4. Change of a mean draft and trim after loading, discharging and shifting of cargo.
   4.1. Calculation procedure.
   4.2. Use of ship's documentation.
   4.3. Final stage of loading: weight to load to get a ship trimmed or to bring a ship to an even keel.
5. Effect of outboard water density on the equilibrium position and stability of a ship.
6. Methods of stability control on a ship in service, calculation of metacentric height based on the period of ship motions.
7. Appliances used for stability control. Usage of computer programs for planning, assessment and optimization of the loading condition.
8. Information on stability for the Master (stability booklet) and its use.
9. Stability of a grounded ship, assessment of a possibility of ship's refloating by itself.
10. Subdivision and damage stability, class notation, permeability, bulkhead deck, subdivision index, standard damage extent, requirements of SOLAS and LL Conventions, Polish Register of Shipping regulations.
11. Methods of determining the equilibrium of damaged ship, added weight method, lost buoyancy – constant displacement method.
12. Stability criteria for a ship with flooded watertight compartment, damage stability booklet and damage control plan.
13. Procedure in case of partial loss of buoyancy.

SEMESTER 4	SHIP CONSTRUCTION AND STABILITY	CLASSES	30 HOURS

STABILITY AND SUBDIVISION

1. Calculation of stability for the carriage of grain.
2. Longitudinal stability, trim calculations.
3. Changes of ship's heel, trim and drafts during cargo and ballast operations.
4. Calculation of forward and aft drafts for planned loading conditions.
5. Effect of outboard water density on ship's draft.
6. Methods of stability control of a ship in service, determination of metacentric height based on the period of roll.
7. Planning a ship's loading condition taking onto account:
   7.1. Stowage factor of a cargo.
   7.2. Stability criteria.
   7.3. Guidelines in stability information.
   7.4. Duration of the voyage.
   7.5. Draft restrictions and water density in the port.
8. Assessment of the possibility for the ship to refloat by itself.
9. Calculation of ship's parameters after flooding of a watertight compartment by the constant buoyancy method.
   9.1. Use of Steiner's theorem for calculating moments of inertia of surfaces.
   9.2. Calculation of initial stability and list.

9.3. Calculation of trim and drafts.
10. Stability criteria of a ship with a flooded watertight compartment, information on damage stability for the master, damage control plan.

SEMESTER 4	SHIP CONSTRUCTION AND STABILITY	LAB CLASSES	15 HOURS

STABILITY AND SUBDIVISION

1. Development of a spreadsheet for calculations of:
   1.1. Coordinates of the centre of gravity and ship's displacement.
   1.2. Initial transverse metacentric height.
   1.3. Righting levers.
   1.4. Area under righting lever curve.
   1.5. Draft and trim.
   1.6. Angle of heel.
2. Use of a stability program for:
   2.1. Analysis of the effect of distribution of weights on the position of the centre of gravity and ship's equilibrium.
   2.2. Analysis of the effect of changes in outboard water density on ship's equilibrium.
   2.3. Assessment of ship stability in a specific loading condition.
   2.4. Assessment of ship stability during the carriage of grain.
3. Familiarization and practical use of the following stability documentation:
   3.1. Information on stability for the master.
   3.2. Tanks and holds sounding.
   3.3. Hydrostatic particulars, cross curves of stability.
   3.4. Loading scale.
   3.5. Diagram of the maximum allowable vertical centre of gravity.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	45	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	30	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	12	
Total workload	**106**	**4**
Workload related to direct teaching activities:	64	2
Workload related to practice-oriented activities:	75	2

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

28.	Course unit:	N2022/48/FS/28/SCS5

SHIP CONSTRUCTION AND STABILITY – module 5

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	2		1	30		15	2
2	15	1		1	15		15	2
3	15	1	2		15	30		3
4	15	1	2	1	15	30	15	4
8	12	1		1.5	12		18	1

III/5. Learning outcomes and syllabus

Learning outcomes – semester 8		Field-specific
LO1	Understands the impact of the marine environment (wind, waves etc.) on seakeeping properties of a ship and stability-specific safety.	K_W09; K_W10; K_W26; K_U20; K_U21; K_U28
LO2	Knows principles of preparing a ship for docking and the docking process.	K_W07; K_W09; K_W25; K_W26; K_U28
LO3	Uses a loading calculator/computer for solving practical ship loading problems related to ship stability.	K_W09; K_W10; K_W26; K_U20; K_U21; K_U28

Assessment methods and criteria				
LO1	Understands the impact of the marine environment (wind, waves etc.) on seakeeping properties (seaworthiness) of a ship and stability-specific safety.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam/answers, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Understanding of the impact of the marine environment on seakeeping properties and safety of a ship.	Does not know seakeeping properties of a ship.	Can describe seakeeping properties of a ship; states some phenomena particularly dangerous for stability-specific safety, but cannot explain relevant theoretical basis; can state methods of avoiding risks for stability in rough seas; has difficulty in explaining relations between ship parameters and waves and the intensity of ship's motions.	Can describe seakeeping properties of a ship; states some phenomena particularly dangerous for stability-specific safety, but has problems with explaining relevant theoretical basis; can state methods of avoiding risks for stability in rough seas; explains relations between ship parameters and waves and the intensity of ship's motions.	Can describe completely seakeeping properties of a ship; states phenomena particularly dangerous for stability-specific safety, explaining relevant theoretical basis; can state methods of avoiding risks for stability in rough seas; precisely explains relations between ship parameters and waves and the intensity of ship's motions.
Criterion 2 Use of a simplified method of calculating pure loss of stability in the following waves.	Cannot calculate a change of righting arms in the following seas.	Can calculate a change of righting arms in the following seas, but poorly explains theoretical basis; makes errors and cannot notice them.	Can calculate a change of righting arms in the following seas; logically explains theoretical basis; makes errors, but notices and corrects them.	Can calculate correctly a change of righting arms in the following seas; logically explains theoretical basis.
LO2	Knows principles of preparing a ship for docking and the docking process.			
Assessment methods	Assessment of classes and lab classes; written exam, oral exam, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of the procedures of preparing a ship for docking.	Does not know procedures of preparing a ship for docking.	Can explain superficially the process of preparing a ship for docking.	Explains the process of preparing a ship for docking; understands the need for cooperation of ship management with the shipyard.	Explains fully the process of preparing a ship for docking; understands the need for cooperation of ship's command with the shipyard; states examples of docking instruction records.
Criterion 2	Does not understand the purpose	Can explain why ships are docked; has difficulties in stating dock types and	Can explain why ships are docked; states dock	Knows perfectly why ships are docked; can quote requirements provided in

Knowledge of the procedures of preparing a ship for docking.	and need of ship docking.	risks resulting from docking.	types, explains risks resulting from docking.	relevant regulations; states dock types and explains differences; fully understands risks resulting from docking; is familiar with relevant procedures.
LO3	Uses a loading calculator/computer for solving practical ship loading problems related to ship stability.			
Assessment methods	Assessment of lab classes; written exam, oral exam/answers, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skill of using a loading computer for solving typical operational problems related to ship stability.	Does not demonstrate skills of using a loading computer.	Can use only a basic scope of functions of a loading computer; has problems with moving around the user interface.	Can use all functions of a loading computer.	Proficiently uses a loading computer; shows initiative in identifying additional functionalities; knows operational restrictions.

Syllabus

SEMESTER 8	SHIP CONSTRUCTION AND STABILITY	LECTURES	12 HOURS

STABILITY AND SUBDIVISION

1. Ship's rolling motions in waves, related phenomena, short-term forecast of ship motions, methods of preventing excess motions.
2. Ship stability in following waves. Ship resonant rolling and parametric rolling movement, surf-riding/broaching, excessive acceleration phenomena, pure loss of stability.
3. Revised guidance to the master for avoiding dangerous situations in adverse weather and sea conditions – MSC. 1/Circ. 1228.
4. Second generation intact stability criteria – MSC. 1/Circ. 1627.
5. Equilibrium, stability and strength of a ship during ballast water exchange.
6. Dry-docking. Preparing the ship for docking.
7. Operational inclining test.

SEMESTER 8	SHIP CONSTRUCTION AND STABILITY	LAB CLASSES	18 HOURS

STABILITY AND SUBDIVISION

1. Equipment and computer programmes used for stability calculations and for stability control; use of computers and dedicated software for planning, assessment and optimization of loading condition. Requirements of IMO and classification societies.
2. Influence of ship's load condition and speed, sea state and heading angle on ship's motions and stability – analysis by use of computer program.
3. Use of computer software to assess the possibility for the ship to refloat by itself.
4. Review ballast water management plan. Develop a ballast water exchange sequence using a loading calculator.
5. Use of computer software to simulate operational inclining test.
6. Stability of the ship in a following wave – calculation of righting lever.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures	12	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	18	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	6	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**46**	**1**
Workload related to direct teaching activities:	30	0.5
Workload related to practice-oriented activities:	24	0.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. International Maritime Organization, International Convention for the Safety of Life at Sea, London 2009.
2. International Maritime Organization, International Code on Intact Stability, 2008 IS Code, Resolution A.267 (85), London 2008.
3. Barrass B., Derrett D.R., *Ship Stability for Masters and Mates*, 6th edition 2006, Elselvier Ltd.
4. Eyres D.J., *Ship Construction*, 5th edition 2001, Elsevier Ltd.
5. Kobyliński L.K., Kastner S., *Stability and Safety of Ships*, Volume 1: *Regulation and Operation*, Elsevier Ocean Engineering Book Series, Vol.9, Baltimore, USA, 2005.
6. Belenky V.L., Sevestianov N.B., *Stability and Safety of Ships: Risk of Capsizing*, 2nd edition, SNAME, 2007.
7. Rawson K.J., Tupper E.C., *Basic Ship Theory*, Elsevier Science, 2005.
8. Biran A., *Ship Hydrostatics and Stability, Technion* – Faculty of Mechanical Engineering, Israel, 2007.

VI. Extra reading
1. Pawłowski M., *Subdivision and damage stability of ships*, Fundacja Promocji POiGM, Gdańsk 2004.
2. Rhodes M.A., *Ship Stability for Mates/Masters*, Glasgow College of Nautical Studies, Seamanship International Ltd., 2003.
3. International Maritime Organization, *Revised Guidance to the Master for Avoiding Dangerous Situations in Adverse Weather and Sea Conditions*, MSC.1/Circ.1228, London 2007.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

29.	Course unit:							N2022/35/FS/29/MPP
MARINE POWER PLANTS								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
5	15	1	0,6	0,4	15	10	5	2

I. Course unit aims

This course unit aims at familiarizing students with basic machinery and equipment installed in ship's engine room, operational principles and ship's systems.

II. Preliminary requirements

The scope of secondary school, elements of physics, mathematics, technical drawing, electrotechnology and electronics, marine automation, manoeuvring and environment protection.Z

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 5		Field-specific
LO1	Describes and characterizes basic installations of a marine power plant; knows basic concepts related to marine power plant, types of basic propulsion systems.	K_W04; K_W07
LO2	Can describe ship's and propulsion system performance at reversing the main propulsion unit from 'full ahead' to 'full astern'.	K_U10; K_U22
LO3	Characterizes basic methods of electric energy generation; knows how to start up and operate an emergency generator, knows its purpose and location on the ship.	K_U15; K_U12

Assessment methods and criteria				
LO1	Describes and characterizes basic installations of a marine power plant; knows basic concepts related to marine power plant, types of basic propulsion systems.			
Assessment methods	Assessment of classes, lab classes/simulators, test during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 The scope of knowledge and its understanding.	Does not know and understand principles of operation of basic installations of the marine power plant.	Understands the principle of operation of the installations of the marine power plant.	Knows the structure of marine power plant installations, can identify correctly individual elements of installations and knows their functions.	Can identify independently the type and purpose of individual marine power plant installations; knows the principle of operation and construction of installation elements.
LO2	Can describe ship's and propulsion system performance at reversing the main propulsion unit from 'full ahead' to 'full astern'.			
Assessment methods	Assessment of classes, lab classes/simulators, test during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Scope of skills and ability to perform emergency manoeuvres.	Cannot perform correctly main propulsion unit crash manoeuvres from 'full ahead' to 'full astern' on a marine power plant simulator.	Can perform correctly main propulsion unit crash manoeuvres from 'full ahead' to 'full astern' on a marine power plant simulator.	Can perform correctly and with understanding main propulsion unit crash manoeuvres from 'full ahead' to 'full astern' on a marine power plant simulator.	Can analyse an emergency situation and take proper action concerning ship's manoeuvres, perform correctly and with understanding main propulsion unit crash manoeuvres from 'full ahead' to 'full astern' on a marine power plant simulator.
LO3	Characterizes basic methods of electric energy generation; knows how to start up and operate an emergency generator, knows its purpose and location on the ship.			
Assessment methods	Assessment of classes, lab classes/simulators, test during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skills of identification, starting up, and operation of emergency generator.	Cannot identify and start up an emergency generator.	Can start up, with teacher's assistance, an emergency generator.	Can start up independently an emergency generator.	Can identify the location and start up independently an emergency generator; with understanding can switch on electric consumers on the emergency switchboard.

Syllabus

SEMESTER 5	MARINE POWER PLANTS	LECTURES	15 HOURS

1. Location and functions of a marine power plant. Marine power plant types.
2. Main and auxiliary machinery in the marine power plant.
3. Types of propulsion systems.
4. Diesel engine, construction and principle of operation.
5. Steam turbine, construction and principle of operation.
6. Diesel-electric, gas-electric propulsion. Dual-fuel engines.
7. Resistance characteristics of the hull. Resistance components: friction, form, wave, air, additional resistance.
8. Propellers, their types.
9. Propeller, propeller shaft, gears, co-operation of the propulsion system elements.
10. Thrusters.
11. Main engine (ME) control – bridge control, engine telegraph, ME safety systems, start-up and stopping procedures for main engines.
12. Emergency ME control, manoeuvring the ship in special running conditions
13. Construction and principles of operation of steering gear, and thrusters.
14. Generation and distribution of electric power on a ship.
15. Propulsion systems with a shaft generator. auxiliary generators, emergency power supply.
16. Auxiliary machinery (pumps, compressors, freshwater generators
17. Deck machinery and equipment, construction and principles of operation.
18. Ballast system, construction and principles of operation.
19. Fresh and sanitary water installations, construction and principles of operation.
20. Bilge installation, construction and principles of operation.
21. Oil record book.
22. Fuel system, construction, marine fuels grades, methods of fuel oil purification, bunkering plan.
23. Environment protection equipment (oily water separator, waste incinerator, sewage treatment plant, installations for the reduction of SOx and NOx in exhaust gases).
24. Refrigerating store and air conditioning – operational principles.

SEMESTER 5	MARINE POWER PLANTS	CLASSES	10 HOURS

1. Main engine start-up procedure – requirements, restrictions.
2. Load diagram of a diesel engine, power demand.
3. Program of thermal load of an engine, barred speed range.
4. Engine manoeuvres and the phenomenon of turbocharger surging.
5. Operating principles for pumps and pump systems.

SEMESTER 5	MARINE POWER PLANTS	LAB CLASSES	5 HOURS

1. Ambient/weather conditions and power demand of the propeller.
2. Influence of operating conditions on the emission of harmful compounds in exhaust gases and fuel oil consumption.
3. Ecological and economical aspects of vessel operation.
4. Crash manoeuvres with the engine (changing from *full ahead* to *full astern*).
5. Operation of pumps and pump systems.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	4	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**42**	**2**
Workload related to direct teaching activities:	34	1
Workload related to practice-oriented activities:	19	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. Zongming Yang, Huabing Wen, Xinglin Yang, Viktor Gorbov, Vira Mitienkova, Serhiy Serbin, *Marine Power Plant,* Shanghai Scientific and Technical Publishers, Springer 2021.

VI. Extra reading
Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

30.	Course unit:							N2022/23/FS/30/CH1
CARGO HANDLING – module 1								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
3	15	1			15			1
4	15	2		1	30		15	3
5	15	2		1	30		15	3

I. Course unit aims

This course unit aims at imparting knowledge of the principles, regulations and procedures related to technologies of transporting various types of cargo on ships and the operation of all systems required for cargo handling operations, including the planning of such operations and calculation of cargo remaining onboard.

II. Preliminary requirements

The scope of secondary school and elements of ship construction and stability, computer science and environment protection.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 3		Field-specific
LO1	Has knowledge of properties and characteristics of various cargoes carried by ships.	K_W01; K_W03

Assessment methods and criteria				
LO1	Has knowledge of properties and characteristics of various cargoes carried by ships			
Assessment methods	Tests and assessment during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have a minimum knowledge of cargoes carried by ships.	Has a general knowledge of a group of cargoes carried by ships.	Has a general knowledge of groups of cargoes carried by ships and their basic properties; has knowledge of individual cargoes carried by ships.	Has knowledge of individual cargoes and by ships and cargo properties; knows properties and characteristics of various cargoes carried by ships.

Syllabus

SEMESTER 3	CARGO HANDLING	LECTURES	15 HOURS

1. Essence and scope of cargo management.
2. Classification of cargoes by various criteria.
3. Cargo characteristics and properties essential in maritime transport.
4. Cargo units in maritime transport.
5. Dry bulk cargo. IMBSC Code.
6. Dangerous goods.
   IMDG Code:
   - 6.1. Structure and application.
   - 6.2. Classes of dangerous goods.
   - 6.3. Packages and marking of IMO class dangerous goods.
   - 6.4. Principles of separation, precuations during handling and carriage, EmS, MFAG.
7. Protection of bulk and general cargo in maritime transport in view of their properties. Precautions during hold fumigation.
8. Procedures for delivery, quantity and quality control, and cargo reception.
9. Cargo care, preparation of the holds, cargo segregation, hold ventilation. Occupational safety in holds.
10. Factors affecting quality change of goods in transport.
11. Cargo damage.
12. Dunnage and segregation materials, equipment for securing cargo, basic securing principles.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		

Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**27**	**1**
Workload related to direct teaching activities:	17	1
Workload related to practice-oriented activities:		

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

30.	Course unit:							N2022/24/FS/30/CH2
CARGO HANDLING – module 2								
Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
3	15	1			15			1
4	15	2		1	30		15	3
5	15	2		1	30		15	3

III/2. Learning outcomes and syllabus

Learning outcomes – semester 4		Field-specific
LO1	Has knowledge of standards and requirements for the construction and equipment of various ship types.	K_W07; K_W09
LO2	Can acquire and use all information on various types of ship from international regulations, instructions and safety management systems.	K_U01; K_U21
LO3	Can supervise and plan cargo and ballast operations, and adjust existing plans to new circumstances or operational requirements.	K_U11; K_U20

Assessment methods and criteria				
LO1	Has knowledge of standards and requirements for the construction and equipment of various ship types.			
Assessment methods	Tests and assessment during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have minimum knowledge of general requirements for ship construction.	Has knowledge of general construction standards for various types of ship.	Has knowledge of general standards of construction and equipment of various types of ship. Has knowledge of general standards of and requirements for construction and equipment of various types of ship.	Has knowledge of individual cargoes carried by ships and cargo properties. Has knowledge of properties and characteristics of various cargoes carried by ships.
LO2	Can acquire and use all information on various types of ship from international regulations, instructions and safety management systems.			
Assessment methods	Tests and assessment during the semester			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot acquire information necessary for the operation of various type ships	Can acquire and use general information on the operation of various type ships from international regulations.	Can acquire and use general information on the operation of various type ships from international regulations and instructions. Can acquire and use general information on the operation of various type ships from international regulations and instructions, and safety management systems.	Can acquire and use necessary information on the operation of various type ships from international regulations and instructions, and safety management systems. Can acquire and use all information on the operation of various type ships from international regulations and instructions, and safety management systems.
LO3	Can supervise and plan cargo and ballast operations, and adjust existing plans to new circumstances or operational requirements.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot supervise and plan cargo and ballast operations.	Can supervise ballast operations only.	Can supervise and plan cargo and ballast operations during the main part of bulk load/discharge. Can supervise and plan cargo and ballast operations at each stage of cargo operations (start, main part, finishing).	Can supervise and plan cargo and ballast operations at any stage of cargo operations. Can supervise and plan cargo and ballast operations, and adjust the existing plans to new circumstances or operational requirements.

Syllabus

SEMESTER 4	CARGO HANDLING	LECTURES	30 HOURS

1. Operation of bulk carriers, loading plan (IMBSC Code).
2. Calculation of cargo mass from draft survey.
3. Transport technology of some bulk cargo: coal, ore, ore concentrates, steel, sulphur.
4. Carriage of grain in bulk.
5. General cargo ship operation. Loading plan of a general cargo ship.
6. Carriage and securing of heavy lifts.
7. Carriage of timber.
8. Carriage and securing of deck cargo (including timber).
9. Securing of cargo on a ship.
10. Operation of reefer ships. Refrigerated cargo.
11. Cargo care.
    11.1. Preparation of holds for cargo operations and control after the completion of operations.
    11.2. Cargo separation.
    11.3. Hold ventilation, microclimate of cargo hold.
12. Carriage of dangerous goods.
    12.1. Packaged dangerous goods.
    12.2. Dry bulk cargo.
13. Shipboard cargo handling equipment and gear. Types and purpose.

SEMESTER 4	CARGO HANDLING	LAB CLASSES	15 HOURS

1. Application of international regulations, codes and manuals on the carriage of dangerous goods.
2. Effect of cargo and cargo handling operations on draft, trim and stability.
3. Calculation of cargo mass from draft survey.
4. Drawing up a loading plan of a bulk carrier. Planning of a loading sequence.
5. Planning of bulk grain loading. Use of calculation spreadsheet forms.
6. Drawing up a loading plan of a general cargo ship.
7. Planning of timber loading.
8. Final stage of loading.
9. Shipboard cargo handling equipment and gear. Operation, instructions, occupational safety during cargo operations.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	30	
Self-instruction: execution of projects	5	
Self-instruction: preparation for passing tests and exams	6	
Total workload	**90**	**3**
Workload related to direct teaching activities:	49	1.5
Workload related to practice-oriented activities:	50	1.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

30.	Course unit:	N2022/35/FS/30/CH3

CARGO HANDLING – module 3

Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
3	15	1			15			1
4	15	2		1	30		15	3
5	15	2		1	30		15	3

III/3. Learning outcomes and syllabus

Learning outcomes – semester 5		Field-specific
LO1	Has knowledge of basic operation of various types of ship, and the use and handling of all equipment and systems related to the operation of these ships.	K_W19; K_W26
LO2	Can communicate on operational matters on various types of ship at sea and in port.	K_U05; K_U08
LO3	Can operate and analyse the operation of systems and equipment, and processes taking place in the operation of various ships.	K_U20; K_U21
LO4	Has communicative competences for work in an international environment, is able to collaborate with other crew members in operational matters on ships of various types.	K_K02; K_K03

Assessment methods and criteria				
LO1	Has knowledge of basic operation of various types of ship, and the use and handling of all equipment and systems related to the operation of these ships.			
Assessment methods	Tests and written assessment during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have knowledge of operations of ships of various types.	Has basic knowledge of operations of various type ships.	Has basic knowledge of operations of various ship types and related systems; Has basic knowledge of operations of various ship types and the use of related systems.	Has basic knowledge of operations of various ship types and the use and handling of main operating systems and equipment; Has basic knowledge of operations of various ship types and the use and handling of all operating systems and equipment.
LO2	Can communicate on operational matters on various types of ship at sea and in port.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot communicate during operations on ships of various types.	Can communicate in basic operational matters on ships of various types at sea.	Can communicate in basic operational matters on ships of various types at sea and in port; can communicate in all operational matters on ships of various types at sea.	Can communicate in operational matters on ships of various types at sea; can communicate in all operational matters on ships of various types at sea and in port.
LO3	Can operate and analyse the operation of systems and equipment, and processes taking place in the operation of various ships.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot handle and analyse the operation of ship systems.	Can handle basic systems used in the operation of various types of ships.	Can handle all systems used in the operation of various types of ships. Can handle basic systems and equipment used in the operation of various types of ships.	Can handle all systems, equipment and processes used in the operation of various types of ships. Can handle and analyse the operation of systems, equipment and processes used in the operation of various types of ships.
LO4	Has communicative competences for work in an international environment, is able to collaborate with other crew members in operational matters on ships of various types.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have a minimum communicative competence required at work.	Has minimum communicative competence required at work, i.e. operations of ships of various types.	Has minimum communicative competence required at work, i.e. operations of ships of various types and collaboration with other crew members. Has communicative competence for	Has communicative competence for work in an international environment on ships of various types and collaboration with other crew members. Has communicative competence for work in an international environment and is able

			work in an international environment on ships of various types.	to collaborate with other crew members in operational matters on ships of various types.

Syllabus

SEMESTER 5	CARGO HANDLING	LECTURES	30 HOURS

1. Containers.
   1.1. Types.
   1.2. Planning of loading/discharging.
   1.3. Securing.
2. Container transport system. Loading plan of a container ship.
3. Ro-ro ship, roll-on/roll-off loading system, loading plan of a ro-ro ship.
4. Carriage of liquid cargo. Tank washing. Regulations on environment protection.
5. Atmosphere in cargo tanks at various phases of ship operations. Inert gas system.
6. Tanker operation. The contents and application of the International Safety Guide for Oil Tankers and Terminals (ISGOTT).
7. Chemical tanker operation.
8. Gas carrier operation. Cargo transshipment.
9. Calculation of the received liquid cargo. Ullage report.
10. Cargo documents, elements of the FAL Convention.
11. Precautions while entering enclosed or contaminated spaces.
12. Requirements for cargo handling (lifting) equipment and gear and its handling, maintenance and control.
13. Requirements for maintenance and control of hatch covers.
14. Application of international regulations, codes and instruction manuals on ship and cargo safety.
15. Inspections and reports on defects and damage to cargo spaces, manholes, companion ways, hatch covers and cargo tanks.
16. Purposes of Enhanced Survey Program.

SEMESTER 5	CARGO HANDLING	LAB CLASSES	15 HOURS

1. Planning of container loading for port rotation.
2. Drawing up a loading plan of a container ship.
3. Drawing up a loading plan of a ro-ro ship.
4. Calculation of liquid cargo quantities. Ullage report.
5. Drawing up a loading plan of a tanker.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	30	
Self-instruction: execution of projects	5	
Self-instruction: preparation for passing tests and exams	6	
Total workload	**90**	**3**
Workload related to direct teaching activities	49	1,5
Workload related to practice-oriented activities:	50	1,5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training

The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading

1. IMO – BLU Code (inc. BLU Manual) 2011 Edition – *Code of Practice for the Safe Loading and Unloading of Bulk Carriers.*
2. IMO – IMSBC Code & Supplement, 2020 Edition – *International Maritime Solid Bulk Cargoes Code*.
3. IMO – International Grain Code, 1991 – *International Code for the Safe Carriage of Grain in Bulk*.
4. IMO – Timber Deck Cargoes Code, 2011 (2012 Edition) – *Code of Safe Practice for Ship Carrying Timber Deck Cargoes.*
5. IMO – CSS Code, 2021 Edition – *Code of Safe Practice for Cargo Stowage and Securing*.
6. IMO – IBC Code, 2020 Edition – *International Code for the Construction and Equipment of Ship Carrying Dangerous Chemicals in Bulk*.
7. IMO – IGC Code, 2016 Edition – *International Code for Construction and Equipment of Ships Carrying Liquified Gases in Bulk.*
8. IMO – IMDG Code Vol. 1–2 , 2020 Edition – *International Maritime Dangerous Goods Code*.
9. IMO – IMDG Code, Supplement, 2020 Edition – *International Maritime Dangerous Goods Code*.
10. IMO – CSC Convention 1972, with amendments 2014 Edition – *International Convention for Safe Containers.*
11. IMO – LL Convention – *International Convention on Load Lines*.
12. IMO – BWM Convention 2004 & BWMS Code – 2018 consolidated edition – *The International Convention for the Control and Management of Ships Ballast Water and Sediments.*

VI. Extra reading

1. Peter R. Brodie, *Illustrated Dictionary of Cargo Handling*, Lloyd's List, 2010.
2. *International Safety Guide for Oil Tankers and Terminals*, ISGOTT.
3. IMO – *Safe Transport of Dangerous Cargoes and Related Activities in Port Areas*, 2007 Edition.

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

31.	Course unit:	N2022/24/FS/31/SMT1

SHIP MANAGEMENT – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	1	1		15	15		2
5	15	1	1		15	15		2

Course unit aims
This course unit aims at imparting knowledge of ship's operational parameters, documents, forms of ship operation, issues of carriage organization and documentation, co-operation: ship – port, port – shipowner, ship – service providers; relevant regulations in force, procedures and good sea practices in relevant areas.

II. Preliminary requirements
The scope of secondary school, elements of: Maritime English, ship construction and stability, cargo handling, ship safety, psychology of human behaviour, maritime law and fundamentals of organization and management.

III/1. Learning outcomes and syllabus
The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 4		Field-specific
LO1	Has an ordered knowledge of forms of commercial operation of ships and problems of shipping organization.	K_W29
LO2	Has an ordered knowledge of ship documentation used in various types of shipping and related legal aspects of cargo carriage.	K_W03; K_W29
LO3	Can interpret cargo document clauses and assess their usefulness for the most effective and appropriate commercial operation of ships.	K_U13; K_W33
LO4	Can use the acquired knowledge to formulate and solve practical problems related to cargo carriage.	K_U01; K_U08
LO5	Has international competences to draw up documents and communicate in matters of ship management and co-operation between: ship and port, port and shipowner, ship and service providers, and for crew management.	K_W07; K_W31

Assessment methods and criteria				
LO1	Has an ordered knowledge of forms of commercial operation of ships and problems of shipping organization.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 The scope of knowledge and its understanding.	Does not know forms of commercial operation of ships and carriage organization.	Knows forms of ship operation.	Knows forms of ship operation, and carriage organization.	Knows forms of ship operation, carriage organization, and problems due to cargo carriage.
LO2	Has an ordered knowledge of ship documentation used in various types of shipping and related legal aspects of cargo carriage.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 The scope of knowledge and its understanding	Does not know ship documentation relating to cargo carriage.	Knows basic documents used in various types of shipping.	Knows all documents used in various types of shipping.	Knows all documents used in various types of shipping and their legal aspects.
LO3	Can interpret cargo document clauses and assess their usefulness for the most effective and appropriate commercial operation of ships.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skill of using source information.	Cannot interpret clauses of ship and cargo documents.	Can interpret basic clauses of ship and cargo documents.	Can interpret all clauses of ship and cargo documents.	Can interpret all clauses of ship and cargo documents and assess their usefulness for effective and appropriate commercial operation of the ship.
LO4	Can use the acquired knowledge to formulate and solve practical problems related to cargo carriage			

Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skill of using source information.	Cannot use the acquired knowledge for formulating and solving practical problems related to cargo carriage.	Can use the acquired knowledge for solving practical problems related to cargo carriage.	Can use the acquired knowledge for formulating practical problems related to cargo carriage.	Can use the acquired knowledge for formulating and solving practical problems related to cargo carriage.
LO5	Has international competences to draw up documents and communicate in matters of ship management and co-operation between ship and port, port and shipowner, ship and service providers, and for crew management.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have international competences for keeping records and communication in ship management matters.	Has international competences for keeping records related to ship management.	Has international competences for keeping records and communication in ship management matters.	Has international competences for keeping records and communication in ship management matters, and the co-operation between: ship and port, port and shipowner, ship and service providers, and for crew management.

Syllabus

SEMESTER 4	SHIP MANAGEMENT	LECTURES	15 HOURS

1. Basic technical-operational parameters and specific characteristics of ships.
2. Various forms of ship operation.
3. Organization and carriage-related documents in liner shipping.
   3.1. Booking contract.
   3.2. Cargo list.
   3.3. Tally sheet
   3.4. Mate's receipt.
   3.5. Bill of lading.
   3.6. Sea waybill.
   3.7. Cargo manifest.
4. Interpretation of major clauses of a liner bill of lading and sea waybill.
5. Organization of carriage by charter, types of charters.
6. Charter documentation.
   6.1. Charter party.
   6.2. Notification Notice of Readiness.
   6.3. Statement of facts.
   6.4. Time sheet.
   6.5. Laydays, laytime.
   6.6. Laytime calculation
7. Ship operation in time charter.

SEMESTER 4	SHIP MANAGEMENT	CLASSES	15 HOURS

1. Voyage planning and practical use of individual technical-operational parameters.
2. Analysis of the contents and meaning of, and principles of using documents typical of various forms of ship commercial operation.
3. Interpretation of major clauses in a liner bill of lading and sea waybill.
4. Laydays, laytime and laytime calculation.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	

Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	4	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	3	
Total workload	**39**	**2**
Workload related to direct teaching activities:	32	1
Workload related to practice-oriented activities:	19	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

31.	Course unit:	N2022/35/FS/31/SMT2

SHIP MANAGEMENT – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	1	1		15	15		2
5	15	1	1		15	15		2

III/2. Learning outcomes and syllabus

Learning outcomes – semester 5		Field-specific
LO1	Has knowledge of documents, certificates, books, logs, etc.; knows and correctly interprets their contents; knows principles of conducting ship inspections and preparation of ship documents for such inspections.	K_W31; K_U30
LO2	Knows principles of crew organization on a sea-going vessel, understands principles of command and personnel management.	K_W30; K_K03; K_K04
LO3	Co-operates with the shipowner, agent, charterer in ship's budget-related matters; uses a computer for financial calculations aimed at cost-effectiveness; correctly interprets and uses practically principles for cost-effective ship maintenance including costs, prices, freight revenues; plans ship's budget items.	K_W29; K_U13; K_U14

Assessment methods and criteria				
LO1	Has knowledge of documents, certificates, books, logs, etc.; knows and correctly interprets their contents; knows principles of conducting ship inspections and preparation of ship documents for such inspections.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot identify basic ship's certificates; does not know legal basis of ship inspections and principles of their execution.	Can interpret the text of certificates; distinguishes types of marine inspections.	Can interpret the text of certificates and use the information therein for preparation of a ship for inspection; knows the scope of particular inspection.	Is proficient in using ship's certificates, interprets their text; uses information contained in certificates to prepare for inspections; properly interprets international and flag state legal requirements.
LO2	Knows principles of crew organization on a sea-going vessel, understands principles of command and personnel management.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know the fundamentals of crew organization and management.	Knows the fundamentals of crew organization and management.	Knows the fundamentals of crew organization and management; identifies qualities of a good commander and knows how to make use of them.	Has mastered perfectly the principles of crew organization and management; knows and is able to make use of principles of good command; has mastered relevant elements of psychology and sociology.
LO3	Co-operates with the shipowner, agent, charterer in ship's budget-related matters; uses a computer for financial calculations aimed at cost-effectiveness; correctly interprets and uses practically principles for cost-effective ship conduct including costs, prices, freight revenues; plans ship's budget items.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know principles of the preparation and execution of ship budget; confuses the concepts of price, cost and freight revenue.	Knows the concept of ship budget, but does not understand the principles of its preparation and execution; is generally familiarized with business terms in shipping.	Knows principles of cooperation for the preparation and execution of ship budget; interprets correctly such terms as prices, costs, freight revenues; draws up a block diagram of ship budget.	Is proficient in using various concepts referring to ship budget preparation and execution; is able to estimate costs and freight revenues; prepares selected elements of ship budget.

Syllabus

SEMESTER 5	SHIP MANAGEMENT	LECTURES	15 HOURS

1. Documents and certificates of a merchant vessel provided for in international regulations.
2. Logbooks and record books; the ship's logbook.
3. FAL 65 Convention. Procedures and documents for ship's clearance for departure, arrival and transit.
4. Ship inspections
5. Co-operation with service providers (agents, pilots, towage, control and surveyor services).
6. General and voyage instructions. A voyage as a basic production cycle of a ship.
7. Ship's operational reports, voyage report, captain's report.
8. Co-operation with the shipowner, agent and charterer relating to the execution of the ship's budget.
9. Use of a computer for financial calculations on a ship.
10. Maritime shipping costs, classification of costs.
11. Prices in maritime shipping and price fluctuations.
12. Freight market: freight revenues.

SEMESTER 5	SHIP DOCUMENTS	CLASSES	15 HOURS

1. Analysis of the content, significance and principles of using documents typical of various forms of ship commercial operation.
2. Documents and certificates of a sea-going merchant vessel set for in conventions: SOLAS 74/78, Load Lines 66, MARPOL 73/78, Tonnage 69, CLC 69, ILO 147, WHO, and codes: IMSBC, IMDG, BCH, GC and others, related to:
   2.1. Registry and identity
   2.2. Classification.
   2.3. Safety.
   2.4. Sanitary.
   2.5. Crew.
   2.6. Cargo.
   2.7. Passengers.
3. Planning of ship budget, orders by ship's departments, disbursement account, ship's safe box.
4. Instructions for a voyage in liner shipping, chartered voyages and other specific forms of shipping.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	4	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**46**	**2**
Workload related to direct teaching activities:	32	1
Workload related to practice-oriented activities:	19	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in Onboard Training Record Book for Deck Cadets. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. Dickie J., Reeds *21st Century Ship Management*, Adlard Coles Nautical, London 2014.
2. Alderton P., *Reeds Sea Transport. Operation and Economics*, Thomas Reed, London 2011.

3. Gorton L., Hillenius P., Ihre R., *Shipbroking and Chartering practice*, Tailor & Francis 2009.
4. Maclachlan M., *The Shipmaster's Business Companion*, The Nautical Institute 2004.
5. Bucklay J., *The Business of Shipping*, Shiffer Publishing 2008.
6. Williams H., *Chartering Documents*, Lloyd's of London Press 1999.
7. www.maritimeknowhow.com

VI. Extra reading

1. Branch A., *Elements of Shipping*, Routledge 2007
2. www.bimco.org/Documentary.aspx
3. www.imo.org

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

32.		N2022/35/FS/32/SS

SHIP SAFETY

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
5	15	1	2		15	30		2

I. Course unit aims

This course unit aims at imparting knowledge of national and international regulations concerned with problems of ship safety in various operational conditions and skills of applying these regulations in case of threats.

II. Preliminary requirements

The scope of secondary school, elements of maritime law and maritime salvage and rescue.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 5		Field-specific
LO1	Has basic knowledge of emergency procedures, muster lists, procedures of the ship command to ensure the safety of personnel, ship and cargo; knows the basic scope of legal acts – conventions, resolutions, codes and related requirements, International Safety Management Code (ISM) in reference to the ship and shipowner, scope and principles of ship's conduct (procedures) during a Port State Control (PSC).	K_W19; K_W32
LO2	Can interpret correctly the text of conventions, resolutions and codes, effectively manage ship safety by using instructions of the ISM code; use emergency procedures; take effective action in all conditions to ensure the safety of people, ship and cargo; effectively prepare a ship for a PSC inspection.	K_U22; K_U26; K_K05
LO3	Has skills of effective resource management; understands the principles of team leadership, including task allocation and assessment of employee's performance; can identify training needs of a team.	K_U13; K_U22; K_U06; K_K01; K_K03; K_K04; K_K08

Assessment methods and criteria				
LO1	Has basic knowledge of emergency procedures, muster lists, procedures of the ship command to ensure the safety of personnel, ship and cargo; knows the basic scope of legal acts – conventions, resolutions, codes and related requirements, International Safety Management Code (ISM) in reference to the ship and shipowner, scope and principles of ship's conduct (procedures) during a Port State Control (PSC).			
Assessment methods	Test, oral assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of emergency procedures, muster lists and procedures providing the safety of personnel, ship and cargo.	Does not have elementary knowledge of implemented emergency procedures, muster lists and ship safety-related procedures.	Has elementary knowledge of implemented emergency procedures, muster lists and ship safety-related procedures.	Knows implemented emergency procedures, muster lists and ship safety-related procedures and corresponding legal instruments.	Has full knowledge of implemented emergency procedures, muster lists and ship safety-related procedures and corresponding legal instruments.
LO2	Can interpret correctly the text of conventions, resolutions and codes, effectively manage ship safety by using instructions of the ISM code; use emergency procedures; take effective action in all conditions to ensure the safety of people, ship and cargo; effectively prepare a ship for a PSC inspection.			
Assessment methods	Oral assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skill of correct interpretation and application of binding regulations on ship safety.	Cannot interpret and apply binding regulations related to ship safety.	Can interpret and apply to a basic extent binding regulations related to ship safety.	Can interpret and apply binding regulations related to ship safety, and take effective action assuring the safety of personnel, ship and cargo.	Can interpret and apply fully binding regulations related to ship safety, and take effective action assuring the safety of personnel, ship and cargo.

LO3	Has skills of effective resource management; understands the principles of team leadership, including task allocation and assessment of employee's performance; can identify training needs of a team.			
Assessment methods	Oral assessment of tutorial activities.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot identify or demonstrate skills of resource management and teamwork.	In class exercises demonstrates the understanding of basic principles of resource management; demonstrates a skill of working in a team.	Demonstrates good understanding of resources management principles; can be a team leader.	Analyses a situation, understands relevant principles and selects proper methods of effective resource management; can be a team leader, proper leadership qualities.

Syllabus

SEMESTER 5	SHIP SAFETY	LECTURES	15 HOURS

1. The concept of ship safety, classification of safety at sea.
2. International Maritime Organization (IMO).
   2.1. The structure.
   2.2. Adopting resolutions and other legal instruments.
3. The influence of human factor on ship safety.
   3.1. Seafarers training (STCW Convention).
   3.2. National requirements for seafarers training.
   3.3. Fatigue and ship safety.
   3.4. Ship manning and watch keeping
4. The SOLAS Convention.
   4.1. Amendments.
   4.2. 1988 SOLAS Protocol (Harmonized System of Survey and Certification).
   4.3. Structure and principles of use.
5. National regulations on shipping safety.
6. International Safety Management Code (ISM Code).
7. Special measures for the enhancement of safety at sea.
8. International Ship and Port Facility Security Code (ISPS Code).
9. Additional safety measures for bulk carriers.
10. Requirements of Chapter III, SOLAS Convention, on Life-saving Appliances and the LSA Code.
11. Shipping safety. Requirements of Chapter V, SOLAS Convention.
12. Protection of human life.
    12.1. Passenger care in emergency situations.
    12.2. Rescue of people from a ship in distress and from wreck.
    12.3. 'Man overboard'.
13. Procedures in emergency situations (fire, explosion, flooding of watertight compartment), abandoning ship.
14. Emergency plan, crew member duties (muster list).
15. Regulation 29 of Chapter III, SOLAS Convention 'Decision support system for the master of a passenger ship'.
16. On-board training: methods of training, alarm drills.
17. Attacks or threat of attacks against vessels, maritime piracy, maritime terrorism.
18. Port State Control (PSC), structure in the world, aims, procedures, effects.

SEMESTER 5	SHIP SAFETY	CLASSES	30 HOURS

1. Port State Control (PSC). Preparation of the ship for inspection.
2. Safety-related documents of a sea-going ship; examples.
3. Documentation of the Safety Management System (ISM Code).
   3.1. Requirements.
   3.2. Shipboard documentation.
   3.3. Procedures and checklists.
   3.4. Functioning of the system.
4. Procedures in case of an accident.
   4.1. Emergency procedures.
   4.2. Muster lists and instructions in case of an emergency.
   4.3. Conducting alarm drills, documentation.

Leadership and Teamwork; Human element, Leadership and Management (HELM) – STCW 2010, *Manila Amendments.*

1. Organization of sea-going ship crew, responsibilities, command structure. Crew leadership. Forms of team management (command, management, leadership)

2. Skills of task allocation and work management. Planning and coordination. Teamwork, selection of team members, personal potential and limitations, limited time and resources. Determination and allocation of duties taking into consideration priorities for performing necessary tasks.
3. Identification of rank specific and allocated duties and requirements concerning work standards and behaviour. Workload, fatigue, rest.
4. Knowledge and skills of effective recourse management. Effective communication on board and on land. Allocation, assignment and priorities of resources. Decision making in view of collected team experiences.
5. Assertiveness, leadership and worker motivation. Situational awareness – acquisition and management. Assessment of work efficiency. Short term and long term strategies.
6. Employee assessment. Determination of training needs and tasks for the crew based on the current evaluation of competences and skills and ship operational conditions.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	10	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**67**	**2**
Workload related to direct teaching activities:	47	1
Workload related to practice-oriented activities:	30	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in the *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. ISM Code – International Safety Management
2. IMO – SOLAS, Consolidated Edition 2020.
3. STCW inc. 2010 Manila Amendments, 2011 Edition

VI. Extra reading
1. http://www.cargolaw.com/
2. http://www.imo.org
3. http://ec.europa.eu/
4. http://www.lr.org/
5. www.emsa.europa.eu/
6. http://www.equasis.org

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

33.		N2022/23/FS/33/ML1

MARITIME LAW – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
3	15	2			30			1
4	15	2			30			2

I. Course unit aims

This course unit aims at imparting knowledge of maritime law to an extent needed for safe and effective ship operation; indicating international conventions, regulations and recommendations concerning the direct obligations and responsibilities of the ship and its crew; familiarizing the students with legal regulations related to the safety of ship, personnel, cargo, passengers and cargo, protection of crew's health; identifying the requirements for environmental protection and corresponding preventive actions; presenting fundamental concepts of marine insurance.

II. Preliminary requirements

The scope of secondary school.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 3		Field-specific
LO1	Can discuss relations characteristic of human activities at sea; knows the origins of maritime law; can describe the process of formation and creation of maritime law and the scope of its regulations; can name international organizations dealing with maritime affairs; explains their tasks and competences.	K_W26; K_W29; K_W33
LO2	Knows and describes the international maritime order; knows legal status of sea areas.	K_W30
LO3	Knows issues related to seafaring; can explain and describe the essence of ship's nationality, classification, maritime safety, labour law and marine environment protection.	K_W29; K_W30; K_W31; K_W33
LO4	Can describe maritime shipping as transport activity; knows property rights on a ship, contracts of carriage of goods by sea, and the use of other owner's ship; knows and characterizes auxiliary services in maritime shipping.	K_W29

Assessment methods and criteria				
LO1	Can discuss relations characteristic of human activities at sea; knows the origins of maritime law; can describe the process of formation and creation of maritime law and the scope of its regulations; can name international organizations dealing with maritime affairs; explains their tasks and competences.			
Assessment methods	Various forms of tests, essay.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know issues related to human activities at sea.	Knows issues related to human activities at sea to a minimum sufficient degree.	Knows issues related to human activities at sea to a sufficient degree; knows and explains issues related to human activities at sea.	Can explain and analyse issues related to human activities at sea; can explain, analyse and classify issues related to human activities at sea.
LO2	Knows and describes the international maritime order; knows legal status of sea areas.			
Assessment methods	Various forms of tests, essay.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know issues related to human activities at sea.	Knows issues related to human activities at sea to a minimum sufficient degree.	Knows issues related to human activities at sea to a sufficient degree; knows and explains issues related to human activities at sea.	Can explain and analyse issues related to human activities at sea; can explain, analyse and classify issues related to human activities at sea.
LO3	Knows issues related to seafaring; can explain and describe the essence of ship's nationality, classification, maritime safety, labour law and marine environment protection.			
Assessment methods	Various forms of tests, essay.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know issues related to	Knows issues related to human activities at sea to	Knows issues related to human activities at sea to a sufficient degree; knows and	Can explain and analyse issues related to human activities at sea; can explain,

	human activities at sea.	a minimum sufficient degree.	explains issues related to human activities at sea.	analyse and classify issues related to human activities at sea.
LO4	Can describe maritime shipping as transport activity; knows property rights on a ship, contracts of carriage of goods by sea, the use of other owner's ship; knows and characterizes auxiliary services in maritime shipping.			
Assessment methods	Various forms of tests, essay.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know issues related to human activities at sea.	Knows issues related to human activities at sea to a minimum sufficient degree.	Knows issues related to human activities at sea to a sufficient degree; knows and explains issues related to human activities at sea.	Can explain and analyse issues related to human activities at sea; can explain, analyse and classify issues related to human activities at sea.

Syllabus

SEMESTER 3	MARITIME LAW	LECTURES	30 HOURS

1. The concept, subject and classification of maritime law.
2. Sources of national and international maritime law.
3. International maritime organizations.
4. Legal status of sea areas.
5. Ship's nationality.
6. Register of ships.
7. Maritime administration.
8. Maritime courts.
9. Maritime labour law.
10. Marine accidents.
11. Property rights on a ship.
12. Carriage of cargo by sea.
13. Carriage of passengers by sea.
14. Time charter.
15. Agency services. Brokering services. Towage services. Pilot service.
16. Maritime salvage.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	15	
Total workload	**47**	**1**
Workload related to direct teaching activities:	32	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

33.	Course unit:							N2022/24/FS/33/ML2
MARITIME LAW – module 2								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
3	15	2			30			1
4	15	2			30			2

III/2. Learning outcomes and syllabus

Learning outcomes – semester 4		Field-specific
LO1	Knows and describes the role of marine insurance in maritime shipping.	K_W29

Assessment methods and criteria				
LO1	Knows and describes the role of marine insurance in maritime shipping.			
Assessment methods	Various forms of tests, essay.			
Criteria/Grade	2	3	3.5−4	4.5−5
Criterion 1 The scope of knowledge and its understanding.	Does not know issues related to human activities at sea.	Knows issues related to human activities at sea to a minimum sufficient degree.	Knows issues related to human activities at sea to a sufficient degree; knows and explains issues related to human activities at sea.	Can explain and analyse issues related to human activities at sea; can explain, analyse and classify issues related to human activities at sea.

Syllabus

SEMESTER 4	MARITIME LAW	LECTURES	24 HOURS

1. The marine insurance subject-matter and coverage.
2. Auxiliary institutions in the marine insurance market.
3. Marine risks and types of marine insurance.
4. General average.
5. Contract of marine insurance in the maritime code.
6. Marine policy and its types.
7. Rights and obligations of the parties to a contract of marine insurance.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	30	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	20	
Total workload	**52**	**2**
Workload related to direct teaching activities:	32	**2**
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets.* The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading

1. *Polish Maritime Code* of 18th September, 2001.
2. *United Nations Convention on the Law of the Sea*, 1982 (UNCLOS).
3. *International Convention for the Safety of Life at Sea*, 1974 (SOLAS).
4. *International Convention for the Prevention of Pollution from Ships*, 1973/1978 (MARPOL).
5. *Convention on the International Regulations for Preventing Collisions at Sea*, 1972 (COLREG).
6. *International Convention on Salvage*, 1989 (SALVAGE).
7. *York-Antwerp Rules*, 2016 (YAR).

VI. Extra reading

Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

34.	Course unit:							N2022/23/FS/34/MEP
MARINE ENVIRONMENT PROTECTION								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
3	15	1	1		15	15		2

I. Course unit aims
This course unit aims at imparting the knowledge of principles of marine environment protection, operation of shipboard equipment for environment protection and keeping records as required.

II. Preliminary requirements
Chemistry, biology, physics.

III. Learning outcomes and syllabus
The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes.Z

Learning outcomes – semester 3		Field-specific
LO1	Has basic knowledge of concepts, principles, theory, and historical development of marine environment protection; understands and explains the impact of ship operation on environmental pollution.	K_W02
LO2	Has skills of self-instruction and teamwork, and is responsible for sustainable development, his own and others' safety at work; is able to analyse problems related to pollution from ships adversely affecting the environment.	K_U02; K_U05; K_U06
LO3	Is aware of the responsibility, and significance of environmental issues; can look at things from a global perspective, and is creative.	K_K02; K_K05

Assessment methods and criteria				
LO1	Has basic knowledge of concepts, principles, theory, and historical development of marine environment protection; understands and explains the impact of ship operation on environmental pollution.			
Assessment methods	Written exam			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know marine environment protection issues.	Can state sources of marine environment protection, most relevant conventions, oil clearance methods.	Additionally, discuss the stated conventions and oil clearance methods; knows examples of renewable energy sources.	Additionally, can discuss the global warming issue: causes and effects, knows the legal aspects in the light of binding regulations, keeps records of environment protection activities; at work can implement principles of optimized use of energy.
LO2	Has skills of self-instruction and teamwork, and is responsible for sustainable development, his own and others' safety at work; is able to analyse problems related to pollution from ships adversely affecting the environment.			
Assessment methods	Written exam			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not demonstrate self-instruction skills, does not analyse problems of marine environment protection.	Can analyse sources of marine environment protection during normal ship operation; can counteract these sources, knows which convention applies.	Additionally, can verify those marine sources of marine pollution where he can counteract or reduce the impact.	Additionally, can use ship's documentation and act as required by shipboard certificates; can present onboard purifying and pollution preventing systems.
LO3	Is aware of the responsibility, and significance of environmental issues; can look at things from a global perspective and is creative.			
Assessment methods	Project, presentation.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not understand problems of marine environment pollution.	Cares for the environment, is aware of changes and degradation.	Additionally, can use observations for the improvement of environment protection, in accordance	Additionally, demonstrates on a ship an active attitude towards the reduction of marine environment pollution; is aware of the

			with relevant conventions.	responsibility and can co-operate with all teams concerned.

Syllabus

SEMESTER 3	MARINE ENVIRONMENT PROTECTION	LECTURES	15 HOURS

1. Abiotic and biotic factors of the ocean biosphere.
2. Types and sources of marine pollutants according to the GESAMP.
3. International regulations on environment protection – conventions: Stockholm, Rio de Janeiro, Kobe. International co-operation.
4. Selected conventions and agreements ratified by Poland, essential for the ocean biosphere.
5. The 1979 Convention on Long-range Transboundary Air Pollution (Geneva).
6. The Vienna Convention for the Protection of the Ozone Layer, with amendments: Montreal, London, Copenhagen, Beijing.
7. Legal regulations and conventions referring to marine pollution – Intervention, CLC, LDC, IMO standards.
8. Role and current work of the IMO's Marine Environment Protection Committee on international cooperation to protect the seas.
9. The MARPOL Convention (including optimization of energy use – Annex VI), the Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area.
10. International Convention for the Control and Management of Ship's Ballast Water and Sediments, London 2004.
11. International Convention for the Safe and Environmentally-Friendly Recycling of Ships. Hong Kong 2009.
12. UN Framework Convention on Climate Change and Kyoto Protocol.
13. EU regulations on environment protection.
14. Polish regulations referring to environment protection.
15. Significance of activities aimed at the marine environment protection.

SEMESTER 3	MARINE ENVIRONMENT PROTECTION	CLASSES	15 HOURS

1. Port regulations on environment protection.
2. Direct threats to the marine environment caused by human activities at sea (maritime transport, offshore industry, fishing, leisure activities).
3. Means and methods of combating pollution by ships.
4. Marine purification and pollution prevention equipment and systems.
5. Ship's documentation related to the marine environment protection, required certificates.
6. Environmental threats caused by lost fishing gear.
7. Impact of deep-sea fishing on the degradation of habitats.
8. Gear conflict, impact on the environment.
9. Energy efficient operation and the environment protection (sea area, atmosphere).
10. Renewable sources of energy.

Student workload − semester 3	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**55**	**2**
Workload related to direct teaching activities:	34	1
Workload related to practice-oriented activities:	30	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training

The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading

1. Baris Soyer, Andrew Tettenborn, *Pollution at Sea: Law and Liability*, Taylor & Francis, 2013.
2. *The Convention on The Protection of The Marine Environment of The Baltic Sea Area*, 1992.
3. IMO – *Guidelines for the Development of Shipboard Marine Pollution Emergency Plans*, 2001.
4. *The International Convention for the Prevention of Pollution from Ships, now known universally as* MARPOL*, which has been amended by the Protocols of 1978 and 1997 and kept updated with relevant amendments*.
5. Shipping and the Environment: A Code of Practice 4th Edition, 2009.

VI. Extra reading

1. IMO – *Guidelines for the Development of Shipboard Marine Pollution Emergency Plans*, 2001.
2. IMO 630E (A) *Manual on Chemical Pollution Section 1: Problem Assessment and Response Arrangements*.

VII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

35.	Course unit:							N2022/24/FS/35/PI
PORT INFRASTRUCTURE								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	1			15			1

I. Course unit aims

This course unit aims at getting students familiar with port structures, particularly port basins and other marine structures and facilities, and presenting conditions of safe ship manoeuvring within harbour waters, and the interactions between the ship and port structures.

II. Preliminary requirements

The scope of secondary school, fundamentals of navigation and ship manoeuvring.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 4		Field-specific
LO1	Has basic knowledge of port architecture, i.e., components of port infrastructure.	K_W01
LO2	Has basic knowledge of conditions for safe manoeuvring of a ship in harbour areas, and phenomena related to ship movement in harbour waters.	K_W11
LO3	Has basic knowledge of criteria for ship manoeuvring safety assessment using navigational risk.	K_W11
LO4	Has knowledge of port structures, their construction, stability and equipment.	K_W04
LO5	Knows equipment of port shore structures used by manoeuvring ships.	K_W08

Assessment methods and criteria				
LO1	Has basic knowledge of port architecture, i.e., components of port infrastructure.			
Assessment methods	Oral and written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Kryterium 1 Knowledge of port architecture and elements of port infrastructure.	Does not know port architecture and infrastructure.	Has basic knowledge of the lectured subject.	Knows principal elements of port infrastructure and their functions.	Has systematic knowledge of the port and its elements.
LO2	Has basic knowledge of conditions for safe manoeuvring of a ship in harbour areas, and phenomena related to ship movement in harbour waters.			
Assessment methods	Oral and written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of assessment criteria for ship manoeuvring safety and related phenomena.	Does not know conditions of safe manoeuvring of a ship.	Has basic knowledge of conditions and phenomena related to ship movement.	Knows well conditions and phenomena related to ship movement in harbour basins.	Has basic knowledge required to describe conditions and phenomena related to ship manoeuvring.
LO3	Has basic knowledge of criteria for ship manoeuvring safety assessment using navigational risk.			
Assessment methods	Oral and written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of assessment criteria for ship manoeuvring safety in harbour basins.	Cannot define assessment criteria for ship manoeuvring safety.	Has elementary knowledge of the assessment of ship manoeuvring safety.	Knows assessment criteria for ship manoeuvring safety in harbour basins.	Has systematic knowledge of ship movement safety assessment.
LO4	Has knowledge of offshore structures, their construction, stability and equipment.			
Assessment methods	Oral and written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of the construction, stability and equipment of port structures.	Does not know the construction, stability conditions and equipment of port structures.	Has basic knowledge of the role, functions and types of port structures.	Has knowledge of the role, functions, types and equipment of port structures.	Has systematic knowledge of types, characteristics, and equipment of port structures.
LO5	Knows equipment of port and shore structures used by manoeuvring ships.			

Assessment methods	Oral and written assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of the equipment of port structures related to manoeuvring ships.	Does not have any knowledge of the lectured subject.	Has basic knowledge of elements of port structure equipment.	Knows elements of the equipment and its relation to a manoeuvring ship.	Can give a comprehensive description of equipment elements depending on the type of a manoeuvring ship.

Syllabus

SEMESTER 4	PORT INFRASTRUCTURE	LECTURES	15 HOURS

1. Ports and port basins.
   1.1. Types of ports. The main dimensions of different terminals in the port.
   1.2. Depths of port basins, underkeel clearance (UKC), static and dynamic UKC.
   1.3. Waterway elements and their parameters (roads, anchorages, approach and port channels, port entrance, turning basins, lay-bys, port basins).
2. The main characteristics of the ships.
   2.1. Different types of sea going vessels. Parameters.
   2.2. Ship manoeuvring and hydrodynamic behaviour in port waters (approach channels, manoeuvring areas within the port, port basin, berth areas): shallow water effect, bank effect, ship-generated wave, back currents/streams and wakes (propeller streams).
3. Design and construction of port structures.
   3.1. Types of structures (breakwaters, wharves, piers, jetties)
   3.2. Maximum depth at the wharf.
   3.3. Shore and bottom strengthening, dredging and sand filling.
4. Stability of a port structure.
   4.1. Active and passive earth pressure.
   4.2. Interactions of a ship, waves, current, load from cargo handling equipment and storage.
5. Determination of manoeuvring areas.
   5.1. Assessment criteria for ship manoeuvring safety.
   5.2. Navigational risk.
   5.3. Methods of manoeuvring area determination.
6. Impact of ship on the berth.
   6.1. Ship's thrust and drag.
   6.2. Impact energy of berthing and mooring.
   6.3. Interaction of the propeller.
7. Details of berthing facilities for different type of berth.
   7.1. Mooring equipment.
   7.2. Fender systems.
   7.3. Rescue equipment.
8. Offshore structures.
   8.1. Drilling and production rigs.
   8.2. Underwater structures and facilities (tunnels, pipelines, cables).
   8.3. Probability of ship's collision with a port/offshore structure.
   8.4. Structure protection against ship's impact.

Student workload − semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	6	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	8	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**33**	**1**
Workload related to direct teaching activities:	21	0.5
Workload related to practice-oriented activities:	8	0.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
Not applicable.

V. Recommended reading
1. Port Planning and Infrastructure Design.
2. Ligteringen H., Ports and Terminals – lecture notes, 2nd Edition 2017, Delf Academic Press.

VI. Extra reading
Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

36.	Course unit:	N2022/11/FS/36/MTS

MARITIME TRANSPORT SECURITY

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
1	15	1	1		15	15		1

I. Course unit aims

This course unit aims to impart the knowledge of today's threats to shipping, counteracting principles and methods, and enhancing shipping security by actions of military and non-military units.

II. Preliminary requirements

not applicable

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 1		Field-specific
LO1	Has basic knowledge of legal and economic factors affecting the functioning of maritime economy and foreign trade.	K_W29
LO2	Has ordered knowledge of the safety of life and work at sea, knows in detail procedures in emergency situations threatening the crew, passengers, ship and cargo, and knows how to avoid such threats.	K_W19
LO3	Can use professional literature, learn independently and thus acquire information from Polish- and English-language resources of the Internet and specialist data bases; is able to integrate, assess, interpret correctly acquired information, and on this basis draw conclusions and formulate opinions.	K_U01
LO4	Is aware of legal, economic and environmental consequences of decisions made in connection with ship operation and carriage by sea, understands the significance of global problems of the marine environment and the need to develop the awareness of environment protection.	K_K02

Assessment methods and criteria				
LO1	Has basic knowledge of legal and economic factors affecting the functioning of maritime economy and foreign trade.			
Assessment methods	Various forms of tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of elementary components and issues related to the functioning of maritime economy and foreign trade	Cannot state basic concepts derived from legal determinants of maritime economy.	Can state basic legal acts and concepts and discuss their significance.	Additionally, characterizes basic threats to maritime economy and implications of the relevant legal acts.	Additionally, can analyse threats and possible countermeasures; fluently discusses the related topics.
LO2	Has ordered knowledge of the safety of life and work at sea, knows in detail procedures in emergency situations threatening the crew, passengers, ship and cargo, and knows how to avoid such threats.			
Assessment methods	Various forms of tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge of safe navigation and familiarization of emergency procedures.	Cannot state basic institutions, functionaries, procedures ensuring the safety of navigation; does not perform assignments.	Is able to state basic institutions, functionaries, procedures ensuring the safety of navigation, and in general terms describe their tasks and functions; does assignments correctly and on time.	With slight teacher's assistance, can state the range of tasks and procedures in more detail and precisely; correct and timely assignments are done more independently.	Additionally, can generally make basic analyses and plans resulting from documents setting forth navigation safety standards; assignments feature originality and comprehensive approach.
LO3	Can use professional literature, learn independently and thus acquire information from Polish- and English-language resources of the Internet and specialist data bases; is able to integrate, assess, interpret correctly acquired information, and on this basis draw conclusions and formulate opinions.			
Assessment methods	Paper, presentation.			
Criteria/Grade	2	3	3.5–4	4.5–5

Criterion 1 Skill of self-instruction and retrieving information from Internet resources.	Cannot use proper sources of information, cannot select information; does not hand in assignments.	Properly uses recommended reading sources but does not search on his own for other sources; assignments are correct and on time.	Uses properly all available sources of information; correct and timely assignments are done more independently.	Additionally, attempts at investigating a problem exactly; draws conclusions based on the acquired knowledge; assignments are comprehensive and to the point.
LO4	Is aware of legal, economic and environmental consequences of decisions made in connection with ship operation and carriage by sea, understands the significance of global problems of the marine environment and the need to develop the awareness of environment protection.			
Assessment methods	Various tests, paper.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Awareness of the need to make proper decisions related to safe ship operation.	Does not realize and is not aware of threats resulting from incorrect operation of the ship.	Is aware of consequences arising from improper ship operation.	Is aware of consequences arising from improper ship operation; realizes legal, economic and social consequences of improper decisions.	Additionally, sees and understands global problems of the environment pollution and protection.

Syllabus

SEMESTER 1	MARITIME TRANSPORT SECURITY	LECTURES	15 HOURS

TRAINING ON SECURITY-AWARENESS (1.5)
TRAINING FOR SEAFARERS WITH DESIGNATED SECURITY DUTIES (2.8)

1. Maritime security.
   1.1. Unlawful acts at sea – overview, nature and motivation.
   1.2. High risk areas.
   1.3. Definitions of elements of maritime security, threats (terrorism, piracy, armed robbery, types of port facilities, SSO, CSO, PFSO).
   1.4. International policy on maritime safety, security of shipping and port facilities.
   1.5. SOLAS security requirements, ISM Code and ISPS Code – International Ship and Port Facility Security Code.
   1.6. Key security system issues.
   1.7. Terminology relating to ship and port facility security.
2. Identification of ship security risks and threats.
   2.1. Types of potential threats (hijacking, illegal passengers, piracy, explosive devices, smuggling and others).
   2.2. Basic techniques for identifying ship security risks and threats.
   2.3. Characteristics and recognition of hazardous materials (weapons, explosives, dangerous instruments, drugs).
   2.4. Techniques for avoiding security measures used by pirates and criminals.
3. Maritime security procedures, ship and port facility security plan.
   3.1. Responsibilities of governments, institutions and individuals involved in maritime security.
   3.2. Security levels between ship and port facility.
   3.3. Cooperation procedures, ship and port facility interactions, division of security duties.
   3.4. Procedures for checking persons and cargo, monitoring sensitive points. Security duties of shipboard personnel.
      3.4.1. Methods of checking restricted areas.
      3.4.2. Methods of controlling access to the ship and control of embarkation.
      3.4.3. Monitoring of deck and area around the ship. Control of cargo operations.
      3.4.4. Methods of controlling ship's stores loaded.
   3.5. Crowd management.
   3.6. Non-invasive controls.
   3.7. Documentation of security incidents. Procedures for reporting security incidents.
   3.8. Declaration of Security.
   3.9. Procedures and requirements for drills and test alarms required by law. Record of security drills and exercises.
4. Security equipment – Principles of effective and safety use.
   4.1. Security equipment and systems (Ship Security Alert System). SSAS location.
   4.2. Testing and operating procedures.
   4.3. Passive and active ship and port facility security equipment and devices.
5. International and national organisations supporting ship and port facility security.
   5.1. NATO Shipping Control System, NCAGS (Naval Co-operation and Guidance for Shipping), Operation Ocean Shield.
   5.2. Passage of a ship through a regional maritime navigation control area by NATO naval forces.
   5.3. Support activities of other organisations.
      5.3.1. UKMTO (UK Maritime Trade Operations).

5.3.2. MSCHOA (Maritime Security Centre Horn of Africa) and MARLO (Maritime Liaison Office).
5.3.3. CMF (Combined Maritime Forces) and EU NAVFOR (European Union Naval Forces).
5.3.4. Other shipping organisations (BIMCO, IMB and others).
5.4. Host Nation Support (HNS) responsibilities.
5.5. Crisis management in Poland, protection of critical infrastructure.
6. Selected problems of maritime conflicts

SEMESTER 1	MARITIME TRANSPORT SECURITY	CLASSES	15 HOURS

1. Identification of ship security risks and threats – analysis of potential threats.
2. Identification of weapons and hazardous materials. Measures to prevent weapons, dangerous substances on board the ship.
3. Passive ship security. Restricted areas. Measures to prevent unauthorised access.
4. Declaration of Security. Notification of arrival – analysis of records.
5. Checking the effectiveness of the ship security system, control and evaluation techniques.
6. Security equipment onboard and its maintenance. Principles of effective and safe use. Performance tests.
7. Preparation of ship security plan for selected units.
8. Procedures and requirements for security drills and exercises required by the ISPS Code.
9. Methodology of port facility security assessment.
10. Preparation of the port facility security plan.
11. Ship's crew behaviour in emergency situations. Procedures in case of Security Threats.

Student workload − semester 2	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	8	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**44**	**1**
Workload related to direct teaching activities:	32	0.5
Workload related to practice-oriented activities:	23	0.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. ISPS Code – The International Ship and Port Facility Security Code.

VI. Extra reading
1. ILO/IMO – *Security in ports*. *Code of practice*, 2004.
2. Bichous K., Szyliowicz J.S., Zamparini L., *Maritime Transport Security – Issues, Challenges and National Policies*, Edward Elgar Publishing, 2014.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

37.	Course unit:							N2022/24/FS/37/DS1
DIPLOMA SEMINAR – module 1								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15		1			15		1
8	12			1			10	

I. Course unit aims
In this curse unit students will be taught the principles of writing a diploma thesis based on the knowledge acquired mainly in profession-specific course units, the thesis writing procedure and the use of research methods.

II. Preliminary requirements
The scope of secondary school.

III/1. Learning outcomes and syllabus
The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 4		Field-specific
LO1	Knows and understands procedures and methods of scientific research.	K_W01; K_W24; K_W35
LO2	Can formulate research problems and hypotheses. Can develop a research plan suitable for the problem.	K_U01; K_U02; K_U06; K_U11; K_U12; K_K01; K_K03
LO3	Can develop a concept of an engineering diploma thesis.	K_U05; K_U09;
LO4	Respects opinions of other seminar participants, is disciplined and responsible in voicing his/her standpoint; observes copyright.	K_W03; K_U03; K_U04; K_K01

Assessment methods and criteria				
LO1	Knows and understands procedures and methods of scientific research.			
Assessment methods	Tests during the semester, assessment of active participation in the seminar			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Knowledge and understanding of research methods.	Does not know research methods.	Has a fragmentary knowledge of research methods.	Has a systematic theoretical knowledge of research methodology.	Has a systematic theoretical knowledge, deepened with readings of Polish and foreign sources.
Criterion 2 Defining criteria for research method choice.	Does not know criteria the choice of for research methods.	Knows criteria the choice of for research methods in a limited scope of empirical methods.	Knows criteria the choice of for research methods, limited to real and model research methods.	Knows criteria the choice of for real and model research methods, applying an extended systems approach.
Criterion 3 Knowledge of scientific research terminology.	Does not know basic concepts and terms of research procedures and methods.	Knows terminology of research procedures and methods; cannot define key terms.	Knows terminology of research procedures and methods; can define most key terms in Polish.	Knows terminology of research procedures and methods; can define all key terms in Polish and understands the meaning of English terms.
LO2	Can formulate research problems and hypotheses. Can develop a research plan suitable for the problem.			
Assessment methods	Project, presentation.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Ability to acquire information and knowledge of research procedures and methods.	Cannot use sources of information on research procedures and methods.	Can use, independently or in a team, elementary (recommended) sources of information on research procedures and methods.	Can use, independently or in a team, Polish sources of information on research procedures and methods.	Can use current specialized sources of information research procedures and methods in Polish and other languages.

Criterion 2 Skills of analysing and synthesizing acquired information and formulating critical judgments and logical conclusions.	Cannot analyse and synthesize acquired information, formulate critical judgments, and draw logical conclusions.	Can analyse and synthesize acquired information, but cannot formulate logical conclusions.	Can analyse and synthesize information from research procedures and methods from Polish sources, and formulate logical conclusions.	Can analyse and synthesize information from research procedures and methods from Polish and foreign sources, and formulate logical conclusions, and can formulate critical judgments and logical conclusions.
Criterion 3 Skill of describing a source of acquired information (footnotes).	Cannot indicate sources of acquired information.	Can describe sources of presented tables and figures, but cannot state footnotes to presented texts.	Can describe sources of all forms used to acquire information.	Can describe sources of all forms used to acquire information in Polish and other languages.
Criterion 4 Skill of using research procedures and methods for solving research problems.	Cannot use research procedures and methods for solving research problems.	Can use only a few research procedures and methods learnt for solving research problems.	Can aptly choose and use research procedures and methods learnt for solving research problems.	Can aptly choose research procedures and methods, give reasons for their use and suggest innovative solutions of research problems.
Criterion 5 Skill of self-instruction during the process of research work.	Does not have self-instruction skills.	Undertakes self-instruction with assistance of the teacher.	Has skills of self-instruction in a selected area.	Has skills of self-instruction in a wide spectrum of areas.
LO3	Can develop a concept of an engineering diploma thesis.			
Assessment methods	Project, presentation.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Skill of developing a concept and plan of a diploma thesis.	Cannot independently develop a concept and plan of his/her diploma thesis.	Develops a concept and plan of his/her diploma thesis, following a given algorithm.	Can develop independently, taking logical and hierarchical steps, a concept and plan of his/her diploma thesis.	Can develop independently, following a proper research procedure and methods, a concept and plan of his/her diploma thesis with innovative solutions of research problems chosen to be solved.
Criterion 2 Skill of presenting a concept and plan of a diploma thesis.	Cannot demonstrate a concept and plan of his/her diploma thesis, using proper research and professional terminology, orally or in writing.	Can partly present a concept and plan of his/her diploma thesis, using proper research and professional terminology.	Can present a consistent concept and plan of his/her diploma thesis, using proper research and professional terminology in Polish.	Can draw up and present synthetically his/her concept and plan of diploma thesis, using proper research and professional terminology in Polish and English, logically sequences and grounded by arguments.
LO4	Respects opinions of other seminar participants, is disciplined and responsible in voicing his/her standpoint; observes copyright.			
Assessment methods	Assessment of the participation and attitude in the seminar.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Attitude, discipline, punctuality.	Is inattentive, does not comply with class discipline, is not punctual.	Is well-behaved and disciplined at the seminar classes, occasionally comes a bit late, does not always keep deadlines for assignments.	Is well-behaved and disciplined at the seminar classes, occasionally comes a bit late, always keeps deadlines for assignments.	Responsibly performs students' duties, is conscientious and punctual, performs assignments on time.
Criterion 2 Participation in a discussion, ability to express opinions.	Does not take part in class discussions; does not ask questions, does not express opinions.	Occasionally take part in class discussions; prompted, asks questions, abstains from voicing own opinions in public.	Is active in discussions; asks questions, encouraged, expresses own opinions, listens to others with respect and attention.	Very active in discussions; inspires solving problems; asks questions, expresses own opinions, takes the opinion of others into consideration.

Criterion 3 Reference to intellectual property of other authors.	Plagiarizes and cheats.	Occasionally attributes successes of others/team to himself/herself.	Respects achievements of others, does not attribute others' successes to himself/herself.	Honestly and accurately states information sources and indicates own contribution to a work.
Criterion 4 Team co-operation.	Does not work in a team.	Occasionally undertakes work in a team as its regular member only.	Often participates in teamwork, occasionally plays the role of a leader.	Often initiates and organizes teamwork; presents team's results with full responsibility.

Syllabus

SEMESTER 4	DIPLOMA SEMINAR	CLASSES	15 HOURS

RESEARCH METHODOLOGY AND PRINCIPLES OF WRITING AN ENGINEERING THESIS

1. Basic concepts of scientific research: methodology, method, science, scientific research, knowledge.
2. Research methods: experiment, observation, construction, statistical.
3. Research planning.
4. Gathering of research material.
5. Ethical standards of research, intellectual property protection.
6. Processing of research material: analysis and synthesis, induction and deduction. Synthesizing of the materials: explanation, reasoning, proving.
7. Methodology of processing and presenting the results: knowledge within the area of research.
8. Procedures of writing a thesis.
9. Concept of a diploma thesis. Discussion over the presented thesis concepts, assessment of the presentations by students supervised by the teacher.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	5	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams		
Total workload	**25**	**1**
Workload related to direct teaching activities:	20	0.5
Workload related to practice-oriented activities:	5	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

37.	Course unit:							N2022/48/FS/37/DS2
DIPLOMA SEMINAR – module 2								
Semester	Weeks in the semester	Hours in week			Hours in the semester			ECTS
		A	C	L	A	C	L	
5	15		1			15		1
8	12			1			10	

III/2. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for all modules as the acquired knowledge, skills and attitudes, with a division into semester.

Learning outcomes – semester 8		Field-specific
LO1	Can write an engineering thesis as guided by the teacher.	K_U01; K_U10; K_U11; K_U12; K_U26; K_K01; K_K08; K_K09

Assessment methods and criteria				
LO1	Can write an engineering thesis as guided by the teacher.			
Assessment methods	Summative assessment.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Summative assessment of the knowledge of methodology, cognitive and practical skills and attitudes.	Does not have theoretical knowledge or practical skills for the preparation of a diploma thesis; does not know basic research concepts and definitions or research procedure; cannot formulate research objectives, present a concept and plan of diploma thesis; cannot use literature and profession-specific and scientific terminology; avoids taking responsibility for own work and behaviour.	Has scattered theoretical knowledge of research methodology; can analyse and synthesize gathered information, and cannot formulate logical conclusions; has limited specialist vocabulary; hesitates when expressing own opinions; has difficulties in independent preparation of thesis concept and plan; rather punctual in performing assignments.	Has a systematic theoretical knowledge, knows criteria of the choice of methods for real and model research; can develop in detail a thesis concept and plan, using proper research and profession-specific terminology; is engaged in discussions; when encouraged, presents own opinions; timely performs assignments.	Has a systematic and extensive knowledge going beyond the seminar topics; is inquisitive; can analyse and synthesize information from Polish and other sources and formulate critical judgments and opinions; present logical conclusions; can choose optimal procedures and methods, justify their use, and propose innovative solutions; cam deliver an interesting presentation of own research concept and plan, using specialist terminology.

Syllabus

SEMESTER 8	DIPLOMA SEMINAR	LAB CLASSES	10 HOURS

ENGINEERING DIPLOMA THESIS – INDIVIDUAL WORK OF THE THESIS SUPERVISOR WITH THE STUDENT

1. Concept of a diploma thesis.
2. Knowledge of the literature related to the thesis topic.
3. Adoption of the research method and procedure.
4. Formulation of the main and specific problems and hypotheses.
5. Thesis layout, presentation of substantive research outcome.
6. Analysis and processing of research results.
7. Drawing conclusions.
8. Layout of the thesis – formal and editorial requirements.
9. Updating and broadening of student's curriculum-covered knowledge of thesis-related areas.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	10	

Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	5	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects	*	
Self-instruction: preparation for passing tests and exams		
Total workload	**15**	*
Workload related to direct teaching activities:	15	
Workload related to practice-oriented activities:		

* The student workload concerning the preparation of the thesis and awarding ECTS credits are stated in the course unit: Diploma Thesis.

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Recommended reading
1. Guidelines for Authors and Translators of Scientific Articles to be Published in English.

V. Extra reading
1. Thesis Writing Guide.

VI. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

SPECIALISATION SUBJECTS

38. SHIP SURVEYS, MAINTENANCE AND REPAIRS
39. BULK CARRIERS OPERATIONS
40. OIL AND GAS TANKER OPERATIONS
41. LINER SHIPPING
42. MARITIME INSPECTIONS
43. PILOTAGE OF SEAGOING VESSELS

38.	Course unit:	N2022/24/SS/TM/38/SSMR1

SHIP SURVEYS, MAINTENANCE AND REPAIRS – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	1	1		15	15		2
5	15			2			30	1

I. Course unit aims

This course unit aims at making students aware of threats associated with incorrect technical operation of a ship, i.e., enhancing their awareness of the responsibility for the good technical condition of the ship and its equipment.

II. Preliminary requirements

The scope of secondary school, physics, chemistry, seamanship, ship construction and stability, occupational safety on board.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for each semester as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 4		Field-specific
LO1	Knows and uses procedures of the International Safety Management System – ISM Code.	K_W07; K_W26
LO2	Knows problems of technical operation of a ship and can assess technical condition of shipboard systems.	K_W07; K_W23 K_U25
LO3	Can manage a ship in view of shipyards repairs and day-to-day maintenance.	K_W07; K_U13

Assessment methods and criteria				
LO1	Knows and uses procedures of the International Safety Management System – ISM Code.			
Assessment methods	Various tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know guidelines of the Safety Management System.	Knows guidelines of the Safety Management System.	Knows specific principles of using the Safety Management System and understands the system of procedures and instructions.	Knows specific principles of using the Safety Management System; knows procedures and instructions and can make use of them; additionally, can create own procedures and instructions.
LO2	Knows problems of technical operation of a ship and can assess technical condition of shipboard systems.			
Assessment methods	Assessment of the classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know principles of technical operation of ships.	Knows principles of technical operation of ships in all conditions.	Knows operational problems of the ship and principles of technical assessment; knows specific operational problems of a ship, principles of technical assessment and knows methods of preventing problems.	Can assess a technical condition of shipboard equipment and analyse the results.
LO3	Can manage a ship in view of shipyards repairs and day-to-day maintenance.			
Assessment methods	Report, assessment of classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know principles applicable during a shipyard repair and current maintenance on board.	Knows principles concerning ship repairs and maintenance.	Can plan a shipyard repair and maintenance/repair work on board; can plan and supervise a shipyard repair and maintenance/repair work on board.	Can plan, supervise and estimate costs of a shipyard repair and maintenance/repair work on board; can analyse work done.

Syllabus

SEMESTER 4	SHIP SURVEYS MAINTENANCE AND REPAIRS	LECTURES	15 HOURS

1. Ship operation, maintenance of ships' seaworthiness, technical supervision, repairs, program of enhanced surveys. Legal regulations.
2. *International Association of Classification Societies* (IACS) – present policy and tasks.
3. Technical condition of a ship in the light of flag state choice and a classification society of the ship.
4. Ship types and their technical operation. Ship's trading region and the location and availability of ship repair yards.
5. Corrosion in marine structures. Factors affecting corrosion, impact of the marine environment on the process of corrosion.
6. Corrosion mechanism and its types. Corrosion of marine metals and non-metallic materials.
9. Corrosive damage to particular elements of the ship, hull, equipment and installations.
10. Anti-corrosive protection of the ship. Protective and painting coatings, metallic coatings and cathodic protection (sacrificial cathode protection) protection. Technology of paint coating application.
11. Bio-fouling and methods of anti-fouling.
12. Ship structure fatigue and wear.
13. Hogging, sagging and buckling of the hull.
14. Cracks in the ship structure.
15. Examples of hull damage of bulk carriers, tankers. New construction standards for ships, particularly for bulk carriers and tankers (IMO GBS – *Goal-based standards*).
16. Damage to hull structure and equipment of other ship types, e.g., container ships, ro-ro ships.
17. The application of this International Safety Management System (ISM) concerning the technical operation of the ship.
18. Planning the ships technical maintenance. Surveys of ships' hull and equipment – tasks and types of surveys. Operational recommendations and repairs. Preventive actions to maintain good technical condition. Repair documentation.

SEMESTER 4	SHIP SURVEYS, MAINTENANCE AND REPAIRS	CLASSES	15 HOURS.

1. Actions of ship owner's technical services. Monitoring of ships' technical condition and operational readiness.
2. Tasks of ship's crew relating to the maintenance of a ship's seaworthiness and its equipment. Ship's crew, number of crew members in view of maintenance and repair work on board.
3. Arranging repair work, procedures. Technical supervision of repairs.
4. Loading/unloading operations in a port, the effect on ship's technical condition.
5. Ship maintenance at sea.
6. Fault detection.
7. Work to be done specification for the ship repair yard.
8. Elements of ship's structure and equipment in relation to the qualitative operation and technical supervision – preventive actions. Inspections, technical surveys (determination of technical condition), monitoring of faults, repairs, overhauls, maintenance.
   8.1. Steel structures of the hull and superstructure.
   8.2. Cargo spaces and hatch covers.
   8.3. Cargo handling equipment and gear.
   8.4. Main engine and auxiliary machinery.
   8.5. Ballast/fuel/freshwater tanks.
   8.6. Pipeline systems and valves.
   8.7. Bilge and ballast pumping system. Oil separators.
   8.8. Anchoring and mooring equipment.
   8.9. Steering gear.
   8.10. Safety and environment protection equipment.
   8.11. Fire-fighting system: detection of smoke, fire and high temperature.
   8.12. Waste and sewage management system.
   8.13. External and internal communications systems.
   8.14. Navigational equipment.
9. Ship docking, preparation for docking. Ship's stay in a dock.
10. Shipyard repairs, co-ordination of repair work, repair performance quality control. Threats.

Student workload in semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	15	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**51**	**2**

Workload related to direct teaching activities:	32	1
Workload related to practice-oriented activities:	30	1

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

38.	Course unit:	N2022/35/SS/TM/38/SSMR2

SHIP SURVEYS MAINTENANCE AND REPAIRS – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	1	1		15	15		2
5	15			2			30	1

III/2. Learning outcomes and syllabus

Learning outcomes – semester 5		Field-specific
LO1	Can perform rigging work on board	K_U22
LO2	Can administer the ship operation using appropriate programs.	K_U26; K_U28; K_U30

Assessment methods and criteria				
LO1	Can perform rigging work on board			
Assessment methods	Assessment of the workshop, practical tests.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot perform rigging work.	Can perform basic rigging work involving knots and hitches; distinguishes types of ropes used on ships.	Can perform rigging work involving knots and splices; distinguishes types of ropes used on ships.	Can perform rigging work involving knots and splices; can rig ship's ropes and properly mark them; distinguishes types of ropes used on ships.
LO2	Can administer the ship operation using appropriate programs.			
Assessment methods	Report, assessment, test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot administer the ship operation.	Can use programs for administering the ship operation.	Can use programs for administering the ship operation; can generate periodical survey reports.	Can use programs for administering the ship operation; can generate periodical survey reports, and plan and adapt the maintenance schedule for shipboard equipment.

Syllabus

SEMESTER 5	SHIP SURVEYS MAINTENANCE AND REPAIRS	LAB CLASSES	30 HOURS

WORKSHOP

ROPEWORK AND RIGGING (15 HOURS)

1. Classification and characteristics of ropes.
   1.1. Fibre ropes – structure, types, operational properties.
   1.2. Wire ropes – structure, types, operational properties.
   1.3. Compound ropes – structure, types, operational properties.
2. Whips and seizing.
3. Knots on fibre ropes.
   3.1. Overhand knot, double stopper knot (figure eight knot), square knot, reef knot, overhand knot with draw-loop, double sheet bend, water knot, timber hitch, double clove hitch, two half hitches, fisherman's bend, slip knot, bowline, Portuguese bowline, bowline on the bight, slipped half hitch, sheepshank, common (ordinary) bend, masthead knot, Spanish bowline (double forked loop), marlin spike hitch (boat knot), blackwall hitch, double blackwall hitch, cat's paw, ground-line hitch.
4. Fibre rope splicing.
   4.1. Back splice, short splice, long splice, eye splice, eye splice with thimble.
5. Wire rope splicing.
   5.1. Eye splice, eye splice with thimble, short splice, long splice.
6. Wire rope rigging elements.
   6.1. Thimbles, hooks, shackles, swivels, cleats.
   6.2. Blocks and tackles.
7. Chains and lanyards.
8. Modern mooring systems.

SHIP SURVEYS, MAINTENANCE AND REPAIRS (15 HOURS)

1. Ship inspections – instruction based on a training application: DNV Survey Simulator.
2. Enhanced Survey Programme for bulk carriers and oil tankers.

3. Ship technical specification.
4. Documentation on board, survey reports, findings.
5. Applications for the administration of technical operation of the ship, including the maintenance of ship's seaworthiness, inspections, repairs and overhauls, materials management, servicing.
   5.1. SpecTec – AMOS Maintenance & Procurement (M&P) AMOSD – Administration of Maintenance Operations and Spare.
   5.2. CODie – ISMAN Integrated Safety & Maintenance System.

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	30	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators including writing reports and assignments	4	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	4	
Total workload	**40**	**1**
Workload related to direct teaching activities:	32	0.5
Workload related to practice-oriented activities:	30	0.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. Barbara Merry, *The Splicing Handbook, Third Edition: Techniques for Modern and Traditional Ropes*, 2011.
2. Biloxi, Mississippi, *Coatings for Corrosion Protection: Offshore Oil and Gas Operation Facilities, Marine Pipeline and Ship Structures*, April 2004.
3. IACS – *A guide to managing maintenance in accordance with the requirements of the* ISM Code.
4. International marine, *The Boatowner's Guide to Corrosion: A Complete Reference for Boatowners and Marine Professionals*, 2006.
5. IMO – *Guidelines on Ship Recycling*, 2006.

VI. Extra reading
1. IMO – *International Code on the Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers* (2011 ESP Code), 2020 Edition.
2. IACS – *Guidelines for Surveys, Assessment and Repair of Hull Structure – Bulk Carriers, Container ships*.
3. IACS – *Confined spaces safe practice.*
4. IACS – *Care and survey of hatch covers of dry cargo ships – guide.*
5. American Bureau of Shipping ABS – *Ship inspection and maintenance management software*.
6. *The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships*, 2009.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

39.	Course unit:	N2022/48/SS/TM/39/BCO

BULK CARRIER OPERATIONS

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
8	12	1		2	12		24	2

I. Course unit aims

This course unit aims at imparting principles, regulations and procedures related to the carriage of various bulk cargoes, and characteristics of bulk carrier construction and equipment.

II. Preliminary requirements

The scope of secondary school and elements of ship construction and stability, computer science, environment protection and cargo handling.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 8		Field-specific
LO1	Has knowledge of bulk carrier types and their structural characteristics.	K_W04; K_W05; K_W07; K_W08
LO2	Has knowledge of safe operation of bulk carriers, and physical-chemical properties of bulk cargoes.	K_W09; K_W23
LO3	Can acquire and use all information on safe operation of bulk carriers based on international regulations, instructions and safety management systems.	K_U01; K_U20; K_U21
LO4	Can handle and analyse the operation of all systems, equipment and processes used in the operation of bulk carriers.	K_U20; K_U21; K_U28
LO5	Can supervise and plan cargo and ballast operations, and adapt existing plans to new operational circumstances or requirements.	K_U20; K_U21; K_U30
LO6	Can apply emergency principles and procedures in case of a hazard arising on board a bulk carrier, and identify problems related to the provision of bulk carrier safety.	K_U22; K_U30
LO7	Is aware of the responsibility for decisions made during cargo watchkeeping and possible impact of such decisions on the safety of the ship, crew and marine environment.	K_K02; K_K05; K_K07
LO8	Has communication competence for work in an international environment is able to co-operate with other crew members in all matters of bulk carrier operation and duties resulting from the working environment.	K_K03; K_K06; K_K07

Assessment methods and criteria				
LO1	Has knowledge of bulk carrier types and their structural characteristics.			
Assessment methods	Various tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know types of bulk carriers and characteristics of their construction.	Knows types of bulk carriers and, in general, the scope of their use.	Knows types of bulk carriers and, in general, the scope of their use, and can state their construction characteristics, and resulting restrictions.	Knows types of bulk carriers and, in general, the scope of their use, and can state their construction characteristics, and resulting restrictions, indicating their reasons; additionally, states development trends in bulk carrier operations.
LO2	Has knowledge of safe operation of bulk carriers, and physical-chemical properties of bulk cargoes.			
Assessment methods	Various tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have knowledge of safe operation of bulk carriers.	Has basic knowledge of safe operation of bulk carriers.	Has basic knowledge of safe operation of bulk carriers, and of bulk cargoes and their physical-chemical properties.	Has detailed knowledge of safe operation of bulk carriers, and of bulk cargoes and their physical-chemical properties.
LO3	Can acquire and use all information on safe operation of bulk carriers based on international regulations, instructions and safety management systems.			
Assessment methods	Various tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5

Criterion 1	Cannot acquire information necessary for safe operation of bulk carriers.	Can acquire and use general information necessary for safe operation of bulk carriers based on international regulations.	Can acquire and use general information necessary for safe operation of bulk carriers based on international regulations, instructions and safety management systems.	Can acquire and use all information necessary for safe operation of bulk carriers based on international regulations, instructions and safety management systems.
LO4	Can handle and analyse the operation of all systems, equipment and processes used in the operation of bulk carriers.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot handle and analyse the operation of shipboard systems.	Can handle basic systems and equipment used in bulk carrier operations.	Can handle all systems and equipment used in operations of various type bulk carriers.	Can handle and analyse the functioning of all systems, equipment and processes used in operations of various type bulk carriers.
LO5	Can supervise and plan cargo and ballast operations, and adapt existing plans to new operational circumstances or requirements.			
Assessment methods	Assessment of classes, lab/simulator classes			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot supervise and plan cargo and ballast operations.	Can supervise only ballast operations.	Can supervise cargo and ballast operations during the main part of bulk load/discharge) operations; can supervise ballast/cargo operations at any stage (start, main part, finishing).	Can supervise and plan cargo and ballast operations at any stage of the operations; can adapt existing plans to new operational circumstances or requirements.
LO6	Can apply emergency principles and procedures in case of a hazard arising on board a bulk carrier, and identify problems related to the provision of bulk carrier safety.			
Assessment methods	Assessment of classes, lab/simulator classes			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot apply principles and procedures in emergency situations on board bulk carriers.	Can apply basic principles of safe conduct in emergency situations on board bulk carriers.	Can apply basic principles of safe conduct in emergency situations on board bulk carriers of various types; can apply basic emergency principles and procedures of safe conduct in emergency situations on bulk carriers.	Can apply emergency principles and procedures of safe conduct in emergency situations on bulk carriers of various types; can apply emergency principles and procedures in emergency situations on bulk carriers and identify problems related to the provision of bulk carrier safety.
LO7	Is aware of the responsibility for decisions made during cargo watchkeeping and possible impact of such decisions on the safety of the ship, crew and marine environment.			
Assessment methods	Reports			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Is not aware of the responsibility for the safety of crew, ship and cargo.	Is not fully aware of the responsibility for the decisions made during cargo watchkeeping.	Is not fully aware of the responsibility for the decisions made and their possible impact on the crew safety; is not fully aware of the responsibility for the decisions made and their possible impact on the crew and ship safety.	Is much aware of the responsibility for the decisions made and their possible impact on the crew, ship and marine environment; is fully aware of the responsibility for the decisions made during cargo handling watch and their possible impact on the crew, ship and marine environment.
LO8	Has communication competence for work in an international environment is able to co-operate with other crew members in all matters of bulk carrier operation and duties resulting from the working environment.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have minimum communication competence for the shipping job environment.	Has minimum communication competence required for work involving bulk carrier operations.	Has minimum communication competence required for work involving bulk carrier operations and co-operation with other personnel; Has	Has communication competence required for work involving bulk carrier operations in an international environment and co-operation with other personnel; Has communication competence

			communication competence required for work involving bulk carrier operations in an international environment.	required for work in an international environment and is able to co-operate with other personnel in all aspects of bulk carrier operations and professional duties.

Syllabus

SEMESTER 8	BULK CARRIER OPERATIONS	LECTURES	12 HOURS

1. Characteristics of main types of bulk carriers (mini bulkers, self-unloading, BIBO – Bulk in, Bags out, *Handymax*, *Panamax*, C*apsize*, *Supramax*).
2. Main structural features of bulk carriers – framing of the hull.
3. Bulk carrier systems and installations (cargo handling systems and gear, ballast installation, hold ventilation, water level detection in holds and forward compartments, remotely-controlled water discharge, hold closing etc.).
4. Bulk carrier stability and operational documentation.
5. IMSBC Code.
6. BLU Code.
7. Loading Manual.
8. Preparation of a bulk carrier for accepting cargo.
   8.1. Technical and environmental problems of washing bulk carrier hold.
   8.2. Charterer's requirements (instruction for a voyage, charterer's general instruction for ships under his charter).
   8.3. Special requirements of some bulk and break-bulk cargoes (whitewashing/lime whiting of holds).
   8.4. Co-operation with surveyors accepting the hold cleanness.
9. Hold ventilation during the voyage.
10. Solid bulk cargoes and carriage principles.
11. Bulk carrier as a high-risk vessel for a PSC, extended inspections.
12. Deck cargo on bulk carriers (sawn timber, mine timber, logs), stability of ship with deck cargo at sea and in port.
13. Bulk carrier as a ship for carrying general cargo and heavy lifts. Securing cargo in bulk carrier holds.
14. Ballast Management Plan. Stability and strength of a bulk carrier during ballast water exchange. Methods of ballast exchange (discharge/pumping empty/refill (sequential method) or flow through ('pump-through'). Problems of preparation, filling in and out of a ballast tank/hold. Heavy cargo, sailing with empty hold(s).
15. Hazards for bulk carrier personnel, entry into a hold after fumigation or harmful chemicals discharge.
16. Enhanced surveys 2011 ESP Code, personnel participation in enhanced surveys of bulk carriers. *Enhanced Survey Programme* documentation.

SEMESTER 8	BULK CARRIER OPERATIONS	LAB CLASSES	24 HOURS

1. Planning of cargo un/loading and distribution.
2. Planning of cargo distribution in individual holds.
3. Planning of ballast operations.
4. Ballast operations in port: key element of bulk carrier operation. Ballast systems of bulk carriers. Holds flooded in a port (to reduce freebord).
5. Loading plan of a bulk carrier. Cooperation of the stevedores, shippers, receivers.
6. Choice of optimal un/loading sequence.
7. Strength of bulk carriers (in calm water, in waves, in reference to selected loading method).
8. Loading procedures, control of draft, trim, list and freeboard height.
9. Supervision of cargo handling operations.
10. Check list – cargo handling safety.
11. Un/loading and carriage of specific bulk cargoes – grain, coal, ore, other industrial products and semi-products, semi-bulk cargo.
12. Carriage of bulk dangerous goods.
13. Exchange of ballast water at sea, ballast exchange documentation, Ballast Management Plan.
14. Contracts for carriage of bulk cargo and carriage documentation.
15. Notice of readiness, calculations of DWT and cargo quantity for the notice of readiness, dead freight and calculations for a dead freight letter of protest.
16. Issues of bulk carrier safety (structural, weather conditions, cargo-related hazards).

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures	12	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	24	

Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	6	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	8	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**60**	**2**
Workload related to direct teaching activities:	42	1
Workload related to practice-oriented activities:	32	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. *Code of Practice for the Safe Loading and Unloading of Bulk Carrie*rs, BLU Code.
2. *Code of Safe Practice for Solid Bulk Cargoes*, IMSBC Code.
3. *Code of Practice for the Safe Loading and Unloading of Bulk Carriers* (Res. A.862(20)).
4. *International Code for the Safe Carriage of Grain in Bulk*, International Grain Code.
5. *International Convention on Load Lines*, LL.
6. IMO – *Ballast Water Management – How to do it,* 2017 Edition.

VI. Extra reading
1. Isbester J., Bulk *Carrier Practice: A Practical Guide*, The Nautical Institute, 2010.
2. IMO – *International Code on the Enhanced Programme of Inspections During Surveys of Bulk Carriers and Oil Tankers* (2011 ESP Code), 2020 Edition.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

40.	Course unit:	N2022/35/SS/TM/40/OGTO1

OIL AND GAS TANKER OPERATIONS – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
5	15	1	0,8		15	12		1
8	12		2	2		24	24	2

I. Course unit aims

This course unit aims at imparting knowledge of safe operation of tankers and gas carriers, the technology of carriage, loading and discharge of liquid bulk dangerous cargo and cargo care, types of use of all systems necessary for safe tanker operation, and the basic practical skills required for independent cargo watchkeeping.

II. Preliminary requirements

The knowledge imparted in such course units as chemistry, cargo handling, ship construction and stability, occupational safety on a ship.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined for each semester as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 5		Field-specific
LO1	Has knowledge of physical and chemical properties of liquid bulk dangerous goods.	K_W03
LO2	Has knowledge of the transport of liquid bulk dangerous goods and related hazards.	K_W03; K_W34
LO3	Has knowledge of hazards related to tanker accidents and knows how to deal with oil spills.	K_W19; K_W20; K_W26

Assessment methods and criteria				
LO1	Has knowledge of physical and chemical properties of liquid bulk dangerous goods.			
Assessment methods	Overall test			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Has no elementary knowledge of liquid bulk dangerous goods.	Has elementary knowledge of liquid bulk dangerous goods (crude oil and petroleum products).	Has knowledge of liquid bulk dangerous goods and physical/chemical properties of petroleum and its products, knows methods of their production.	Has knowledge of liquid bulk dangerous goods and physical/chemical properties of petroleum and its products, knows methods of their production; knows hazards related to these cargoes.
LO2	Has knowledge of the transport of liquid bulk dangerous goods and related hazards.			
Assessment methods	Overall test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have elementary knowledge of the transport of liquid bulk dangerous goods.	Has elementary knowledge of the transport of liquid bulk dangerous goods.	Has elementary knowledge of the transport of liquid bulk dangerous goods and knows types of vessels for the carriage of these goods.	Has knowledge of the transport of liquid bulk dangerous goods and knows types of vessels for the carriage of these goods; knows basic hazards related to the transport of liquid bulk dangerous goods
LO3	Has knowledge of hazards related to tanker accidents and knows how to deal with oil spills.			
Assessment methods	Overall test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Has no elementary knowledge of oil spills.	Has elementary knowledge of oil spills.	Has knowledge of oil spills; knows basic methods of combating oil spills.	Has knowledge of oil spills; knows basic methods of combating oil spills; knows the equipment and facilities for combating oil spills.

Syllabus

SEMESTER 5	OIL AND GAS TANKER OPERATIONS	LECTURES	15 HOURS

CARRIAGE OF LIQUID CARGO

1. Characteristics and classification of crude oil (petroleum) and its products.
   1.1. Chemical composition and types of crude oil.
   1.2. Physical and chemical properties of crude oil essential for sea transport: colour, density, viscosity, flash point, auto ignition temperature, flammability limits, toxicity.
   1.3. Main petroleum products and their physical-chemical properties essential for sea transport.
2. Hazards in sea transport of petroleum and its products.
   2.1. Hazards to personnel health and life, and ship due to petroleum: risks of explosion, fire, due to static electricity.
   2.2. Environmental risks.
   2.3. Threats of pirate attacks on main crude oil routes due to dangerous goods carried on board.
3. Tanker incidents and navigational accidents.
   3.1. Accident oil spills.
   3.2. Oil spill characteristics: spreading of an oil slick on the sea surface, oil vaporization and emulsification, oxidation and photooxidation of oil, weathering of oil layer, biodegradation, disturbances of the marine ecosystem by oil spills.
4. Major ecological disasters – causes, size and consequences for the marine ecosystem.
5. Tactics of containment and combating oil spills.
   5.1. Oil cleanup facilities: floating booms, semi-submersible and submersible booms (oil barriers).
   5.2. Equipment for mechanical gathering of oil, various types of skimmers: adhesive, centrifugal, disc, belt skimmers.
   5.3. Auxiliary equipment for skimmers.
6. Transport of liquefied gas by sea.
   6.1. Physical-chemical properties of liquefied gases essential for sea transport.
   6.2. Physical properties of liquefied gases: laws relating to ideal gas and real gases, thermodynamic fundamentals of gas liquefaction, real gas processes, Mollier diagram and its application, pressure of saturated steam of a pure liquid and liquid mixtures, selected physical parameters of liquefied gases.
   6.3. Chemical properties of liquefied gases: general chemical characteristics, processes of polymerization and formation of hydrates, reactivity of liquefied gases.
7. Hazards of liquefied gas transport by sea.
   7.1. Dangerous properties of liquefied gases – flammability and explosivity, noxiousness and toxicity.
   7.2. BLEVE effect (*Boiling Liquid Expanding Vapour Explosion*) and its consequences.

SEMESTER 5	OIL AND GAS TANKER OPERATIONS	CLASSES	12 HOURS

BASIC ISSUES CONCERNING SHIPS CARRYING PETROLEUM AND ITS PRODUCTS AND LIQUEFIED GAS IN BULK

1. Characteristics of tankers carrying petroleum and its products, liquefied gas in bulk.
2. International regulations concerning tankers and carriage of liquid cargo by sea.
   2.1. SOLAS and MARPOL Conventions and other regulations governing the carriage of petroleum products, chemicals and liquefied gases.
   2.2. ISGOTT – *International Safety Guide for Oil Tankers and Terminals.*
   2.3. IBC Code – *International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk*.
   2.4. IGC Code – *International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk;* SIGTTO – LNG *Shipping Knowledge.*
   2.5. Certification and surveys, standardization organizations – OCIMF (*Oil Companies International Marine Forum),* SIGTTO *(Society of International Gas Tanker and Terminal Operators),* CDI (*Chemical Distribution Institute*).

Student workload − semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	12	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	6	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**41**	**1**
Workload related to direct teaching activities:	29	0.5
Workload related to practice-oriented activities:	18	0.5

Passing the course unit

All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.

Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

40.	Course unit:	N2022/48/SS/TM/40/OGTO2

OIL AND GAS TANKER OPERATIONS – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
5	15	1	0,8		15	12		1
8	12		2	2		24	24	2

III/2. Learning outcomes and syllabus

Learning outcomes – semester 8		Field-specific
LO1	Has knowledge of standards of and requirements for the construction and equipment of tankers and gas carriers, and environment protection.	K_W22; K_W26
LO2	Has knowledge of safe operation of tankers and gas carriers and the use and handling of equipment and systems related to the operation of these vessels.	K_W03
LO3	Can acquire and use all information on safe operation of tankers and gas carriers based on international regulations, instructions and safety management systems.	K_U01; K_U27
LO4	Can plan and supervise un/loading operations on oil tankers and gas carriers.	K_U20; K_U21
LO5	Able correctly perform liquid cargo calculations on oil tankers and gas carriers.	K_U21; K_U28

Assessment methods and criteria				
LO1	Has knowledge of standards of and requirements for the construction and equipment of tankers and gas carriers, and environment protection.			
Assessment methods	Overall test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have basic knowledge of vessels for the transport of liquid bulk dangerous goods.	Has basic knowledge of standards of and requirements for the construction of tankers and gas carriers.	Has basic knowledge of standards of and requirements for the construction and equipment of tankers and gas carriers; knows basic shipboard systems related to safe operation.	Has basic knowledge of standards of and requirements for the construction and equipment of tankers and gas carriers; knows basic shipboard systems related to safe operation; knows requirements for environment protection on tankers and gas carriers.
LO2	Has knowledge of safe operation of tankers and gas carriers and the use and handling of equipment and systems related to the operation of these vessels.			
Assessment methods	Overall test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have basic knowledge of safe operation of tankers and gas carriers.	Has basic knowledge of safe operation of tankers and gas carriers.	Has knowledge of safe operation of tankers and gas carriers and the use of equipment and systems related to the safe operation of these ships at typical operational stages.	Has knowledge of safe operation of tankers and gas carriers and the use and handling of all equipment and systems related to the safe operation of these ships in all operational stages.
LO3	Can acquire and use all information on safe operation of tankers and gas carriers based on international regulations, instructions and safety management systems.			
Assessment methods	Overall test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot acquire information necessary for the safe operation of tankers.	Can acquire and use general information concerning the safe operation of tankers, based on international regulations.	Can acquire and use general information concerning the safe operation of tankers, based on international regulations, instructions and safety management systems.	Can acquire and use necessary information concerning the safe operation of tankers, based on international regulations, instructions and safety management systems.
LO4	Can plan and supervise un/loading operations on oil tankers and gas carriers.			
Assessment methods	Assessment of lab classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot draw up a loading plan of a tanker or gas carrier.	Can draw up a loading plan of a tanker or gas carrier,	Can draw up a loading plan of a tanker or gas carrier, taking into account ballast operations;	Can draw up a loading plan of a tanker or gas carrier, taking into account ballast operations; can supervise loading and ballasting

		taking into account ballast operations.	can supervise loading and ballasting operations.	operations; can adapt existing loading plans to new operational circumstances or requirements.
LO5	Able correctly perform liquid cargo calculations on oil tankers and gas carriers.			
Assessment methods	Assessment of lab classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know a liquid cargo measurement system.	Has basic knowledge of liquid cargo measurement systems on ships carrying crude oil and liquefied gas.	Has knowledge of liquid cargo measurement systems on ships carrying crude oil and liquefied gas; can make basic calculations.	Has knowledge of liquid cargo measurement systems on ships carrying crude oil and liquefied gas; can calculate cargo quantities and knows documents related to cargo calculations.

Syllabus

SEMESTER 8	OIL AND GAS TANKER OPERATIONS	CLASSES	24 HOURS

CARRIAGE OF LIQUID CARGO [STCW Code, *Section A-V/1 par. 9*]

1. Basic properties of petroleum and its products and hazards related to the carriage [STCW Code, *Section A-V/1 par. 11*].
   1.1. Classification of liquid cargoes carried by tankers.
   1.2. Basic units of measure for determining properties of liquid cargoes.
   1.3. Hazards associated with the carriage of liquid cargoes by tankers (effect of the carried cargo on human health and life and the marine environment).
   1.4. Basic definitions related to tanker operation safety.
2. Safety during tanker operation [STCW Code, *Section A-V/1 par. 12/13*].
   2.1. General safety principles on tankers.
   2.2. The atmosphere in cargo tanks at various operational stages of the vessel.
   2.3. Equipment for controlling the atmosphere in tanks: permanent and portable.
   2.4. Hazards of static electricity.
3. Design and equipment of oil tanker cargo systems [STCW Code, *Section A-V/1 par. 10*].
   3.1. International regulations concerning oil tanker design and systems in view of structural safety and environment protection.
   3.2. Basic types of cargo systems.
   3.3. Cargo tanks.
   3.4. Cargo piping.
   3.5. Cargo heating system.
   3.6. Safety of cargo systems at various operational stages.
   3.7. Ballast system – interrelations between ballast and cargo systems.
4. Inert Gas System (IGS) [STCW Code, *Section A-V/1 par. 10/14*].
   4.1. International requirements for IGS.
   4.2. Types of IGS.
   4.3. Familiarization with basic IGS components.
   4.4. Deck IGS piping and its use at various operational stages.
   4.5. IGS start-up procedure.
   4.6. Methods of ventilation and maintenance of safe atmosphere in tanks.
5. Crude Oil Washing system (COW) [STCW Code, *Section A-V/1 par. 10/12*].
   5.1. International requirements for COW system.
   5.2. Basic components of permanent COW system and their operation.
   5.3. Deck installation of COW piping and its use in tanker operations.
   5.4. Familiarization with a portable system of tank washing.
   5.5. Use of a COW system for tank washing with water.
   5.6. Methods of tank washing.
   5.7. Preparation of the system for washing and actions after washing completion.
6. Pollution prevention in tanker operations [STCW Code, *Section A-V/1 par. 9/14*].
   6.1. Requirements concerning oil pollution prevention provided by MARPOL Annex I.
   6.2. Requirements concerning air pollution prevention in during tanker operation, MARPOL Annex VI.
   6.3. Oil Record Book – deck dpt.
   6.4. Requirements for ship emergency plan in case of oil spillage.
   6.5. Emergency procedures for oil spillage at sea and in port.
7. Tanker operations [STCW Code, *Section A-V/1 par. 10/12*].
   7.1. Methods of tanker loading and discharging.
   7.2. Safety of loading and discharging operations.
   7.3. Tank stripping.

7.4. Ballast operations.
7.5. Co-operation and safety procedures during loading and discharging operations – ship-terminal.
7.6. Co-operation and safety procedures during loading and discharging operations – ship-ship.
7.7. Cargo care at sea.

CARRIAGE OF LIQUEFIED GASES

1. Introduction to the carriage of liquefied gases.
   1.2. Types of gas carriers: LEG, LPG, LNG.
   1.3. General construction, types of tanks.
2. Basic properties of liquefied gases and carriage-related hazards.
   2.1. Classification of gases carried in liquefied state.
   2.2. Hazards associated with the carriage of liquefied gases.
   2.3. Basic definitions concerning gas carrier operations.
3. Safety of gas carrier operations.
   3.1. General safety principles on gas carriers.
   3.2. The atmosphere in cargo tanks at various operational stages.
   3.3. Equipment for controlling the atmosphere in tanks: permanent and portable.
   3.4. Firefighting installations.
4. Operational and protection systems in gas carriers.
   4.1. International safety-related requirements for the construction and systems of gas carriers – IGC Code, SOLAS.
   4.2. Cargo pipelines and valves.
   4.3. Cargo pumps and spray pumps, discharging systems.
   4.4. Cargo heating systems.
   4.5. Cargo liquefaction systems.
   4.6. Emergency shutdown systems on gas carriers.
5. Inert gas systems (IGS) and nitrogen generators (NG).
   5.1. International requirements for IGS and NG.
   5.2. Inert gas systems and nitrogen generators: basic components.
   5.3. Deck installation of IGS/NG piping, the use at various operational stages of a gas carrier.
   5.4. Methods of venting and maintaining safe atmosphere in tanks.
6. Operational stages of a gas carrier – general cycle of cargo operations.
   6.1. Operational stages of a gas carrier.
   6.2. Preparation of gas carrier tanks for loading and loading proper.
   6.3. Control of pressure in tanks during gas carrier operations.
   6.4. Generation of gas vapor and vapor return.
   6.5. Preparation of gas carrier tanks for discharging and discharging proper.
   6.6. Preparation of a gas carrier for another cargo.
   6.7. Safety of cargo handling operations.
   6.8. Co-operation and safety procedures during loading and discharging operations – ship-terminal.
   6.9. Co-operation and safety procedures during loading and discharging operations – ship-ship.

SEMESTER 8	OIL AND GAS TANKER OPERATIONS	LAB CLASSES	24 HOURS

TANKERS CARRYING PETROLEUM AND ITS PRODUCTS

1. Tanker loading and discharging planning [STCW Code, *Section A-V/1 par. 10/12*].
   1.1. Factors essential in planning quantities of cargo for loading.
   1.2. Calculation of cargo quantity that can be loaded, restrictions.
   1.3. Planning quantities of homogeneous cargo.
   1.4. Planning quantities of two or more types of cargo.
   1.5. Planning quantities of heated cargo.
   1.6. Planning quantities in case of mixing two types of cargo in tanks.
2. Calculation of the received liquid cargo in a tanker [STCW Code, *Section A-V/1 par. 10/12*].
   2.1. Systems for cargo measuring in tanks.
   2.2. Definitions of terms used in cargo calculations.
   2.3. VCF (*Volume Correction Factor*) and VEF (*Vessel Experience Factor*) used in liquid cargo calculations.
   2.4. Use of ASTM tables in cargo calculations.
   2.5. Methods of calculating a quantity of crude oil.
   2.6. Methods of calculating a quantity of oil product.
   2.7. Methods of calculating a quantity of cargo mixed in a tank.
   2.8. Methods of calculating slops after discharge and before loading.
3. Emergency procedures.
   3.1. Structure and planning.
   3.2. Emergency situations.
   3.3. First aid.

LIQUEFIED GAS CARRIERS

1. Planning gas carrier loading/discharging.
   1.1. Factors essential in planning quantities of cargo for loading.
   1.2. Calculation of cargo quantity that can be loaded.
   1.3. Drawing up a loading plan.
2. Calculation of the received cargo.
   2.1. Systems for cargo measuring in tanks.
   2.2. Definitions of terms used in cargo calculations.
   2.3. Methods of calculating a quantity of cargo for a particular gas carrier and liquefied gas.
   2.4. Documents related to cargo calculations.
3. Emergency procedures.
   3.1. Structure and planning.
   3.2. Emergency situations.
   3.3. First aid.
4. LNG simulator.
   4.1. Introduction to simulator handling.
   4.2. Safety arrangements on an LNG carrier – ship-shore compatibility.
   4.3. Preparation of a ship for discharging in the Świnoujście terminal – checklists.
   4.4. Cooling of cargo transfer lines, custody transfer.
   4.5. Agreeing on the quantity and sequence of discharging with the shore.
   4.6. Nitriding, inerting, handling of compressors and valves, use of other LNG systems.
   4.7. *Ramp-up*, ballasting, *ramp down*.
   4.8. Use of HV and LV compressors.
   4.9. Completion of the transfer, stripping, nitriding.
   4.10. Emergency operations, failures of pump, compressor, valves, measuring instruments.
   4.11. Emergency shutdown systems (ESD) and operation, ESD levels: 1 and 2.
   4.12. Emergency situations: fire, explosion, loss of tank integrity.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	48	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	6	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**64**	**2**
Workload related to direct teaching activities:	52	1
Workload related to practice-oriented activities:	54	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. MARPOL *Consolidated*, Edition 2006, IMO, London 2006.
2. ISGOTT – *International Safety Guide for Oil Tankers and Terminals*, 5th Edition 2006, ICS – *International Chamber of Shipping*, OCIMF – *Oil Companies Marine Forum* and IAPH – *International Association of Ports and Harbors.*
3. *Liquefied Gas Handling Principles On Ships and In Terminals*. 3rd Edition 2000, SIGTTO – 2000.
4. *Crude Oil Washing Systems*, 2000 Edition, IMO, London 2000.
5. *Inert Gas System*, 1990 Edition, IMO, London 1990.
6. *Amendments to* SOLAS – *Inert Gas System Requirements on Board New Build Tankers (from 1 January 2016)*.

VI. Extra reading

1. ASTM *Petroleum Tables.*
2. *Guidance Manual for Tanker Structure.* Tanker Structure Co-operative Forum. Witherbys & Co. Ltd., London 2008.
3. *Tanker Handbook for deck Officers by* Captain C. Baptist 7th Edition. Reprinted 1993. Glosgow, Brown, Son & Ferguson, Ltd.
4. IMO – *International Code for Construction and Equipment of Ships Carrying Liquified Gases in Bulk* (IGC Code, 2016 Edition).
5. IMO – *International Code for Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk* (IBC Code, 2020 Edition).

VIII. Course unit teachers

The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

41.	Course unit:	N2022/24/SS/TM/41/LS1

LINER SHIPPING – module 1

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15		1			15		1
8	12	1		2	12		24	2

I. Course unit aims

This course unit aims at deepening the knowledge of cargo handling and demonstrating the specific nature of cargo and passenger transport in liner shipping, and discussing stricter legal regulations concerning the design and equipment of vessels and personnel qualifications.

II. Preliminary requirements

The knowledge acquired in course units: Ship Construction and Stability, Cargo Handling, Ship Management, Environment Protection, Maritime Search and Rescue.

III/1. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 4		Field-specific
LO1	Has knowledge of the transport of dangerous goods and related hazards.	K_W19; K_W22; K_W31

Assessment methods and criteria				
LO1	Has knowledge of the transport of dangerous goods and related hazards.			
Assessment methods	Assessment of lab classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have elementary knowledge of dangerous goods.	Knows IMO classes of dangerous goods, and in general, the IMDG Code.	Knows classes and subclasses of dangerous goods as specified in the IMDG Code, is familiar with the Code; knows hazards of dangerous goods carriage.	Knows classes and subclasses of dangerous goods as specified in the IMDG Code, is familiar with and able to use the Code; knows hazards of dangerous goods carriage, and methods of stowing and distributing dangerous goods.

Syllabus

SEMESTER 4	LINER SHIPPING	CLASSES	15 HOURS

TRANSPORT OF DANGEROUS GOODS – HAZMAT

1. Principles of classifying dangerous goods, correct technical name and proper shipping name, classes of primary and additional hazards, principles of classifying dangerous goods as pollutants, marine pollutants, UN No, packaging group, risk labels, general principles of dangerous goods stowage.

PROPERTIES OF DANGEROUS GOODS

2. Class 1–3 goods.
   - 2.1. Explosives – class 1: substances and articles, subclasses, compatibility groups, use of subclasses and compatibility groups the stowage of explosives.
   - 2.2. Stowage arrangements: ordinary, special, dangerous goods excluded from simultaneous carriage with some other dangerous goods, carriage of explosives on passenger ships, carriage of explosives in containers and vehicles.
   - 2.3. Gases – class 2: subclasses: flammable, non-flammable, toxic.
   - 2.4. Forms of transport: compressed gases, dissolved gases, liquefied gases, refrigerated liquefied gases, additional hazardous properties: corrosive, oxidizing, gas packaging, natural direction of gas dispersion in the air, gas stowage categories on ships: A, B, C, D and E, limits of forming flammable mixtures, innage (degree of filling of receptacles containing liquefied gases, stowage of packages with gases, including pollutants.
   - 2.5. Flammable liquids – class 3: flashpoint, limits of forming flammable mixtures, packaging groups, packages of flammable liquids, stowage categories, innage in receptacles containing flammable liquids.
3. Class 4 goods.

3.1. Flammable solids – class 4.1: flammable solids may be ignited by an external source of fire or friction, self-reactive substances, division by type, physical state and temperature control provision, solid desensitized explosives, packaging, packing groups, stowage categories.
3.2. Substances liable to spontaneous combustion – class 4.2: pyrophoric and self-heating substances, auto-ignition temperature, packages of self-igniting goods, packing groups, stowage categories of self-igniting substances on ships, general principles of stowing self-igniting substances on ships.
3.3. Substances which, in contact with water, emit flammable gases – class 4.3: properties, packaging, packing groups, degree of filling of packaging, categories of stowage on ships, general stowage principles.

4. Class 5 goods.
4.1. Oxidizing substances – class 5.1: physical state and flammability of oxidizing substances, packing groups, stowage categories, general stowage principles.
4.2. Organic peroxides – class 5.2: physical state, properties, types of peroxides by physical state and by temperature control provisions, desensitization of organic peroxides, diluents: water, neutral solids, type A and B diluents, packing groups, stowage categories, general stowage principles.
5. Class 6 goods.
5.1. Toxic substances – class 6.1: properties, ways of absorbing toxic substances, LD_{50} (median lethal dose) as a criterion for class 6.1 and a criterion of dividing packing groups, packing groups, general stowage principles.
5.2. Infectious substances – class 6.2: properties, packaging and principles of testing them, preparation for and transport of infectious substances.
6. Class 7 goods – radioactive materials: properties, types of radiation, fixed and non-fixed contamination, definition of radioactive material, specific activity, activity A1 and A2, dose rate, transport index, categories of radioactive consignments: I, II and III, industrial packages of type I, II, III, commercial packages of type B(U) and B(M).
7. Class 8 goods – corrosives: properties, packaging of corrosive substances, packing groups, stowage categories, general stowage principles.
8. Class 9 goods – miscellaneous dangerous substances and articles – class 9: properties, packing groups, general stowage principles.
9. MHB – materials hazardous only in bulk: properties, the use of the BC Code, properties of goods included in Appendices A, B and C, cargoes requiring the aging.

Student workload in semester 4	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	5	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Total workload	**32**	**1**
Workload related to direct teaching activities:	17	0.5
Workload related to practice-oriented activities:	20	0.5

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

41.	Course unit:	N2022/48/SS/TM/41/LS2

LINER SHIPPING – module 2

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
IV	15		1			15		1
VIII	12	1		2	12		24	2

III/2. Learning outcomes and syllabus

Learning outcomes – semester 8		Field-specific
LO1	Has knowledge of the classification, characteristic design features and operational issues of ships representing liner shipping fleet.	K_W07; K_W09
LO2	Has knowledge of problems concerning stability control in ro-ro ships, container ships and reefers.	K_W09; K_W10
LO3	Has knowledge of IMO's safety regulations IMO (SOLAS, STCW, others) concerning the design and equipment of ships and personnel qualifications.	K_W26; K_W27
LO4	Can prepare a stowage plan for a container ship employed on a line linking a few un/loading ports.	K_U21
LO5	Can perform a stability control of a ro-ro/ferry, calculate evacuation time by the IMO's simplified method, use an evacuation plan of a passenger ship.	K_U17; K_U20
LO6	Can draw up and use a loading plan for a container ship, supervise cargo handling and ballast operations, take care of various types containers during a voyage.	K_U02; K_U19; K_U20
LO7	Is aware of the responsibility for decisions made while keeping a cargo watch and possible effect of such decisions on the safety of ship, personnel and the marine environment.	K_K02
LO8	Has communication competences for work in an international environment and is able to co-operate with other crew members in all operational areas of the ship and in performing duties resulting from the working environment.	K_K03; K_K04

Assessment methods and criteria				
LO1	Has knowledge of the classification, characteristic design features and operational issues of ships representing liner shipping fleet.			
Assessment methods	Various tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Has no knowledge of types of ships representing the liner fleet.	Knows types of ships representing the liner fleet.	Knows the types of ships representing the liner fleet and has general knowledge of their employment; can list their design characteristics.	Knows the types of ships representing the liner fleet and has general knowledge of their employment; can list their design characteristics, related restrictions and their origin; additionally, states development trends in the operations of liners.
LO2	Has knowledge of problems concerning stability control in ro-ro ships, container ships and reefers.			
Assessment methods	Various tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Has no knowledge for assessing the effect of cargo operations on ship stability and strength.	Has knowledge of ship stability assessment.	Can assess the stability of various types of ships and ship operational problems.	Can assess the stability of various types of ships and ship operational problems; states sources of regulations, distinguishes local and international regulations.
LO3	Has knowledge of IMO's safety regulations IMO (SOLAS, STCW, others) concerning the design and equipment of ships and personnel qualifications.			
Assessment methods	Various tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have knowledge of safety regulations.	Has basic knowledge of safety regulations.	Has detailed knowledge on safety regulations referring to one type of liner and general knowledge concerning the other types; distinguishes the sources of regulations.	Has detailed knowledge on safety regulations referring to one type of liner and general knowledge concerning the other types; distinguishes the sources of regulations and can use proper publications; has detailed knowledge of safety regulations for all types of liners;

				distinguishes the sources of regulations and can use proper publications.
LO4	Can prepare a stowage plan for a container ship employed on a line linking a few un/loading ports.			
Assessment methods	Assessment of classes, and lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot prepare a stowage plan.	Can prepare a basic stowage plan without port rotation.	Can prepare a basic stowage plan with full description, without port rotation. Can prepare a basic stowage plan with full description, taking account of two ports rotation.	Can prepare a basic stowage plan with full description, taking account of multiple ports rotation, with full description.
LO5	Can perform a stability control of a ro-ro/ferry, calculate evacuation time by the IMO's simplified method, use an evacuation plan of a passenger ship.			
Assessment methods	Assessment of classes, and lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot assess the effect of cargo operations on ship stability and strength.	Can assess ship stability.	Can assess ship stability and adjust cargo operations to improve the stability; Can assess ship stability and adjust cargo operations to improve the stability and calculate passenger evacuation time.	Can assess ship stability and adjust cargo operations to improve the stability and calculate passenger evacuation time, using an evacuation plan; states sources of relevant regulations.
LO6	Can draw up and use a loading plan for a container ship, supervise cargo handling and ballast operations, take care of various types containers during a voyage.			
Assessment methods	Assessment of classes, and lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot handle and analyse the operation of ship's systems.	Can handle basic systems and equipment used in the operations of liners.	Can handle all systems and equipment used in the operations of liners; understands and uses ship's loading plan.	Can handle and analyse the working of all systems and equipment, and processes used in the operations of liners; understands and uses ship's loading plan.
LO7	Is aware of the responsibility for decisions made while keeping a cargo watch and possible effect of such decisions on the safety of ship, personnel and the marine environment.			
Assessment methods	Report(s).			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Is not aware of the responsibility for the safety of personnel, ship and cargo.	Has low awareness of the responsibility for the decisions made while keeping a cargo watch.	Has low awareness of the responsibility for the decisions made and how they may affect the safety of personnel and ship.	Is quite well aware of the responsibility for the decisions made and how they may affect the safety of personnel, ship and marine environment; is fully aware of the responsibility for the decisions made while keeping a cargo watch and how these decisions may affect the safety of personnel, ship and marine environment.
LO8	Has communication competences for work in an international environment and is able to co-operate with other crew members in all operational areas of the ship and in performing duties resulting from the working environment.			
Assessment methods	Assessment of classes, and lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not have minimum communicative competences for the shipping job environment.	Has minimum communication competence required for work involving liner operations.	Has minimum communication competence required for work involving liner operations and co-operation with other personnel; Has communication competence required for work involving liner operations in an international environment.	Has communication competence required for work involving liner operations in an international environment and co-operation with other personnel; Has communication competence required for work in an international environment and is able to co-operate with other personnel in all aspects of liner operations and professional duties.

Syllabus

SEMESTER 8	LINER SHIPPING	LECTURES	12 HOURS

Specific nature of liner trade and liners, based on the operations of container ships, general cargo ships, feeders, reefers, ro-ro, con-ro, ro-lo-ro-pax ships, including specialized roro type − car carriers. Selected issues.

ROLL-ON ROLL-OFF UN/LOADING SHIPS.

1. Trends in demand for the carriage of wheeled cargo – motorways of the sea for 'from road to sea' transshipment.
2. Specific design and equipment of ferries depending on their functions: passenger, passenger-cargo, combined.
3. Access facilities: doors, external and internal ramps, winches and hoists.
4. Cargo decks (permanent, movable). Hydraulic deck lifting systems.
5. Stern and bow doors – cargo handling.
6. Assurance of ferry service safety: separation of passenger and cargo traffic. Side doors for passenger movement. Connection with the terminal.
7. Compensation for quick moving weights during ship un/loading. Extended system of ballast tanks, roll stabilization tanks, anti-heeling system, ballast pump capacity.
8. Securing cargo, stowage gear, additional securing in case of bad weather conditions.
9. Outboard water ingress though bow doors and loss of stability. Analysis of the accidents. IMO requirements for electronic systems monitoring the closed condition of the bow door (signalling, video cameras).
10. Other risks of stability loss. Distribution of cargo above waterline. Small draft and large windage areas of the sides and superstructures.
11. Enhancement of safety and stability requirements to avoid risk of cargo shifting due to stormy weather and major heeling.
12. Risk of fire and its rapid spreading in an undivided hold of the cargo deck. Additional fire-fighting equipment. Automatic sprinkler systems, system of water curtains dividing a hold into smaller sections. Employment of fire officers.
13. Deck ventilation and drain systems in ro-ro ships.
14. Cargo damage during handling operations in a port and during the carriage. Damage due to storm. Performing cargo condition checks. Damage reports, gathering the relevant documentation. Claims.
15. Stringent safety regulations IMO (SOLAS, STCW, others) concerning the design and equipment of vessels and personnel qualifications.

CONTAINER SHIPS

1. Development of the container ship fleet in the light of the global economic crisis.
2. Specific sizes of medium-sea and deep-sea shipping vessels. Technical parameters of the largest container ships in the world (operated by Maersk, MSC, COSCO).
3. Container ship liner services. Container hub-ports. Container terminals.
4. Major ports and a fleet of feeder ships serving them.
5. Some elements of container ship's design and equipment.
6. The hull and holds. Hatch covers. Guides.
7. Lifting machinery. Cranes and gantry cranes.
8. Ballast and bilge systems. Anti-heeling system.
9. Ventilators and container reefer systems.
10. Container securing systems – securing gear, principles of use.
11. Oversize and overweight cargoes on container ships. Methods of loading and securing.
12. The term *stocking weights.*
13. Problem of excessive stability, exceeded limit values of shear forces and bending moments at partially loaded condition of a container ship.
14. Damage to ship and its equipment during cargo operations in a port. Performing cargo condition checks. Damage reports, gathering the relevant documentation. Claims.
15. Damage due to storm.

REEFERS (REFRIGERATED SHIPS)

1. Global reefer fleet. Types of reefers.
2. Division of reefers by cargo carried, cargo handling technology, refrigeration technology used. Basic characteristics.
3. Selected elements of reefer design and equipment. Holds, 'tween decks, cargo spaces – palletization of cargo, operational dimensions.
4. Hatch covers, side doors for ro-ro loading. Hydraulic system.
5. Refrigerated holds with/without gratings. Systems and methods of refrigeration.
6. Refrigeration plant, refrigerant.
7. Reefer containers.
8. Sea voyage – fruit transport in the controlled atmosphere (CA).
9. Sea voyage – fruit transport in the modified atmosphere (MA).
10. Risk of loss of life in cargo and adjacent spaces where the modified atmosphere technology is in use. Safety procedures, check lists. Supervision.
11. Problem of untight holds in case of cargo carriage in controlled and modified atmospheres.

12. Safety procedure of entering enclosed spaces.
13. Hold ventilation, air change system. Temperature and gas monitoring in cargo compartments.
14. Cargo handling equipment and gear.
15. Dunnage and cargo securing gear.
16. Risk of refrigerated cargo damage on a sea voyage.

DEVELOPMENT OF PASSENGER SHIPPING

1. Short-sea trade ferries carrying exclusively passengers.
2. New class of water-turbine powered ferries – high speed craft (HSC).
3. Hovercraft used in shuttle service.
4. Legal regulations concerning the construction and safety of HSC: SOLAS (Chapter X), *High Speed Craft Codes* 1994 & 2000.
5. Cruise ship operating in the coastal and inland waters.
6. Passenger liners (ocean liner – RMS Queen Mary 2) and large cruise ships. Required design and manoeuvring characteristics of passenger and cruise ships.
7. Carriage of passengers. Stringent safety regulations IMO (SOLAS, STCW, others) concerning the design and equipment of vessels and personnel qualifications.
8. Alarm installations and public address/communication systems on board passenger and cruise ships.
9. Additional firefighting equipment (e.g., automatic fire extinguishing installations).
10. Life-saving appliances and shipboard evacuation systems.
11. System of master's decision support systems on passenger ships and ferries.
12. Enhanced requirements concerning the manning and personnel qualifications.
13. Alarm drills on passenger and cruise ships.
14. Joint exercises of passenger ships and ferries with SAR vessels and security craft.

SEMESTER 8	LINER SHIPPING	LAB CLASSES	24 HOURS

Specific nature of liner trade and liners, based on the operations of container ships, general cargo ships, feeders, reefers, ro-ro, con-ro, ro-lo-ro-pax ships, including specialized ro-ro type − car carriers. Selected issues.

CONTAINER SHIPS

1. Loading documentation of a container ship. Pre-planning.
2. Construction and types of containers – stowage plan preparation.
3. Containers with dangerous goods, principles of distribution planning, other cargo separation. Stowage plan preparation.
4. Preparation of stowage plans and their sequencing for a container ship calling at a number of un/loading ports.
5. Container securing systems – securing gear, principles of use, example instructions.
6. Selected problems of the safe operation of ships carrying containers.
7. Computer applications, e.g., SHIPMASTER, LOADMASTER; container loading software for preparing stowage plans, ballast operations and stability control.

REEFERS

1. Cargo documentation of a reefer ship.
2. Familiarization with a company guide for refrigerated cargo transport.
3. Procedures of hold preparation for loading.
4. Stowage plan preparation, cargo and temperature instructions. Pre-planning.
5. Stowage plan check for correct separation of cargoes.
6. Control of loading, cargo temperature, and securing system before departure. Documentation.
7. Recording of parameters during temperature reduction. Measurement of oxygen and CO_2 concentration in cargo spaces.
8. Computer applications, e.g., CONSULTAS *Loading program* for preparing stowage plans, ballast operations and stability control.

PASSENGER FLEET, FERRY FLEET

1. Methods of stability control on ro-ro ferries.
2. Analysis of muster lists on passenger ships.
3. Methods of evacuation time calculations.
4. Analysis of an evacuation plan of a passenger ship.

Student workload − semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures	12	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	24	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	4	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	12	

Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	6	
Total workload	**58**	**2**
Workload related to direct teaching activities:	40	1
Workload related to practice-oriented activities:	36	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. *International Maritime Dangerous Goods Code*, IMDG Code.
2. *International Convention for Safe Containers*, CSC.
3. *International Convention on Load Lines*, LL.
4. *Ro-ro ships and shipping*, Michael Grey, Fairplay, 1985.
5. *Box Boats: How Container Ships Changed the World*, Brian J. Cudahy, New York 2006.

VI. Extra reading
1. ROYAL INSTITUTION OF NAVAL ARCHITECS (RINA) – *Design and operation of passenger ships*. London 2007.
2. Current literature and reference material on the subject as indicated by the teacher.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

42.	Course unit:	N2022/35/SS/TM/42/MI

MARITIME INSPECTIONS

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
V	15	1	1		15	15		2

I. Course unit aims

This course unit aims at imparting legal regulations governing ship inspections, systems and procedures followed while preparing a sea-going vessel for an inspection.

II. Preliminary requirements

The scope of secondary school, basics of maritime English.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 5		Field-specific
LO1	Has basic knowledge of inter/national regulations and the scope of each inspection.	K_W29; K_W31
LO2	Can interpret provisions of inter/national regulations, draws conclusions and formulates opinions concerning the satisfaction of requirements for the shipping industry.	K_U01
LO3	Is aware of and understands the significance of own and inspectors' work for the safety of people and the environment.	K_K02

Assessment methods and criteria				
LO1	Has basic knowledge of inter/national regulations and the scope of each inspection.			
Assessment methods	Written test.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Interpretation of inter/national regulations.	Does not understand the significance of regulations, confuses legal acts, does not know the competences scopes of particular inspections and their consequences.	Interprets maritime law acts to a minimum extent, distinguishes inspections and their scopes.	Interprets independently maritime law acts and applies them without difficulties; skillfully finds information on inspection competence and consequences.	Analyses independently maritime law acts and interprets their texts, uses the English language.
LO2	Can interpret provisions of inter/national regulations, draws conclusions and formulates opinions concerning the satisfaction of requirements for the shipping industry.			
Assessment methods	Assessment of classes, lab/simulator classes, tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1 Analysis and interpretation of legal acts.	Cannot indicate sources of information, draws wrong conclusions and formulates wrong opinions.	Can use indicated sources of information, analyses the text in the translated version.	Independently chooses sources of information, analyses the text, draws correct conclusions.	Analyses original texts of legal acts in English, formulates opinions satisfying the requirements.
Criterion 2 Preparation for co-operation with ship inspectors.	Does not distinguish inspections and their competences; does not analyse the consequences.	Distinguishes inspections; analyses positive and negative consequences of inspections.	Analyses the scope of inspections and the extent of ship's preparation.	Defines the extent of ship's preparation for an inspection, with a reference to applicable regulations in English.
LO3	Is aware of and understands the significance of own and inspectors' work for the safety of people and the environment.			
Assessment methods	Project, presentation.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not appreciate the significance of inspections, disregards the safety of people and the environment protection.	Understands and appreciates the significance of ship inspections	Appreciates the effect of inspections on the protection of human life and the environment.	Positively evaluates actions of individual inspections, attempts at maintaining high standards of the assurance of the safety of life;

		in today's world.		focuses particular attention on the environment protection.

Syllabus

SEMESTER 5	MARITIME INSPECTIONS	LECTURES	15 HOURS

1. Legal basis of sea-going ship inspections.
   1.1 International legislation, applicability of conventions, codes and resolutions.
   1.2 Regulations of the ship's flag state.
   1.3 Institutions recognized by the administration.
2. Inspection of the ship's flag State.
   2.1. Inspections of ships subject to conventions.
   2.2. Inspection of non-convention ships.
   2.3. Types of inspections: preliminary, periodical, occasional.
   2.4. Post-incident inspections, cancellation of certificates.
   2.5. Marine Equipment Directive issues.
   2.6. Approval of servicing stations for lifesaving and fire protection equipment.
3. Port State Control inspections.
   1.1. Paris Memorandum of Understanding and other regional agreements.
   1.2. System of inspections, selection of ships for inspection, target factor.
   1.3. PSC documentation.
   1.4. Detention and releasing of a ship, banning of access to ports under Paris MoU.
   1.5. Types of inspections, inspection campaigns, high risk ships.
   1.6. Unjustified requirements, ship's action against an unjustified requirement.
   1.7. Additional inspections under EU regulations (ro-ro ships, high speed craft).
4. Classification society supervision.
   4.1. Classification societies, IACS.
   4.2. Regulations of classification societies, classification cycle, class symbol, class certificate.
   4.3. Inspections and surveys performed by a classification society.
   4.4. Withdrawal of class, permission for a single voyage.
5. ISM audit.
   5.1. Legal basis.
   5.2. Types and conducting of audits.
   5.3. Audit documentation.
   5.4. Major non-conformity, non-conformity, observation, technical fault.
   5.5. Corrective action.
   5.6. Issuance of documents and certificates.
   5.7. Document expiration and its consequences.
6. ISPS audit.
   6.1. Legal basis.
   6.2. Types and conductiong of audits.
   6.3. Audit documentation.
   6.4. Issuance of documents and certificates.
   6.5. Document expiration and its consequences.
7. Vetting inspections.
   7.1. Institutions and organizations conducting vetting inspections.
   7.2. Aim of a vetting inspection.
   7.3. Conduct of a vetting inspection.
8. On hire/off hire inspections.
9. Shipowner's inspections.
   9.1. Shipowner's technical supervision.
   9.2. Shipowner's inspections of vessels under *bareboat* charter.
10. Other inspections and controls.
   10.1. Port Health Officer/Health & Sanitary Inspection of the vessels.
   10.2. Security.
   10.3. Harbour Master's.
   10.4. Trade union.
   10.5. Coastguard.
   10.6. National fisheries authority.
   10.7. Environment protection.
   10.8. Customs.

SEMESTER 5	MARITIME INSPECTIONS	CLASSES	15 HOURS

1. Procedures and check lists of flag State inspectors.
2. Preparation of a ship for flag State inspection.
3. Procedures and check lists of Port state Control inspectors.
4. Preparation of a ship for Port state Control inspection.
5. Preparation of a ship for an internal and external ISM audit.
   5.1. Safety management booklet/files.
   5.2. ISM check lists.
   5.3. Corrective action.
6. Preparation of a ship for an internal and external ISPS audit.
   6.6. ISPS documentation, Declaration of Security, list of last 10 ports, change of security level.
   6.7. Logbook entries (drills, equipment inspections and maintenance, records of training, ship searching procedure).
7. Preparation of a ship for classification society survey. Class symbol.

Student workload in semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes	15	
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	3	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments	7	
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	5	
Student workload in semester 5	**45**	**2**
Workload related to direct teaching activities:	33	1
Workload related to practice-oriented activities:	22	1

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. Ask T., *Handbook of Marine Surveying*, Sheridan House 2007
2. IMO – SOLAS *Consolidated Edition*, 2020.
3. IMO – ISM *Code and Guidelines*, 2010.
4. IMO – ISPS *Code and Maritime Security Guide*, 2012.
5. *Directive 2009/16/EC of 23 April 2009 on Port State Control.*
6. *Directive 1999/37/EC of 29 April 1999 on a system of mandatory surveys for the safe operation of regular ro-ro ferry and high-speed passenger craft services.*
7. Directive 2014/90/EU – MED *on marine equipment.*
8. www.parismou.org

VI. Extra reading
1. Alderton P., *Port Management and Operations*, Informa, 2008.
2. *Guidelines for Flag State Inspections: Maritime Labour Convention, 2006*, International Labour Office, 2009.
3. www.imo.org
4. www.emsa.europa.eu
5. www.eur-lex.europa.eu
6. www.ocimf.com/SIRE

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

43.	Course unit:	N2022/24/SS/TM/43/PSV

PILOTAGE OF SEAGOING VESSELS

Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
4	15	1			15			1

I. Course unit aims

This course unit aims at imparting the knowledge and skills of piloting sea-going ships, taking into account various conditions and stages of navigation, and safety criteria of ship manoeuvring in restricted areas.

II. Preliminary requirements

Physics, mathematics, navigation, navigational equipment, electronics, and automation.

III. Learning outcomes and syllabus

The learning outcomes the student will achieve after completing the course unit are defined as the acquired knowledge, skills and attitudes.

Learning outcomes – semester 4		Field-specific
LO1	Defines coordinate systems and explains the principles of operation of position determination systems and their accuracy, used in piloting (pilot navigation), chooses methods of ship movement control and proper manoeuvres.	K_W08; K_W13; K_W15
LO2	Defines navigational safety criteria and proposes systems for ship movement control in restricted areas, and is able to define and choose a proper manoeuvre used in piloting.	K_W11; K_W17; K_W27
LO3	Can define correctly coordinate systems and choose appropriate methods and systems of position determination for required accuracy and safety of pilot navigation.	K_U08; K_U11; K_U18
LO4	Can assess the position of ship's waterplane in relation to navigational dangers and analyse appropriate navigational safety criteria for ship movement control and safe manoeuvre performance.	K_U18; K_U19; K_U23; K_U24; K_K02

Assessment methods and criteria				
LO1	Defines coordinate systems and explains the principles of operation of position determination systems and their accuracy, used in pilot navigation, chooses methods of ship movement control and proper manoeuvres.			
Assessment methods	Various tests during the semester.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot describe principles of operation of position determination systems.	Can define principles of operation of some position determination systems.	Can define and explain principles of operation of some/all position determination systems.	Can define and explain principles of operation of all position determination systems, including their accuracy parameters depending on the type of waterway in restricted areas.
LO2	Defines navigational safety criteria and proposes systems for ship movement control in restricted areas, and is able to define and choose a proper manoeuvre used in piloting.			
Assessment methods	Various tests during the semester			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Does not know safety criteria.	Defines some of the safety criteria.	Defines all criteria and knows vessel movement control systems.	Defines all criteria and knows vessel movement control systems, knows manoeuvres used in pilot navigation, can choose a proper manoeuvre.
LO3	Can define correctly coordinate systems and choose appropriate methods and systems of position determination for required accuracy and safety of pilot navigation.			
Assessment methods	Assessment of classes, lab/simulator classes.			
Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot correctly define the right coordinate system.	Can define coordinate systems.	Can define coordinate systems, methods and systems of position determination.	Can define coordinate systems, methods and systems of position determination, can assess the accuracy and calculate an error circle/ellipse, can assess indicators of navigational safety.
LO4	Can assess the position of ship's waterplane in relation to navigational dangers and analyse appropriate navigational safety criteria for ship movement control and safe manoeuvre performance.			
Assessment methods	Assessment of classes, lab/simulator classes.			

Criteria/Grade	2	3	3.5–4	4.5–5
Criterion 1	Cannot assess the position of waterplane in relation to navigational dangers.	Can calculate coordinates of ship's waterplane.	Can calculate coordinates of ship's waterplane and the distance to a navigational obstruction, can interpret some criteria of navigational safety.	Can calculate coordinates of ship's waterplane and the distance to a navigational obstruction, can interpret all criteria of navigational safety and choose the safest system of ship movement control or manoeuvre.

Syllabus

SEMESTER 4	PILOTAGE OF SEAGOING VESSELS	LECTURES	15 HOURS

1. National and international legal regulations concerning deep sea pilotage.
2. Principles of pilot-bridge co-operation.
3. Pilot navigation – basic terms and definitions.
4. Determination of ship's position (point of observation) in restricted waters and accuracy assessment.
5. Determination of ship's waterplane position in restricted areas.
6. Ship movement control in pilot navigation.
   6.1. General classification of manoeuvres used in piloting.
   6.2. Manoeuvres phases, parameters and use.
7. Safety of navigation in restricted areas.
   7.1. Navigational criteria of the safety of manoeuvres in restricted areas.
   7.2. Assessment of manoeuvres safety in piloting.

Student workload in semester 5	Hours	**ECTS**
Hours with direct teacher participation: lectures	15	
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time	2	
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects		
Self-instruction: preparation for passing tests and exams	10	
Student workload in semester 5	**27**	**1**
Workload related to direct teaching activities:	17	1
Workload related to practice-oriented activities:		

Passing the course unit
All activities in a course unit in a particular semester must be passed. The course unit assessment grade results from grades for particular activities plus an exam grade (if any) and is calculated as a weighted average: A/(E) 40%, C 30%, L 30%; A/(E) 40%, L 60%; A/(E) 40%, C 20%, L 20%, P 20%.
Failure to pass any form of course unit activities in a semester means a failure to pass that course unit. The successful completion of a course in a semester shall be awarded the student the number of ECTS credits allocated to the course.

IV. Practical training
The scope of practical training programme included in the executed course units is defined in *Onboard Training Record Book for Deck Cadets*. The completion and passing of the planned practical training shall take not more than two years from the date of passing a diploma exam.

V. Recommended reading
1. Williamson P., *Ship Manoeuvring Principles and Pilotage*, Witherby, 2013.
2. Gucma L., *Marine Traffic Engineering: Proceeding*, Szczecin 2011.

VI. Extra reading
1. House D.J., *Nawigation for Masters*, 4th edition, Witherby, 2012.

VII. Course unit teachers
The teacher responsible for the subject is indicated in the Faculty Education Centre document and, in addition, the teacher or staff of teachers conducting classes in a given semester in the electronic course card.

44.	Course unit:		N2022/BST
PRACTICAL TRAINING			
Year	Type of training	Duration	ECTS
0/I	Basic Safety Training	2 weeks	60
I	Preparatory onboard training for candidates	2 weeks	
I/III	Seamanship training – tugboat	1 week	
II	Seamanship training – ferries	3 weeks	
II	Manoeuvring-navigational training*	3 weeks	
III/IV	Individual onboard training **	12 months	

* or individual training on board an internationally trading ship, lasting at least three months, in the deck department of a ship 500 GT or more (as per the training guidelines for individual trainees).
** individual training on board an internationally trading ship, lasting at least six months, in the deck department of a ship 500 GT or more; in justified cases, upon Dean's consent, a student may have land-based training in a maritime industry establishment, for a period of at least six months.

NOTE:
Specific dates for holding seamanship and specialized training for each student group are given in 'Onboard cadet training schedule' issued each academic year. The specified dates of training may be changed for organizational reasons.

YEAR 0/I	BASIC SAFETY TRAINING	OSRM	2 WEEKS

THE PLACE OF TRAINING: CLASSES HELD IN OSRM (MARINE RESCUE TRAINING CENTRE)

PROGRAMME AND ORGANISATIONAL ASSUMPTIONS
The aim of integrated basic training in safety and security is to prepare candidates/students for work at sea. After completing and passing the training the participant receives certificates, which are the basis for applying to the Seafarers' Documents Department for obtaining certificates of training, which in turn are necessary for issuing other seafarers' documents (e.g., Seaman's book, Deck hand certificate, etc.) and embarkation on a ship. Classes are conducted by OSRM instructors and include instruction, demonstrations and practical exercises. Training courses are subject to credit.
All candidates qualified for full-time studies in navigation undergo the above training as part of their preparatory training or during their first year of studies. The training is free of charge for the students, they only pay a fee for the issuing of the certificate – as this document will become their property.

SYSTEM OF CONTROL AND PASSING TRAINING COURSES
1. Training courses in accordance with the procedures in force at OSRM.
2. Passing the training is one of the conditions of continuing studies.

PROGRAMME ACTIVITIES AND GRADUATION – 70 hours
1. Training in Personal Survival Techniques – 20 hours
2. Training in Fire Prevention and Fire Fighting (basic level) – 16 hours
3. Training in Elementary First Aid – 11 hours
4. Training in Personal Safety and Social Responsibilities – 21 hours

DETAILED TRAINING PROGRAMME
The training programmes shall comply with the requirements specified in the Ministerial Regulation on the framework programmes of training for crew members of seagoing vessels.

PERSONAL SURVIVAL TECHNIQUES
1. Introduction.
   1.1. Types of threats to life at sea.
   1.2. Distress signals (COLREGs).
   1.3. Organization of Search and Rescue (SAR) at sea in Poland and in the world.
2. Lifesaving equipment on board ships.
   2.1. Individual and collective lifesaving appliances:
   2.2. Lifebelts, lifejacket – design, outfit, principles of use.
   2.3. Life buoys – design, distribution on a ship, principles of use.
   2.4. Immersion suits and thermal protection equipment, design, principles of use.
   2.5. Lifeboats – open, covered, special – equipped with gas tide system and sprinkler system, free fall boats, rescue boats – design and equipment, davits, design and principles of operation.
   2.6. Life raft – design, equipment, location and securing.
   2.7. Methods of launching life rafts, launching by a slip gear, davits and hydrostatic release.
   2.8. Evacuation slides, design, principles of cooperation.
3. Methods of survival recovery (including recovery from lifeboat/life raft).
   3.1. Principles of survival, behaviour while waiting for assistance.

3.2. 'Person overboard' alarm – organization of maneuvers, maneuvers of the ship and rescue boat.
3.3. Rescue by another ship – use of shipboard equipment, IAMSAR elements.
3.4. Rescue by means of a rescue boat.
3.5. Typical errors during evacuation and rescue of people at sea – based on decisions of maritime courts.

4. Radio means of distress communications.
   4.1. Distress frequencies and signals send by shipboard radio station (including VHF).
   4.2. Formulation and transmission of distress messages in Polish and English.
   4.3. Use of VHF radiotelephone.
   4.4. Radio beacons – design, principles of operation, use.
   4.5. Radar transponder – design, principles of operation, use.
5. Methods of evacuating people from a ship.
   5.1. General principles: raising an alarm, distribution of functions during an alarm, personal outfit, roots to assembly stations, abandoning ship during fire or oil spillage on the sea surface.
   5.2. Lifeboat evacuation – launching a boat.
   5.3. Life raft evacuation – launching a life raft, entering a life raft, staying in a life raft.
   5.4. Crew evacuation onto a rescue boat of another ship.
6. Crew evacuation by a helicopter.
   6.1. Preparation of a ship for crew evacuation: directing a helicopter, communications, safety rules during evacuation.
   6.2. Types of rescue equipment used in evacuations (Demonstration of rescue equipment operation).
   6.3. Organization and conduct of evacuation.
   6.4. Recovery of survivals from lifeboats/life rafts and from water.
7. Swimming pool or open water exercises.
   7.1. Practice with individual lifesaving equipment:
      – putting on the life belt and correct jump in the life belt into the water from a low height and from a height of min. 2.5 m,
      – using the lifebuoy in the water,
      – method of pulling survivors into the lifeboat.
   7.2. Practice with inflatable life raft:
      – climbing onto an overturned inflatable life raft,
      – reversing an overturned inflatable life raft,
      – independent entry into an inflatable life raft from water,
      – methods of getting an unconscious person into an inflatable life raft,
      – jump into an inflatable life raft,
      – collective evacuation to inflatable life raft by methods from the ship and from the water, including the following:
         ▪ designation of an inflatable life raft commander,
         ▪ designation of two 'unconscious' persons,
         ▪ towing the 'unconscious' persons to the inflatable life raft,
         ▪ boarding of the designated persons into the inflatable life raft,
         ▪ pulling in the 'unconscious' and entry of the others, taking seats in the inflatable life raft,
         ▪ ability to stream a lifeboat drogue or sea anchor,
         ▪ ability to operate inflatable life raft equipment,
         ▪ ability to perform survival skills.
   7.3. Tying of the rescue knot in water (one handed bowline).
   7.4. Practice with different types of thermal protective suits.
8. Pyrotechnics.
   8.1. Discussion and demonstration of the principles of operation and safe use of:
      – man-overboard smoke and light flares,
      – hand flares,
      – buoyant smoke signal (bright orange smoke),
      – rocket parachute flares (red star),
      – red torch,
      – line throwing appliance, including detonator replacement.
   8.2. Demonstration of signal pyrotechnics by an instructor.

FIRE PREVENTION AND FIRE-FIGHTING – BASIC TRAINING

1. Introduction
   1.1. STCW Convention requirements.
   1.2. General obligations concerning fire protection.
   1.3. Safety principles during classes.
2. Theory of fire.
   2.1. Conditions for fire occurrence (fire triangle) and chemical reactions.
   2.2. Sources of ignition: chemical, physical, biological.
   2.3. Properties of flammable materials: flammability, ignition point, temperature of combustion, rate of combustion, calorific value, flammability limits, inerting, temperature of ignition, temperature of self-ignition, static electricity, reactivity.
   2.4. Fire hazards and fire spreading: radiation, convection and conduction.

2.5. Classification of fires and corresponding firefighting media.
2.6. Causes of fire on ships: smoking cigarettes, overheated bearings, gully, self ignition, electric installations and devices, hot work, reactivity, static electricity.
3. Fire prevention on ships.
3.1. Principles of fire prevention.
3.2. Safe operation of a ship.
3.3. Structural fire protection.
4. Fire detection.
4.1. Systems of fire and smoke detection.
4.2. Automatic fire alarms.
5. Contraction use and deployment of fire-fighting equipment.
5.1. Fire extinguishers and blankets.
5.2. Fire monitors: foam and powder.
5.3. Equipment for foam generation.
5.4. Water equipment.
5.5. Breathing apparatus, escape breathing apparatus.
5.6. Fireman's outfit, rescue and resuscitation equipment.
6. Construction and use of fixed fire-fighting installations.
6.1. General installations.
6.2. Dumping installations: CO2, foam.
6.3. Inhibiting installations: powder and others.
6.4. Cooling installations: water-hydrant sprinkler installations, water curtain.
6.5. Emergency fire pumps.
6.6. High pressure systems of water mist.
7. Fire-fighting organization on a ship.
7.1. Fire alarms.
7.2. Muster lists.
7.3. Individual tasks.
7.4. Fire-fighting protection plan.
7.5. Communications.
7.6. Fire-fighting procedures.
7.7. Safety procedures.
7.8. Fire drills, fire patrol.
8. Fire-fighting techniques.
8.1. Extinguishing methods.
8.2. Actions after detecting a fire.
8.3. Fire attack and protection by using fixed fire installations, hazards during fire-fighting and safety rules.
9. Extinguishing media.
9.1. Water.
9.2. CO_2.
9.3. Halon.
9.4. Extinguishing foam (foam producing substances).
9.5. Powder, halon substitutes.
10. Training exercises.
10.1. Measurement (demonstration)of the ignition temperature.
10.2. Extinguishing small fires of solids, liquids and gases, using powder, foam, CO_2 and water extinguishers.
10.3. Extinguishing major fires using various streams of water and foam.
10.4. Passage through space filled with light foam.
10.5. Use of rescue and fire-fighting equipment and maintaining contact in smoked chamber during exercises with breathing apparatus.
10.6. Rescue and fire-fighting operation – extensive fire in the engine room or accommodations with the use of breathing apparatus, means of communications and fire-fighting equipment and installations.

ELEMENTARY FIRST AID

1. General principles.
2. Anatomy and physiology of a human body relevant to medical first aid and lifesaving.
3. Position casualty, positioning of the injured person necessary for proper medical first aid.
4. Procedures and sequence of actions in case of unconsciousness.
5. Applying resuscitation techniques.
6. Procedures in event of bleeding (control bleeding).
7. Shock control (applying appropriate measures in basic shock management).
8. Procedures in event of burns and scalds including accidents caused by chemicals or electric current. Degrees and types of burns.
9. Rescue and prepare the casualty for transport.

PERSONAL SAFETY AND SOCIAL RESPONSIBILITIES

1. Introduction, source materials, documents, international regulations.
   1.1. STCW Convention.
   1.2. SOLAS Convention (Chapter IX) ISM Code
   1.3. MLC 2006 Convention.
   1.4. IMDG Code, MARPOL Convention.
2. Types of ship hazards.
   2.1. Collision.
   2.2. Fire.
   2.3. Grounding/stranding.
   2.4. Damage to hull.
   2.5. Dangerous goods.
   2.6. Stowaways (illegal passengers)
   2.7. Pirates.
   2.8. Passenger as 'special cargo'.
   2.9. Terrorism.
   2.10. Others.
3. Ways of preventing the above risk (threats).
4. Familiarization with ship's emergency plans. Labelling and knowing how to use emergency plan.
5. Alarm signals.
6. Knowledge of evacuation ways – external and internal.
7. Spills at sea as an effect of:
   7.1. Collision, allision.
   7.2. Grounding.
   7.3. Sinking.
   7.4. Cargo transfer.
8. Basic knowledge on marine environment protection.
   8.1. Cargo procedures (bunkering). MARPOL Convention.
9. Alarm signals. and duties assigned in the muster list.
10. Proper use of personal lifesaving appliances.
11. Safety and safety measures.
    11.1 Working conditions on board ships.
    11.2 Potential hazards, threats.
    11.3 Personal safety on ships – Personal protective equipment.
12. Precaution to be taken before entering any enclosed spaces:
    12.1. On oil, gas and chemicals tankers,
    12.2. On containers and other types of ships.
    12.3. Procedures before entering confined spaces.
13. Maritime English, understanding of commands in various shipboard relationships.
    13.1 Duty relations.
    13.2 Orders given in emergency situations.
    13.3 Ability to explain the use of personal lifesaving appliances, crew-passenger relationships in various situations.
14. Interrelationships between crew members.
    14.1. Types of human characters.
    14.2. How to recognise personality.
    14.3. Religious differences versus tolerance, care for good interpersonal relations on board ship.
15. Social responsibilities.
    15.1. Condition of employment.
    15.2. Rights and obligations of crew members.
16. Treats.
    16.1. Alcohol, drugs.
17. Knowledge of international health and safety regulations (ILO).
18. Compliance with safe working practices.
19. Communication – effectiveness, barriers to communication.
20. Rest, watch rotation and stress as conditions affecting seafarers.

SECURITY AWARENESS TRAINING AND SECURITY TRAINING FOR SEAFARERS WITH DESIGNATED SECURITY DUTIES

The detail programme of the above courses is contained in the subject (36) 'Maritime Transport Security'.

44.	Course unit:			N2022/PT
PRACTICAL TRAINING				
Year		Type of training	Duration	ECTS
I		Basic Safety Training	2 weeks	60
I		Preparatory onboard training for candidates	2 weeks	
I/III		Seamanship training – tugboat	1 week	
II		Seamanship training – ferries	3 weeks	
II		Manoeuvring-navigational training*	3 weeks	
III/IV		Individual onboard training**	12 months	

* or individual training on board an internationally trading ship, lasting at least three months, in the deck department of a ship 500 GT or more (as per the training guidelines for individual trainees).
** individual training on board an internationally trading ship, lasting at least six months, in the deck department of a ship 500 GT or more; in justified cases, upon Dean's consent, a studen may have land-based training in a maritime industry establishment, for a period of at least six months.

NOTE:
Specific dates for holding seamanship and specialized training for each student group are given in 'Onboard cadet training schedule' issued each academic year. The specified dates of training may be changed for organizational reasons.

YEAR I	PREPARATORY ONBOARD TRAINING	CANDIDATES' TEST	2 WEEKS

LOCATION: THE TRAINING/RESEARCH SHIP NAWIGATOR XXI

TRAINING OBJECTIVES
This onboard training is aimed at verifying candidates' fitness for work at sea, familiarizing them with life and work on a ship, teaching basic seamanship skills and outlining selected themes of job-related knowledge, regarded as the preparation of students for theory-based classes and lectures. The programme of practical onboard training envisages various practical forms for hands-on experience: instruction, demonstration, practical exercises, keeping watch and duties, work for the ship.

SYSTEM OF TRAINING SUPERVISION AND ASSESSMENT
1. Activities are conducted by an officer of the watch under Chief Mate's supervision.
2. The training process shall be controlled by the supervising officer/Master and relevant entries are made in the *On board Training Record Book*.
3. On board training tutor/coordinator shall control the conduct of onboard training periodically.
4. Student's skills acquired during on board training session shall be assessed by the Chief Mate/Master.
5. Positive assessment of the programme-specific training activities and acquired skills is a prerequisite for a student to continue the studies.

TRAINING PROGRAMME – 84 hours
1. Work organization on a ship – 4 hours
2. Health and safety on ships – 8 hours
3. Rescue – 8 hours
4. Fire protection – 8 hours
5. Watchkeeping at sea and in port – 16 hours
6. Seamanship – 14 hours
7. Nautical knowledge – 16 hours
8. Collision regulations – 4 hours
9. English – 6 hours

SPECIFIC ONBOARD TRAINING PROGRAMME

1. Work organization on a ship (safety management system).
Rules and regulations of a training vessel, basic occupational safety rules, daily schedule on board. Alarm-related instruction: principles of behaviour and duties of crew members during alarms. Organization of work and duties, principles, line of authority, Master's/officer's orders, sea customs and etiquette.

2. Health and safety on ships.
General safety principles on sea-going vessels. Principles of safe handling of mooring/anchoring and steering equipment. Safety at work on deck, protective equipment and clothing. Sanitary and health requirements.

3. Rescue.
Jump into water in a life jacket. 'Person overboard' alarm drills. Use of distress signals. Use of an immersion suit. Pyrotechnic signal devices (pyrotechnics).

4. Fire protection.

Fire risks and prevention on a ship. Fire-fighting equipment and its operation. Extinguishing, detection and signalling installations. Fire-fighting tactics: fire alarm drills; training and practical exercises in the handling and maintenance of fire-fighting equipment. Breathing apparatus – construction, testing, use.

5. Watchkeeping at sea and in port.

Duties of gangway watchman (control accesses to the ship, control of people and equipment to and from the ship, searching of personnel and/or baggage, reporting of security incidents), ship security – preventive patrols. Principles to be observed in keeping a navigational watch at sea: steering and lookout. Anchor watch. Taking over the watch. Work at engine and hotel departments.

6. Seamanship.

Ship design and construction: main structural elements of the ship, bulkheads, tanks. Six degrees of freedom of the ship – translatory and rotary motions: yaw, roll and pitch; surge heave and sway. Ships' dimensions: length, breadth, draft, free-board mark, draft marks, reading out the drafts. Familiarization with the engine room, pipeline systems and generating set. Manoeuvres: preparation of manoeuvring stations foreword and aft. Use of heaving lines, stoppers and fenders. Exercises in handling mooring lines and equipment. Handling of Jacob's ladder (embarkation ladder). Anchor equipment and its safe handling. Principles of steering: steering gear, keeping the ship on course, will commands, steering on the leading lines and emergency steering. Ship's maintenance: preparation of surfaces for maintenance. Use of tools for de-rusting, painting technique. Acquiring skills of working with tools for ships maintenance. Rope work: getting familiar with the structure with fibre ropes and wire ropes. Basic knots and splices of fibre ropes. Principles of garbage management on ships, the concept of special area, conditions for the disposing of garbage outside special areas and in special areas. Identification of types and functions of ships at sea and in port.

7. Nautical knowledge.

Familiarization with the bridge and navigational equipment: magnetic compass, gyrocompass and repeaters, autopilot, radar, echo sounders, speed log, course recorder, navigational system receivers, ECDIS and AIS, sextant, chronometer. Familiarization with communications systems. Charts and publications – update standard nautical charts, chart correction log, storing the charts in a chart table. Exercises in taking bearings, use of sextant, manual sounder. Exercises in wind speed and direction measurements. Determination of ship speed by the outboard log. Practical familiarization with aids to navigation lighthouses, leading marks, beacons and buoys, basic characteristics of light. Exercises in identifying lights and daymarks. Familiarization with the basic star constellations.

8. Collision Regulations.

Basic lights and shapes of ships. Manoeuvring and warning signals, signals to be used in restricted visibility, signals to be used to attract attention, distress signals. Analysis of basic ship encounter situations – a concept of the right of way.

9. English.

Wheel command, manoeuvring commands, names of ship parts, mooring lines and equipment. Ship's crew, everyday activities. Life-saving equipment and appliances, damage control and fire-fighting equipment. Alarms: abandon ship, fire, other threats. Names of basic tools and gear used in work on deck and in manoeuvring.

44.	Course unit:		N2022/PT
PRACTICAL TRAINING			
Year	Type of training	Duration	ECTS
I	Basic Safety Training	2 weeks	60
I	Preparatory onboard training for candidates	2 weeks	
I/III	Seamanship training – tugboat	1 week	
II	Seamanship training – ferries	3 weeks	
II	Manoeuvring-navigational training*	3 weeks	
III/IV	Individual onboard training**	12 months	

* or individual training on board an internationally trading ship, lasting at least three months, in the deck department of a ship 500 GT or more (as per the training guidelines for individual trainees).
** individual training on board an internationally trading ship, lasting at least six months, in the deck department of a ship 500 GT or more; in justified cases, upon Dean's consent, a student may have land-based training in a maritime industry establishment, for a period of at least six months.

NOTE:
Specific dates for holding seamanship and specialized training for each student group are given in 'Onboard cadet training schedule' issued each academic year. The specified dates of training may be changed for organizational reasons.

YEAR I/III	SEAMANSHIP TRAINING	1 WEEK

LOCATION: Units of tugboat companies serving the ports of Szczecin, Świnoujście and Police.

TRAINING OBJECTIVES

The tugboat onboard training is aimed at consolidating the knowledge acquired during the studies through direct application of theoretical knowledge in practice. General practical familiarization with the elements of professional knowledge anticipated in higher years of studies. Improvement of maritime skills. Proper formation of the personal qualities of a future officer. Instilling of good seamanship. Familiarisation with basic shipboard knowledge, handling equipment, health and safety at work and life and work organisation on tugboats. Acquisition of skills specified in the *'On board Training Record Book'*.

SYSTEM OF TRAINING SUPERVISION AND ASSESSMENT

1. Activities are conducted by an officer of the watch under tug Captain supervision.
2. The training process shall be controlled by the supervising mates/Master and relevant entries are made in the *On board Training Record Book*.
3. Periodic monitoring of the practical training by the training co-ordinator.
4. On board training shall be assessed by the training co-ordinator on the basis of entries in the *On board Training Record Book.*
5. Positive assessment of the programme-specific training activities and acquired skills is a prerequisite for a student to continue the studies.

TUGBOAT TRAINING PROGRAMME

Familiarisation with the range of services of towing companies: tugs and tows – harbour towing, emergency towing, escort towing, pull back, canal transit towing, icebreaking and special services like AHTS (Anchor Handling Towage Supply – for offshore industry).

1. Detailed familiarisation with the equipment and use of on-board towing and salvage equipment, the design, construction, stability, propulsion, manoeuvrability and characteristics of the offshore tugs on which the training takes place.
2. General data of the tug – type of tug, place and year of construction, tonnage, displacement, deadweight, main dimensions, bollard pull (BP).
3. Tugboat propulsion system (propeller configuration, nozzles): power, towing capacity, etc. Set of achievable manoeuvring parameters from the Ship's Logbook, sea trial protocol and own observations.
4. Information on steering gear (main rudder and thrusters) and method of steering the vessel. Information on the method of propulsion system control, e.g., SG override times, maximum RPMs and speeds, etc.
5. Specialised and salvage equipment of the tug: towing winch, towing hooks and arrangements, bollards, fairleads and sheaves, towlines (ropes and wires), shackles, towing bridle, emergency quick release system for towline, tugboat fenders etc. – all in terms of allowable loads.
6. Typical mooring manoeuvres of a tug to a berth (approach and departure – use of springs). Towing manoeuvres in harbour and sea conditions. Manoeuvres associated with towing vessels in port i.e., holding the ship against berth to reduce load on mooring, during mooring docking the ship, turning, pulling back, tightening and pushing, assisting on bow and stern tow.
7. Carrying out harbour and sea tows (speed of the set, length of the towing line, type of tow and its fastening, execution of turns). Other specific cases occurring during tows and towing services, e.g., shortening the length of the tow, breaking of the towing wire or failure of the main towing arrangement, emergency towing, storming, etc. Special tows with short and long tows (difference and effect on control of tug and vessel).

Rescue services e.g., recovery of a ship from shoals, towing of a damaged ship, fire-fighting or oil spill recovery.

44.	Course unit:		N2022/PT
PRACTICAL TRAINING			
Year	Type of training	Duration	ECTS
I	Basic Safety Training	2 weeks	60
I	Preparatory onboard training for candidates	2 weeks	
I/III	Seamanship training – tugboat	1 week	
II	Seamanship training – ferries	3 weeks	
II	Manoeuvring-navigational training*	3 weeks	
III/IV	Individual onboard training**	12 months	

* or individual training on board an internationally trading ship, lasting at least three months, in the deck department of a ship 500 GT or more (as per the training guidelines for individual trainees).
** individual training on board an internationally trading ship, lasting at least six months, in the deck department of a ship 500 GT or more; in justified cases, upon Dean's consent, a student may have land-based training in a maritime industry establishment, for a period of at least six months.

NOTE:
Specific dates for holding seamanship and specialized training for each student group are given in 'Onboard cadet training schedule' issued each academic year. The specified dates of training may be changed for organizational reasons.

YEAR II	SEAMANSHIP TRAINING	FRRRIES	3 WEEKS

PLACE OF TRAINING: Ferries.

TRAINING OBJECTIVES

This on-board training aims at the consolidation of the theoretical knowledge acquired during the studies by its direct use in practice. General and practical familiarization with the elements of job related knowledge included in the programs in successive years of study. Improvement of seamanship skills, familiarization with work in the deck department. Proper formation of personality traits of a future officer. The above objectives are achieved during watch keeping at sea at duties performed in the port and work done by the cadets for the ship.

SYSTEM OF TRAINING SUPERVISION AND ASSESSMENT

1. Activities are conducted by an officer of the watch under Chief Mate's supervision.
2. The training process shall be controlled by the supervising officer/Master and relevant entries are made in the *On board Training Record Book.*
3. On board training shall be assessed by the training co-ordinator on the basis of entries in the *On board Training Record Book.*
4. Positive assessment of the programme-specific training activities and acquired skills is a prerequisite for a student to continue the studies.

SPECIFIC ONBOARD TRAINING PROGRAMME

1. Watch keeping at sea and in port duties.

   The supervision of traffic and handling of the gang way, taking care of ship's security. The conduct of preventive inspections and the inspection of spaces and decks. Supervision of the loading, stores and provisions as ordered by the officer on duty. Watch keeping – standing at the helm and as a lookout. Watch keeping on the foredeck (lookout and anchor watch) in restricted visibility. Assistance when embarking and disembarking a pilot.

2. Harbour manoeuvres.

   Organization of work at manoeuvring stations during various scenarios of berthing/unberthing. Improvement of skills in using heaving lines, stoppers and fenders. Making fast lines on bollards and winch drums, slacking away. Handling the lines. Preparation and folding of gangways. Operation, control and maintenance of winches, capstans, rolls and other mooring equipment. Un/securing of anchors, paying out and heaving anchor chain (cable) handling the brakes of the anchor chain. Mastering the commands and manoeuvring commands in Polish and English.

3. Lifeboat and rescue training.

   Alarm drills, additional improvement of alarm related actions. Handling of davits, lowering and hosting a lifeboat when ship is at anchor and adrift. Maintenance of life saving equipment. Methods of rescue by helicopter. Use of an immersion suit. Survivor behaviour in water and principles of evacuating the ship, prevention of panic.

4. Fire protection and fire-fighting.

   Further improvement of skills in the handling of fire-fighting equipment. Fire alarm drills. Fire prevention on ships during their operation and repairs. Duties of a rescuer.

5. Handling of cargo equipment and principles of work in holds.

Inspection of rigging and blocks. Construction, functions, marking, storage and maintenance of a cargo handling gear. Techniques and methods of vehicle securing.

6. Maintenance work.
Further improvement of skills in handling manual and mechanical tools for the conservation of metal and wooden surfaces. Handling of auxiliary equipment (bosun's chairs, stages, rafts). Maintenance of tools and auxiliary equipment. Different types of painting products, sequence of painting, the ship painting diagram, painting technique. Use of manual and mechanical spray tools. Handling, maintenance and storage of painting tools. Preservation of wooden parts. Performance of all kinds of maintenance work (outboard elements of the ship, inside spaces, life-saving, fire-fighting and damage control equipment) related to the operation of the ship.

7. Ropework.
Making knots and splices on natural and synthetic fibre ropes. Splices on wire ropes. Making elements of cargo gear and rigging. Maintenance, storage, certificates, SWL and signs of wear of wire ropes and natural and synthetic fibre ropes.

NAUTICAL AND OPERATIONAL ONBOARD TRAINING

1. Navigation.
Charts: reading out coordinates and distances, plotting directions, use of navigational triangles. Thorough familiarization with magnetic compass, tracking, reading out headings and relative bearings. Conversion of directions in all systems. Gyro compass: adjustment of repeaters. Direction finding. Updating the variation. Drawing up variation tables and curves. Control of total compass error, keeping a total compass error log. Speed measurement. Activation and handling of a log. Conduct of terrestrial navigation, dead reckoning, estimated positions, assessment of set and drift, allowance for wind. Depth measurement. Aids to navigation: identification of fixed and floating navigational marks and landmarks at daytime, identification of lights and marks at night: fairways and their marking, navigation on fairways, ranges (range lights and leading marks), fog signals of navigational marks. Use of *List of Lights and Fog Signals*. Exercises in distance assessment. Establishing a distance to the apparent horizon, calculation of ranges. Reading the contents of English charts. Correcting and storing charts. Navigational pre-planning of a voyage, choice of charts and publications from a catalogue. The contents of a ship's logbook and principles of keeping it. Weather observations and entries as per the logbook instructions. Comparison of ECDIS data to a chart and information available in navigational equipment.

2. Ship construction.
Main particulars of the ship and characteristic parameters (volume of displacement, displacement, buoyancy, deadweight capacity, engine power, lightweight). Load lines marks. Draft marks. Calculation of mean draft. Water density measurement. Hull structure. Construction of double bottom, watertight bulkheads, decks, sides, bulwark, stem, stern and superstructures. Hull subdivision. Vessel type-specific features of general arrangement and deck equipment. Bilge and ballast system. Manual ship construction drawings. Ship documentation.

3. Collision Regulations.
Position lights and characteristic lights of ship, ship daymarks. Sound signals (manoeuvring, warning, fog signals): distinguishing the signals and circumstances of sending them. Identification of ships based on lights and shapes. Risk of collision, methods of an appraisal of the risk of collision in good visibility. Observation: types and methods of observation. Application of rules concerning vessels in sight of each other. Navigation in shallow passages and traffic separation schemes.

4. Marine electrotechnology.
Generators and voltage regulators: operation, safeguards. Auxiliary machinery: feeding pumps, compressors, ventilators, windlass; electric current measurements. Capstans: control system, checking the insulation condition. Steering gear. Signalling and communication equipment: engine telegraph, rudder angle indicator, smoke detector, telephones. Emergency lighting. Battery charging board. Start-up of an emergency generating set.

5. Maritime communications.
Radiotelephone traffic: distress communications, alarm signal, distress message, receipt of distress message. Harbour and offshore communications. Ship-to-ship communication.

6. Electronic navigation aids.
Construction and the principle of operation of: autopilot, log, gyrocompass, radar, echo sounder, navigational system and AIS receivers. Basic use of the navigational equipment.

7. English.
Use of British charts and publications, Standard Marine Communication Phrases, reading and translation of weather forecasts and navigational warnings. Helm and engine telegraph orders, manoeuvring and anchor commands. Simple conversations with a pilot.

8. Health and safety on board ship.
Safe onboard work organization. Work in stormy conditions and at height, work on deck. Principles of providing first aid.

44.	Course unit:		N2022/PT
PRACTICAL TRAINING			
Year	Type of training	Duration	ECTS
I	Basic Safety Training	2 weeks	60
I	Preparatory onboard training for candidates	2 weeks	
I/III	Seamanship training – tugboat	1 week	
II	Seamanship training – ferries	3 weeks	
II	Manoeuvring-navigational training*	3 weeks	
III/IV	Individual onboard training**	12 months	

* or individual training on board an internationally trading ship, lasting at least three months, in the deck department of a ship 500 GT or more (as per the training guidelines for individual trainees).
** individual training on board an internationally trading ship, lasting at least six months, in the deck department of a ship 500 GT or more; in justified cases, upon Dean's consent, a student may have land-based training in a maritime industry establishment, for a period of at least six months.

NOTE:
Specific dates for holding seamanship and specialized training for each student group are given in 'Onboard cadet training schedule' issued each academic year. The specified dates of training may be changed for organizational reasons.

YEAR II	MANOEUVRING-NAVIGATIONAL TRAINING	3 WEEKS

LOCATION: the training/research ship Nawigator XXI.

TRAINING OBJECTIVES
This on-board training aims at the consolidation of the theoretical knowledge acquired during the studies by its direct use in practice. General, practical familiarisation with the elements of job-related knowledge included in further semesters. Improvement of seamanship skills. Shaping of the behaviour and attitudes of a future officer, imparting the principles of good sea practices.

SYSTEM OF TRAINING SUPERVISION AND ASSESSMENT
1. Activities are conducted by an officer of the watch under Chief Mate's supervision.
2. The training process shall be controlled by the supervising officer/Master and relevant entries are made in the *On board Training Record Book.*
3. On board training shall be assessed by the training co-ordinator on the basis of entries in the *On board Training Record Book.*
4. Positive assessment of the programme-specific training activities and acquired skills is a prerequisite for a student to continue the studies.

TRAINING PROGRAMME – 98 hours

1.	Navigation	30	hours
2.	Rescue	6	hours
3.	Manoeuvring	24	hours
4.	Propulsion and electric power plants	4	hours
5.	Ship management and marine environment protection	4	hours
6.	Deck apprenticeship	30	hours

SPECIFIC PROGRAMME OF ONBOARD MANOEUVRING – NAVIGATIONAL TRAINING

1. Navigation.

Hands-on familiarization with modern navigational equipment, its technical and operational capabilities, including the navigational information systems ECDIS and RCDS; system of recording navigational and operating data; operation of GPS , DGPS and AIS receivers in real shipping conditions; recording of hydrometeorological data from an automatic measurement station; system of autopilot working with a gyrocompass and magnetic compass, featuring automatic course keeping in variable conditions.

Radar navigation.

Optimizing a radar image; interpretation of a radar image, target identification, collision risk assessment; principles of using a radar in coastal and pilot navigation; parallel indexing technique; interpretation of information from an ARPA.

Watchkeeping on the integrated bridge.

Procedures to be followed by the officer of the watch. Performing the navigational watch, taking over the watch. Notify the master and calling the master to the bridge. Navigation with pilot on board, responsibilities of the officer of the watch. Record-keeping in the logbook. Aids to navigation: identification of fixed and floating navigation marks and coastal landmarks

by day, identification of lights and navigation marks by night: fairways, their markings, navigation on fairways, promontories, fog signals of navigation marks.

Terrestrial navigation.

Dead reckoning, fixing ship's position, safely and efficiently directing the movement of the vessel taking account for total set and drift. Allowing for wind and current.

Navigational publications.

Use of navigational publications. Cataloguing, correcting and storing maps. Preliminary navigational voyage plan., selection of charts and publications on the basis of the catalogue.

Checking the compass error of a magnetic compass, keeping a C/E log.

Practical use of standard programme (databases, spreadsheets) to record and process information in nautical and operational matters.

Interpretation and use of weather forecasts in ship operation.

Familiarisation with the VTS system and the applicable traffic regulation system on the Szczecin–Świnoujście fairway.

2. Sea rescue.

Construction and equipment of a rescue boat. Lowering, hoisting and manoeuvres of a rescue boat. Construction and equipment of life rafts. Launching a life raft, entering and staying in a life raft, reversing a capsized life raft, picking up a survivor into a life raft. Motor boat manoeuvres. Boat coming alongside and departing from a ship in various situations. Life raft inflation, entering a life raft, behaviour in a life raft.

3. Manoeuvering.

Practical familiarisation with the manoeuvrability of the ship, including the effect of the left-hand propeller; operation of the thruster; area of operation of the ship; influence of hydro-meteorological factors on the ship's manoeuvrability, course stability. Observation of ship motions in waves. Free and forced oscillations.

Comparison of manoeuvres carried out during the man overboard alarm, i.e. The Williamson Turn, Scharnov Turn and the 270° turning manoeuvre (single turn).

Anchor station. Practical exercises in anchoring operation (release the anchor with the windlass, letting go the anchor from hawse pipe, dropping the anchor, release the anchor and chain with the windlass until the chain walking out to the required length, control of running-out speed of the anchor chain, length of cable). Anchor dragging, checking the anchor position, safety swinging circle. Weighing anchor (raising the anchor from the sea floor).

Working at manoeuvring stations during mooring and unmooring of a ship.

4. Propulsion and electric power plants.

Familiarization with marine electric power and propulsion machinery. Work of shipboard signalling and alarming systems. Familiarization with selected machines and devices installed in a marine power plant.

5. Ship management and marine environment protection.

Familiarization with the ship's safety management system – documentation and shipboard practices. Methods of sea pollution prevention – implementation of MARPOL Convention provisions.

6. Deck apprenticeship.

Watchkeeping at sea and duties in port. Lifeboat and rescue instruction. Fire protection. Handling and maintenance of deck equipment. Ropework.

It is recommended that cadets undergoing manoeuvring-navigational training be instructed, as the ship's operation status permits, in elements specified above in the seamanship training programme.

44.	Course unit:			N2022/PT
PRACTICAL TRAINING				
Year		Type of training	Duration	ECTS
I		Basic Safety Training	2 weeks	60
I		Preparatory onboard training for candidates	2 weeks	
I/III		Seamanship training – tugboat	1 week	
II		Seamanship training – ferries	3 weeks	
II		Manoeuvring-navigational training*	3 weeks	
III/IV		Individual onboard training**	12 months	

* or individual training on board an internationally trading ship, lasting at least three months, in the deck department of a ship 500 GT or more (as per the training guidelines for individual trainees).
** individual training on board an internationally trading ship, lasting at least six months, in the deck department of a ship 500 GT or more; in justified cases, upon Dean's consent, a student may have land-based training in a maritime industry establishment, for a period of at least six months.

NOTE:
Specific dates for holding seamanship and specialized training for each student group are given in 'Onboard cadet training schedule' issued each academic year. The specified dates of training may be changed for organizational reasons.

YEAR III/IV	INDIVIDUAL ONBOARD TRAINING	SEA SERVICE	12 MONTHS

LOCATION: Approved seagoing service in the deck department of international trade (unlimited) ships of 500 GT or more capacity, or in justified cases, upon Dean's consent, a student may have land-based training in a maritime industry establishment, for a period of at least six months.

TRAINING OBJECTIVES
This training module is aimed at the consolidation of knowledge acquired during study by its practical use. Familiarisation with job-related areas of knowledge and duties to perform. Improvement of seamanship skills. Proper formation of personal attributes of a future officer, inspiring from the principles of good sea practice. Ship handling skills, operation of deck equipment and navigation aids, occupational safety rules, ship operation and organisation of life and work on board. Acquisition mastering of skills specified in the *Onboard Training Record Book*.

SYSTEM OF TRAINING SUPERVISION AND ASSESSMENT
1. Activities are conducted by an officer of the watch under Chief Mate's supervision.
2. The training process shall be controlled by the Master/supervising officer and relevant entries are made in the Onboard Training Record Book.
3. The onboard training report delivered by the student shall be assessed the *Onboard Training Board*.
4. Onboard training is assessed by the training supervisor based on entries made in the *Onboard Training Record Book* and the grade earned for the delivered onboard training report.
5. Positive assessment is a prerequisite for a student to continue the studies.

SPECIFIC PROGRAMME OF INDIVIDUAL ONBOARD TRAINING
The onboard training programme is specified in the *Onboard Training Record Book for Deck Cadets*. The specified training programme should be completed and positively assessed not later than two years from the day of passing a diploma exam.
The Onboard Training Record Book for Deck Cadets covers competences that a cadet (trainee) should achieve, indicates in detail training objectives and tasks. The book is a document the university graduate should hold to obtain an officer of the watch diploma.
Regardless of the tasks specified in the training record book, students shall draw up a written report of their shipboard training, as specified in the guidelines formulated by the board for report assessment, appointed by the Faculty Dean.

PROGRAMME OF INDIVIDUAL LAND-BASED TRAINING
Prepared and agreed on by the parties concerned, a specific programme of training in a selected land-based maritime organization shall be approved by the Faculty Dean.
The trainee should obtain a positive grade for the training (apprenticeship) from a person supervising the training in the chosen organization.

Student workload in the course of the approved programme practice	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		

Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time		
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects	1200	
Self-instruction: preparation for passing tests and exams		
Total workload	**1200**	**60**
Workload related to direct teaching activities:		
Workload related to practice-oriented activities:	1200	60

45.	Course unit:							N2022/DT
DIPLOMA THESIS								
Semester	Weeks in the semester	Hours in a week			Hours in the semester			ECTS
		A	C	L	A	C	L	
8	12							15

Learning outcomes – semester 8		Field-specific
LO1	Has basic knowledge of issues covered by technical, economic and legal sciences, necessary for learning basic determinants of modern navigation.	K_W01; K_W04; K_W05; K_W06; K_W07; K_W11
LO2	Can acquire information necessary for writing a diploma thesis from various available sources, in Polish and English, integrate knowledge from various fields, analyse it, draw conclusions, formulate and justify own judgments.	K_U01; K_U03; K_U08; K_U12
LO3	Has basic knowledge of intellectual property protection and patent law.	K_K03; K_K06; K_W35
LO4	Has skills of self-instruction and upgrading professional qualifications, and is aware of the need for continuous learning to follow the developments in technology and standards used.	K_U01; K_U06; K_U08; K_K01
LO5	Can formulate and test hypotheses related to typical engineering problems, and is able to conduct necessary simulations, tests and surveys.	K_U10; K_U11; K_U12
LO6	Can draw up and present properly documentation related to the completion of a diploma thesis.	K_U04
LO7	Is aware of the social role of a technical university undergraduate and is able to present technical aspects of the societal development in a clear and comprehensible manner.	K_K05

DIPLOMA THESIS

1. One of the obligations first cycle students have to fulfill to complete their studies is an engineer's diploma thesis or project.
2. A diploma thesis may be written by more than one student in compliance with principles set forth by the Dean; in such case the contribution of each co-author shall be stated.
3. A diploma thesis or project constitutes a work subject to copyright and is protected by law.
4. The Maritime University shall take priority in publishing student's diploma thesis. If the University has not published a diploma thesis within six months of the date of its defence, the author may publish it, unless the thesis is part of a collective work.
5. The student submitting the thesis shall make a statement in writing that the work (in case of collective work, its part) has been written independently, that is except for the supervisor's advice, no aid of third parties has been accepted, and in particular no other parties have been asked to develop the work in part or in the entirety, nor the sources other than the referenced ones have been used.
6. A diploma thesis may be written in a language other than Polish pursuant to the relevant provision of the Rules and Regulations.

THE SUPERVISOR, THE THESIS SUBJECT AND ASSESSMENT

1. The student shall prepare the thesis under supervision of an authorised academic teacher holding at least a master's degree.
2. The theses may be written under supervision of a person from outside the University, who specializes in the area that is the subject of the thesis and is a holder of at least a PhD level degree.
3. The student may prepare the diploma thesis outside the University under the student exchange programme. In such case a person appointed by a relevant body of the partner institution may be a diploma thesis supervisor upon Dean's consent.
4. While preparing their theses, students shall seek advice from their supervisors during individually arranged Classes, not less than 10 hours.
5. Authorized thesis supervisors submit suggested thesis topics to Institute Director or Chair Head. The respective **council/board** shall verify the submitted topics and approve of them to suit the limits annually set for by the Dean.
6. Academic staff employed in the Academy outside the faculty in which the student studies may submit topics of diploma theses to the Dean within the scope of the binding curriculum. The Dean shall accept and deliver the topics to the relevant institute or chair council or shall not give approval.
7. The student is entitled to choose a topic of the diploma thesis and the supervisor. If the student cannot get consent of any teacher to supervise his or her thesis the Dean shall appoint a supervisor. The topic of the thesis shall be deemed defined once the student has been given the consent of the supervisor in writing.
8. The topic of a diploma thesis shall be defined not later than one year before the expected date of completion of studies.
9. Dean's consent is required if a student requests to have a different supervisor or choose another approved thesis topic. Dean shall approve of a new topic or a correction of an approved topic upon obtaining an opinion from the institute or chair board/council.
10. In the case of prolonged absence of a supervisor of the thesis, which may result in postponing the time of its completion or submission, the student may request a supervisor substitution who shall be appointed by the Dean upon hearing the opinion of Director/Head of the Institute/Chair where the thesis is being written.
11. A change of the supervisor during the last six months before the deadline of student's submission of the thesis (project) may be the reason for extension of the deadline for submission of the thesis according to the Rules and Regulations.

12. The thesis shall be assessed by the supervisor and a reviewer appointed by the Dean. In case of discrepancy regarding the assessment of a thesis, the Dean, who may consult another reviewer, shall take a decision whether the student can take a diploma exam.
13. A thesis/project is assessed using the grade scale specified in the Rules and Regulations.
14. A diploma thesis/project may be reviewed by an academic teacher or specialist not employed by the University, who holds a master's or higher degree.
15. When the student is granted a scholarship by a future employer, or has concluded a preliminary employment agreement effective upon graduating or is a studying employee, the requirements of the employing organisation may be taken into account while formulating a thesis topic.

THE FORM AND DEADLINE FOR THESIS SUBMISSION

1. The student shall submit the diploma thesis or project in two hard copies (duplex printing, A4 paper format, hard cover) and two copies on labelled electronic carriers.
2. The thesis or the engineering project may be supplemented with a computer program, a model, a project, a device, etc.
3. The first-cycle student is obliged to submit the diploma thesis/project till the date defined in the academic year schedule.
4. At the request of the thesis supervisor or at the request of the student, the Dean may extend the deadline for the submission of the diploma thesis in the case of:
   1) student's long-term sickness confirmed by an authorized medical board;
   2) legitimate and adequately documented circumstances beyond control of the student;
   3) other special circumstances.
5. Failure to submit the diploma thesis by the specified deadline shall be the grounds for striking the student off the register. The Dean shall take a decision in this matter.

NEGATIVE ASSESSMENT OF THE THESIS

1. The student whose diploma thesis was awarded a failing mark may apply for additional three months to be granted for the correction. The decision in this matter shall be taken by the Dean after the consultation with the reviewer.
2. Obtaining no consent from the Dean, referred to in sub-paragraph 1, or another failing mark for the diploma thesis may result in striking from the register of students.

ECTS CREDITS

The student shall be awarded 15 ECTS credits for the preparation of a diploma thesis and preparation for the diploma exam.

DIPLOMA EXAM

REQUIREMENTS FOR ADMISSION TO AND DATE OF THE DIPLOMA EXAM

1. The student, to be admitted to the final diploma exam, shall:
   1) have passing assessments for course units as required in the study plan and the curriculum;
   2) get a positive assessment of the supervisor and reviewer, who will confirm that the thesis (or project) meets all substantial and formal requirements for bachelor-level theses or projects;
   3) pay all due charges relating to their studies.
2. The date of the final comprehensive exam for engineers shall be specified by the Dean.
3. The Dean may set the date of the final diploma exam on an individual basis for the student who has submitted the project ahead of the scheduled date.

TAKING THE FINAL DIPLOMA EXAM

1. The final diploma exam shall be an oral examination during which the examination board chaired by the Dean or a person appointed by him or her shall evaluate the degree of preparation for work in the specific profession within the scope of the specialization (major) in the field of study pursued by the student.
2. The board appointed by the Dean shall be composed of its chairperson and at least two academic teachers representing two basic technical courses of a given field of study. If the engineering project has been carried out for the needs of a given company its representative may also be its member.
3. The Dean may order that the supervisor or the reviewer take part in the board or be present during the examination.
4. The final exam board for engineers for the fields or specialisation of study covered by the certificate of compliance with the requirements of the STCW Convention shall include at least one holder of the highest maritime diploma in the given department.
5. The board may exempt the student from the obligation of answering the questions concerning the final project if in the assessment both the supervisor and the reviewer awarded the grade *good* or higher.
6. The scale of grades applied to give the grades for the examinations is defined in the Rules and Regulations.
7. Obtaining a pass for the examination shall be conditional upon a successful presentation of the respective topics, being the subject matter of the examination, with no failing grades awarded for any of them.

RETAKE DIPLOMA EXAM

1. In the case the student fails the final diploma exam or has failed for no justifiable reason to take the final examination on the date fixed, the Dean shall set another date for the examination as the ultimate date. The second examination shall take place within three months of the first examination date but not until one month has elapsed.
2. In the case of failing the diploma examination on the second date, the Dean shall make a decision on granting the permission to repeat the final year or striking from the register of students.

3. The student repeating the final year due to the failure of the diploma examination shall not be obliged to write a new thesis.

COMPLETION OF STUDIES

The student completes the first cycle studies once he or she passes the diploma exam.

Student workload in semester 8	Hours	**ECTS**
Hours with direct teacher participation: lectures		
Hours with direct teacher participation, practical activities: classes, laboratories, simulators, project-related classes		
Hours with direct teacher participation: consultations with the teacher, passing tests/ exams in extra time		
Self-instruction, including: preparation for classes, laboratories, simulators, including writing reports and assignments		
Self-instruction: execution of projects	300	
Self-instruction: preparation for passing tests and exams		
Total workload	**300**	**15**
Workload related to direct teaching activities:		
Workload related to practice-oriented activities:	300	15