POLISH NAVAL ACADEMY OF GDYNIA

FACULTY OF MECHANICAL-ELECTRICAL ENGINEERING

PROGRAMME AND PLAN

OF THE FIRST CYCLE DEGREE STUDIES

Field of study: Mechanical Engineering

in the range of students exchange
under the program of

ERASMUS

GDYNIA 2018

I. CONTACT

- Polish Naval Academy

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- Academic Erasmus+ Coordinator

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II. THE PRINCIPLES AND GENERAL GOALS

The proposed training content in the range of students and teachers exchange under the program of ERASMUS integrates interdisciplinary students' knowledge with competence in the areas of the mechanical engineering. Therefore, the proposed part of studies, in the range of students exchange ERASMUS, is addressed to for all those students whose field of studies is correlated with the mentioned discipline of knowledge. The undertaking and completion of the studies are conditioned by the accepted preconditions, according to which a student demonstrates knowledge from the area of basic content, defined by training standards for engineering field of studies, from mathematics, physics and mechanics.

The training content presented in this document was selected in such a way that it can constitute self-contained wholes of distinctive groups of content , but may also be considered in the complex of mutually complementing itself detailing goals of proposed course of studies.

The above mentioned propose of studies has its source in observed, of dynamically changing reality, utilitarian trends. In particular, they concern the contemporary nature of human activity in

mechanics, advanced mechanical and electrical technologies, construction and operation of machines, new tends of electrical engineering, electronics and electrotechnology.

III. THE ORGANIZATIONAL-METHODOLOGICAL PRINCIPALS

The publication contains the course catalogue that apply to the students training who are enrolled at the Faculty of Mechanical –Electrical Engineering to undergo the one semester of studies as a part of student exchange with foreign universities under the program of ERASMUS.

The following organizational assumptions were accepted:

1. The term of studies - one semester, studies last 7 semesters.
2. The semester last 14 weeks, according to the schedule of Polish Naval Academy academic year, average 15-20h training hours per week (from Monday to Friday). The total number of training hours during one semester – 200-250h .
3. Classes are taught in English, in academic groups of 8-12 students. Foreigners are in 3-6 students groups.
4. Foreign students have to choose 5-6 from 11 electives before beginning the studies (selected semester).
5. The choice of electives is to be approved by the Dean of Mechanical-Electrical Faculty, based on the declaration.
6. For each course, the credits for each form of the activity are singled out (lectures, exercises. laboratories) and are marked. For some courses final criteria of credit is the exam.
7. The passing of a course requires receiving passing marks for its all criteria and allows receiving the defined number of ECTS points corresponding to the course.
8. The condition for receiving the credit for the semester is to accumulate at least 30 ECTS points.
9. In current matters, connected with the course of studies at Polish Naval Academy foreign students should contact with the faculty plenipotentiary for ECTS.
10. In the course of semester some informative trips to the places connected with development of the Polish history and culture are planned.

IV. GENERAL DATA

Form of studies:	full-time of the first degree
Field of studies:	mechanical engineering
Duration:	1 semester [students]

Professional title of a graduate:	engineer (Bachelor degree)
Language:	English

V. SCHEDULE OF THE STUDIES

Classes and others	semester of studies Winter or summer	In weeks
Classes at the Academy	200-250 hours	14
Examination session	1	2
Courses	5-6	8-12
Diploma Thesis	-	-

VI. GENERAL ACADEMIC CONTENT AND HOUR LOAD [for foreign teachers]

No.	Names of branches and course units	Number of contact hours						Recognition *	
		Lect.	Class.	Labs.	Sem.	Total	ECTS	C	E
1	Electronics	12	4	14	0	30	3	C	
2	Refrigeration, ventilation and ship air-conditioning	30	0	18	0	48	5		E
3	Electrotechnics	30	30	30	0	90	8		E
4	Marine boilers	30	0	6	0	36	4	C	
5	Fundamentals of Machine Design	34	26	0	0	60	7		E
6	Engine room simulator	0	0	60	0	60	6	C	
7	Vibration Theory	12	12	0	0	24	3	C	
8	Safe ship operation	20	16	0	0	36	3	C	
9	Marine Machinery and equipment	80	2	8	0	90	8		E

* C – Credit, E – Exam

We have more subjects and we can adjust individual program of teacher activity to your needs and it's both the subject matter choice and the number of hours

VII. THE STRUCTURE OF THE OFFERED COURSE UNITS (CURRICULUM for foreign students)

Code	Lecturer	Course Unit	Selected subjects					
			Lec.	Class.	Lab.	Semin.	Reco-gnition	ECTS
E_Ee	Piotr Szymak	Electronics	12	4	14	0	Credit	3
E_Uch	Marcin Zacharewicz	Refrigeration, ventilation and ship air-conditioning	30	0	18	0	Exam	5
E_Ea	Tomasz Piłat	Electrotechnics	30	30	30	90	Exam	8
E_Uo	Leszek Wontka	Marine boilers	30	0	6	0	Credit	4
E_Kx	Leszek Flis/Marek Dudziński	Fundamentals of Machine Design	34	26	0	0	Exam	7
E_Uso	Tomasz Lus	Engine room simulator	0	0	60	0	Credit	6
E_Utd	Marcin Kluczyk	Vibration Theory	12	12	0	0	Credit	3
E_Ubz	Marcin Kluczyk	Safe ship operation	20	16	0	0	Credit	3
E_Un	Tomasz Kniaziewicz	Marine Machinery and equipment	80	2	8	0	Exam	8
E_Peu	Iwona Pisarska	Poland in European Union	10	0	10	0	Credit	4
E_Pir	Iwona Pisarska	Poland in International Relations after 1989	10	0	10	0	Credit	4

VIII. SHEETS OF COURSES

I. DETAILED SUBJECT DESCRIPTION

1. Title of subject (O/S)*:	**Poland in European Union**
2. Code of subject:	**E_Peu**
3. Department:	**Mechanical & Electrical**
4. Major:	**mechatronics**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
9. Lecturer:	**Iwona Pisarska, PhD.**
0. Date of update:	**01 February 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT

A1	To acquaint the student with the theoretical knowledge about history of Europe

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES

1	Knowledge of history of Europe.
2	Intermediate level of English .

LEARNING OUTCOMES

On successful completion on this subject, students should be expected to:

LO1	Students understand the rules and methods of governing the country.
LO2	Students understand and know how to properly interpret the political facts
LO3	Student can write, build and modify a current reality with the historical background

STRUCTURE OF THE SUBJECT

Form of classes	Number of hours
Lecture	10
Laboratory	10

SUBJECT MATTER CONTENT

LEC01	Poland and Europe – common history
LEC02	Difficult events in Polish history
LEC03	Why do we have still problems with our place in Europe? – The modern Polish policy
LEC04	Poland and its European relations
LEC05	UE issues in XXI century
LAB1	Big country with complicated history – Poland in Europe
LAB2	Data Import and Analysis – the main fact is Polish history
LAB3	How hard is it to be a part of UE? - discussion
LAB4	The future of Polish policy – games
LAB5	I am a UE citizen – what does it mean?

TEACHING AIDS	
1	Multimedia presentations.
2	Copies and other materials

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
FL1 - FL5	discussion
PLec	Discussion and students speeches
PLab	

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**20**
Lectures and classes	**20**
Exam/tests	**0**
Student work:	100
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	70
Preparation for classes	10
TOTAL NUMBER OF HOURS PER SEMETER	**200**
NUMBER OF ECTS POINTS	**4**

LITERATURE	
	Basic
1	R. Bootle, Making a Success of Brexit and Reforming the EU: The Brexit edition of The Trouble with Europe, London 2017
2	H. Lelieveld, The Politics of the European Union, Cambridge2015
3	Anita J. Prazmowska, A History of Poland, London, 2011
	Recommended
4	Yanis Varoufakis, And the Weak Suffer What They Must?: Europe, Austerity and the Threat to Global Stability, London 2017
5	Norman Davies Europe: A History, London, 1996

LECTURER (NAME AND SURNAME, E-MAIL)	
1	**Iwona Pisarska i.pisarska@onet.pl**

I. DETAILED SUBJECT DESCRIPTION	
1. Title of subject (O/S)*:	**Refrigeration, ventilation and ship air-conditioning (S)**
2. Code of subject:	**Uch**
3. Department:	**Mechanical & Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer:	**Phd Marcin Zacharewicz**
12. Date of update:	**12 February 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT	
A1	To acquaint students with the construction of a cold store and its ongoing service..
A2	To acquaint students with the methods of food storage, necessary installations, their construction and equipment.
A3	To acquaint students with physical phenomena and thermodynamic transformations in a steam refrigeration device and methods of their presentation on thermodynamic diagrams.
A4	To acquaint students with refrigeration systems used on special ships in refrigerated containers and their automation.
A5	To acquaint students with ventilation and air conditioning systems used on ships.
A6	Familiarizing students with the operation of refrigeration plants with the observance of health and safety rules and regulations of classification institutions.

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES	
1	Knowledge of physics.
2	Knowledge of thermodynamics.

LEARNING OUTCOMES

On successful completion on this subject, students should be expected to:

LO1	The student knows a construction and operation of refrigeration equipment, knows the principles of current control of refrigeration plant, can identify individual components of ship refrigeration and air conditioning
LO2	The student knows the basics of food storage, cooling and freezing methods, types of refrigeration equipment, refrigeration installations and equipment, refrigerants and refrigeration oils.
LO3	The student knows the thermodynamic basis of operation of refrigeration plants, is able to perform analysis of energy properties of refrigeration compressors, fans and heat exchangers and on basis of parameters and work indicators to determine technical condition of ship refrigeration and air conditioning.
LO4	The student knows solutions of refrigeration systems used in shipbuilding and special ships, their design and automation, can use their technical and operational documentation.
LO5	The student knows thermodynamic basis of the air-conditioning system operation, construction and automation of air-conditioning and ventilation systems used on ships.

LO6	The student is able to carry out commissioning, constant operation and stopping of refrigeration and air conditioning system, is able to control and regulate refrigeration and air conditioning automatics, detect and correctly respond to emergency situations, observing cases resulting from ecological criteria and regulations of classification institutions.
LO7	The student carefully follows content of lecture, asks questions when has difficulty understanding, discusses during classes, in order to better understand material searches for supplementary information from other sources.
LO8	The student adheres to rules of lectures. Discusses the possibilities of modifying rules in order to increase effectiveness of lecturing by other students.

STRUCTURE OF THE SUBJECT

Form of classes	Number of hours
Lecture	30
Exercise	0
Laboratory	18

SUBJECT MATTER CONTENT

LEC01	Basics of refrigeration technology.
LEC02	Basic parameters of climatic comfort.
LEC03	Thermodynamic basis of cooling circuits.
LEC04	Refrigeration circuits used on ships:.
LEC05	Compressors and chillers.
LEC06	Cooling apparatus.
LEC07	Auxiliary installations
LEC08	Compressor's cooperation with a cooling installation.
LEC09	Automation of supervision of refrigeration equipment and installations:.
LEC10	Service operations regarding refrigeration systems, settings of cooling system operation parameters
LEC11	Ventilation and air conditioning of rooms.
LEC12	Ventilation of cooled holds: regulation of temperature and air humidity
LEC13	thermal balance of refrigerated chamber and influence of external conditions on components of balance sheet..
LEC14	Work safety in servicing cooling installations..
LEC15	Maintenance operations in emergency situations.
LEC16	Regulations of classification societies regarding refrigeration installations, ship documents.
LAB1	The use of cooling system diagrams to explain principle of operation, preparation for start-up, shutdown, preparation of installation for disassembly of elements, replacement of components, condenser cleaning, refilling, lubricating oil, suction of refrigerant, repairs, positioning of defects and other typical maintenance activities.
LAB2	Regulation of expansion valves
LAB3	Extraction of refrigerant from installation.
LAB4	Supplementing refrigerant in circulation.
LAB5	Topping up the lubricating oil in the compressor.
LAB6	Leak detection of refrigerant installation.

TEACHING AIDS	
1	Multimedia presentations.
2	Repository with laboratory materials
METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
F1-F16	Test no. 1
F3-F10	Evaluation of laboratory exercises
PLec	Test
PLab	0,166*(F1+F2+F3+F4+ F5+F6)

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**48**
Lectures and classes	**30**
Exam/tests	**18**
Student work:	**50**
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	50
Preparation for classes	50
TOTAL NUMBER OF HOURS PER SEMETER	**98**
NUMBER OF ECTS POINTS	**5**

LITERATURE	
Basic	
1	Hundy G.F.: Refrigeration and Air-Conditioning.
2	Shan W.:Handbook of Air Conditioning and Refrigeration.
Recommended	
1	Jones J.W., Stoecker W.F.: Refrigeration and AIR Conditioning

LECTURER (NAME AND SURNAME, E-MAIL)	
1	**Marcin ZACHAREWICZ, M.Zacharewicz@amw.gdynia.pl**

I. DETAILED SUBJECT DESCRIPTION	
1. Title of subject (O/S)*:	**Electrotechnics (S)**
2. Code of subject:	**E_Ea**
3. Department:	**Mechanical & Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer:	**LCDR, Msc Tomasz Piłat**
12. Date of update:	**26 February 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT	
A1	To acquaint students with the theory of the electric field.
A2	To acquaint students with the basic concepts of the theory of electrical circuits.
A3	To acquaint students with the methods of analysis of DC electric circuits. Acquisition of engineering skills in the analysis of DC circuits.
A4	To acquaint students with non-linear DC electric circuits.
A5	To acquaint students with the theory of magnetic field.
A6	To acquaint students with the theory of electromagnetic field.
A7	Loop analysis of AC circuits.
A8	Nodal analysis of AC circuits.

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES	
1	Knowledge of physics.
2	In mathematics, knowledge of differential calculus, integral calculus and operator calculus.

LEARNING OUTCOMES

On successful completion on this subject, students should be expected to:

LO1	Student knows the basic concepts of electric field theory. He understands the concepts of electric field, electric charge, field strength, field force lines and electric field flux. He can define the laws of Coulomb and Gauss. He knows the essence of potential and voltage.
LO2	The student knows the basic concepts of magnetic field theory. Understands the essence of the magnetic field. He knows the concept of magnetic force, field force lines and field direction as well as the principles of the movement of charged particles in the magnetic field. He can discuss the operation of the magnetic field on a conductor with current. He can define and discuss Ampere's law and the interaction of parallel conductors with the current.
LO3	Student is able to define the concept of a branched DC circuit. He knows the methods of calculating circuits: the method of arranging the equations from Kirchhoff's laws, the method of transforming the circuit, the loop analysis, the nodal analysis, the superposition theorem and Thevenin and Norton theorems.
LO4	Student is able to define the concept of electric current, current intensity, density and the direction of conventional current flow. He knows the basic concepts of electrotechnics, the law of Ohm and Kirchhoff.

	He can define and discuss the concept of an ideal and real source of electric energy.
LO5	Student is able to define the concept of non-linear DC circuit and discuss the concept of static and dynamic resistance. He knows the analytical, graphical and graphical-analytical method of circuit analysis.
LO6	The student knows the basic concepts of electromagnetic field theory. Understands the essence of electromagnetic induction. He can define Faraday's law of induction, explain the concept of self inductance and Gauss's law for a magnetic field. He knows the essence of induced electric field and induced magnetic field
LO7	The student knows the distribution of variable currents and parameters describing the sinusoidal alternating current. He can interpret the concepts of effective value and average current, pointer, impedance and phase angle. He knows the relationship between current and voltage indicators on RLC elements.
LO8	The student knows the symbolic method of analysis of sinusoidal current circuits. He knows how to use the trigonometric and exponential notation of a complex number. He knows the presentation of sinusoidal waveforms using a rotating vector (pointer, phasor). He mastered the transition operation from the phasor to the instantaneous value. He will determine the derivative and integral phasor

STRUCTURE OF THE SUBJECT

Form of classes	Number of hours
Lecture	30
Exercise	30
Laboratory	30

SUBJECT MATTER CONTENT

LEC01	Electric field.
LEC02	Elementary concepts of the theory of electric circuits.
LEC03	Unbranched electric circuit.
LEC04	Branched current circuits. Basic information. Transforming circuits.
LEC05	Loop analysis.
LEC06	Nodal analysis.
LEC07	Superposition theorem.
LEC08	Thevenin theorem.
LEC09	Norton's theorem.
LEC10	Nonlinear DC circuits. Non-linear elements. Analytical method.
LEC11	Graphic method.
LEC12	Graphical and analytical method.
LEC13	Magnetic field.
LEC14	Electromagnetic field.
LEC15	Parameters of a sine wave current. The average and effective value of the current.
LEC16	Symbolic method of analysis of sinusoidal AC circuits.
LEC17	Ohm and Kirchhoff's law in sinusoidal AC circuits.
LEC18	Serial and parallel resonance of RLC systems.
LEC19	Three-phase AC system.
EXE1	Loop analysis.
EXE2	Nodal analysis.

EXE3	Superposition theorem.
EXE4	Thevenin theorem.
EXE5	Nonlinear DC circuits.
EXE6	Analysis of sinusoidal AC circuits.
LAB1	Test of an unbranched electric circuit.
LAB2	Test of branched electrical circuits.
LAB3	Test of non-linear DC circuit.
LAB4	Magnetic circuit test.
LAB5	The basic laws of electromagnetism.
LAB6	RLC serial circuit test of sinusoidal AC voltage.
LAB7	Testing of the RLC parallel circuit of a sinusoidal alternating current.
LAB8	Improvement of the power factor.

TEACHING AIDS

1	Multimedia presentations.
2	Repository with laboratory materials

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)

F1	Test no. 1
F2	Test no. 2
F3-F10	Evaluation of laboratory exercises
PLec	0,5*F1+0,5*F2
PLab	0,125*(F3+F4+F5+F6+ F7+F8+F9+F10)

STUDENT WORKLOAD

Form of activity	Average number of hours
Contact hours with the teacher:	**90**
Lectures and classes	**86**
Exam/tests	**4**
Student work:	130
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	55
Preparation for classes	75
TOTAL NUMBER OF HOURS PER SEMETER	**220**
NUMBER OF ECTS POINTS	**8**

LITERATURE

Basic

1	McGraw Hill Education (India) Private Limited; 2 edition, Basics Electrical Engineering
2	S.Chand (G/L) & Company Ltd, Basics Electrical Engineering
3	E Allan H. Robbins, Electric circuits

Recommended

4	T. Gaikwad, Basic Electrical Engineering
5	L. S. Bobrow Fundamentals of Electrical Engineering
6	U.A.Patel, Elements of Electrical Engineering

LECTURER (NAME AND SURNAME, E-MAIL)

1	**Tomasz PIŁAT, t.pilat@amw.gdynia.pl**

I. DETAILED SUBJECT DESCRIPTION

1. Title of subject (O/S)*:	**Marine boilers (O)**
2. Code of subject:	**Uo**
3. Department:	**Mechanical-Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer:	**CDR, PhD. Eng. Leszek Wontka**
12. Date of update:	**09 March 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT

A1	To acquaint students with construction and principle of operation main and auxiliary marine boilers.
A2	To acquaint students with boiler operating system and automation.
A3	To acquaint students with thermodynamic transformations especially properties of water and steam.
A4	To acquaint students with individual boiler elements of construction such as burner, armature, control and measurement instruments, .
A5	To acquaint students with principle of operation, setting up to work, supervision during work, turning off.
A6	Assessment of boiler operation based on observations of control and measurement equipment.
A7	Preparing a boiler's heat balance.

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES

1	Knowledge in the field of technical drawing and the basics of machine construction.
2	Knowledge of the issues of technical thermodynamics, fluid mechanics, strength of materials, water chemistry, fuels and lubricants.

LEARNING OUTCOMES

On successful completion on this subject, students should be expected to:

EK1	Student knows a construction and principle of operation of main and auxiliary marine boilers, boiler servicing systems and boilers automation.
EK2	Student knows the characteristic values of boilers, the cycle of thermodynamic changes and other phenomena and procedures taking place in the boiler, knows the thermodynamic properties of water and steam.
EK3	Student knows structure and principle of operation of an individual elements of a boiler, burners, fittings, boiler equipment and control and measurement instruments, can choose the parameters of burners and fittings for a boiler structure.
EK4	Student knows the principles of operation of steam boilers and is able to prepare for work, supervise during work and turning off, assess a correctness of a boiler operation based on

	observation of control and measurement equipment and prepare a thermal balance of a boiler.
EK5	Student carefully follows a content of a lecture, asks questions when has difficulties in understanding, discusses during lessons, in order to better understand a material searches for supplementary information from other sources.
EK6	Student adheres to a rules of a lectures. Discusses possibilities of modifying a rules in order to increase an effectiveness of lecturing by other students.
EK7	Actively participates in lecture, exercise, laboratory and reports to answer when a lecturer asks question about their content. Instructs your lecturer for comments or additions regarding a content of lectures and a laboratory. Provides lecturers with new materials relating to a content of previous lectures and a laboratory.

STRUCTURE OF THE SUBJECT

Form of classes	Number of hours
Lecture	30
Laboratory	6

SUBJECT MATTER CONTENT

LEC01	Basics of construction and principle of auxiliary operation of fired boilers: boiler systems, boiler automation.
LEC02	Basics of construction and operation principle of utilization boilers: boiler handling systems, boiler automation.
LEC03	Use of ship's boilers: boiler start-up, boiler service during operation (preparation of water during boilers operation, water level control, daily service, skimming of level gauges and level controllers), operation of a fuel, water and steam systems (handling of filters and heaters, thermodynamic steam traps, thermal box, condensate container, condensate cooler, excess condenser), switching off boilers, stopping a burner, lowering pressure, boiler skimming, water replenishment, efficiency adjustment of boiler, cooperation between utilization boiler and fired boiler.
LEC04	Safe operation of boilers.
LEC05	Theoretical basics of ship boilers operation: thermodynamic properties of water and steam, thermodynamic cycle occurring in the boiler, thermal balance and efficiency of boilers, characteristic values of boilers.
LEC06	Basic boiler processes: combustion, heat exchange, draft, circulation, combustion.
LEC07	Main ship's boilers: water-tube, stromural, with forced circulation, flow, special.
LEC08	Auxiliary ship's boilers: auxiliary fired, fire-tube, water-tube, dual circuit, combined, auxiliary utilization.
LEC09	Construction elements of ship's boilers: water and steam-water drums, main heating surfaces of boilers, body, gas-tight jacket, insulation, steam dryers, air and water heaters, superheaters.
LEC10	Fuel systems for heating oil, diesel oil and petroleum waste
LEC11	Boiler burners: pressure with mechanical spraying, rotary, dual fuel, with steam spray
LEC12	Armature and boiler equipment: shut-off, safety and return valves, water gauges, float level regulators, capacitive probes (continuous and periodic water supply), pressure switches, thermometers, thermocouples, manometers, soot blowers, boiler cleaning systems with water on combustion side, installations for skimming boilers
LEC13	Safety and emergency procedures
LAB1	Preparation to work, start-up and supervision during the work of ship's auxiliary boiler.
LAB2	Preparing the energy balance of a fired boiler.

TEACHING AIDS

1	Multimedia presentations.

2	Whiteboard and colorful felt-tip pens.
3	Boiler simulator station.
4	The laboratory fired boliler.

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
F1	Test no. 1
F2-F3	Evaluation of laboratory exercises
PLec	F1
PLab	0,5*F2+0,5*F3

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**36**
Lectures and classes	14
Student work:	**40**
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	16
Preparation for classes	24
TOTAL NUMBER OF HOURS PER SEMETER	**90**
NUMBER OF ECTS POINTS	**4**

LITERATURE	
	Basic
1	Marine Boiler – G T H Flanagan
2	Marine Steam Boilers – James Hugh Milton
3	Marine Boiler Management and Construction – C. E. Stromeyer
4	Heating Boiler Operator's Manual: Maintenance, Operation, and Repair – Mohammad Malek
5	Marine Engines and Boilers – Their Design and Construction
	Recommended
4	Marine Auxiliary Machinery – H.D McGeorge
5	Boiler Operation Engineering
6	Boiler Operator's Guide

LECTURER (NAME AND SURNAME, E-MAIL)	
1	**Leszek WONTKA, l.wontka@amw.gdynia.pl**

I. DETAILED SUBJECT DESCRIPTION

1. Title of subject (O/S)*:	**Fundamentals of Machine Design (O) – practical course**
2. Code of subject:	**Kx**
3. Department:	**Mechanical-Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer and exercises:	**PhD Leszek Flis, MSc Marek Dudziński**
12. Date of update:	**12 March 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT

A1	The main objective of this course is to provides rules for the design of general-purpose machine elements

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES

1	Course of Engineering Drawing.
2	Course of Mechanics and Strength of Materials.
3	Welcome knowledge of FEM Fundamentals

LEARNING OUTCOMES

On successful completion on this subject, students should be expected to:

LO1	Gain knowledge by student about the basics of machine design, including the design process, engineering mechanics and materials, failure prevention under static and variable loading, and characteristics of the principal types of mechanical elements
LO2	Acquire practical approach to the subject through the numerical examples
LO3	Acquire practical approach to the subject through using of real-world applications
LO4	Ability to work in group and solving basic engineering design task.

STRUCTURE OF THE SUBJECT

Form of classes	Number of hours
Lecture	34
Exercise	26

SUBJECT MATTER CONTENT

LEC01	Introduction to machine design in CAD/CAE system. Engineering materials. Stresses and strains preparation in CAD/CAE systems.
LEC02	Designing for Strength. Stress concentration. Fluctuating Stresses. Preparation in CAD/CAE systems.
LEC03	Design of Joints in CAD/CAE. Cotter joints. Pin joints. Riveted joints. Bolted joints. Eccentric loads. Power screws.
LEC04	CAD/CAE modelling and calculation and of welded joins.
LEC05	Rolling bearings modelling and calculation with CAD/CAE.
LEC06	Hydrodynamic bearings modelling and calculation with CAD/CAE.

LEC07	Springs. Couplings. Shafts in CAD/CAE.
LEC08	Drivers. Belts and Pulleys. Gears Fundamentals in CAD/CAE.
LEC09	Design of. Miscellaneous Parts. Clutches. Breaks. Pressure Vessels.
LEC10	Design of. I.C. Engine Parts. Pistons. Connecting Rod. Crank Shaft. Valve Gears. Fly Wheels.
LEC11	Concepts of the Own Design.
EXE1	An overview of CAD systems. Capabilities and limitations.
EXE2	Operation and use of CAD systems. Running the software, configure, and start working. Navigation in the cad system. Operation of the system. The rules work in the cad environment. Preparing the project. Working in the field of modelling parts, assemblies, or preparation of technical documentation.
EXE3	3D modelling. Fundamentals of modelling components. Sketching, solid modelling, surface modelling. Binding. Modelling of parts and assemblies.
EXE4	Electronic technical documentation. Preparation of technical documentation on the basis of the CAD model. Figure executive and exploded. Own CAD project. Import and export CAD models to the CAE application.
EXE5	Fundamentals of FEM. Overview CAE and their purpose, capabilities and limitations.
EXE6	CAE systems, installation and preparation for work. Running the software, configure, and start working. Preparing to work chosen example.
EXE7	Examples and types of simulation fem. Finite elements method tutorials. Types of simulation in case of 1D, 2D and 3D and statics, dynamics problems.
EXE8	Designing your own selected issue using CAD/CAE techniques.
EXE9	Defending own design.

TEACHING AIDS	
1	Multimedia presentations.
2	Repository with laboratory materials

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
F1	Attendance of all lectures
F2	Attendance of all exercises
PExam	Defending own design

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**60**
Lectures and classes	**57**
Exam/tests	**1**
Student work:	150
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	102
Preparation for classes	48
TOTAL NUMBER OF HOURS PER SEMETER	**210**
NUMBER OF ECTS POINTS	**7**

LITERATURE	
Basic	
1	Singh,Ajeet, Fundamentals of Machine Design: Volume 1 and 2,Cambridge, 2017
2	Xiaolin Chen, Yijun Liu, Finite Element Modelling and Simulation with ANSYS Workbench,

CRC Press, 2014

I. DETAILED SUBJECT DESCRIPTION	
1. Title of subject (O/S)*:	**Engine room simulator (O)**
2. Code of subject:	**Uso**
3. Department:	**Mechanical-Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer:	**PhD. Eng. Tomasz LUS**
12. Date of update:	**14 March 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT	
A1	This course enables the cadets to gain knowledge and skills to operate with engine room simulator at basic level.

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES	
1	Computer skills at the basic level
2	Basic information about principles of work of all engine room equipment
3	Theoretical knowledge of operation of ship's mechanisms.

LEARNING OUTCOMES	
On successful completion on this subject, students should be expected to:	
EK1	Prepare, startup and maintain all installations of engine room.
EK2	Prepare, startup and maintain diesel engines of ship.
EK3	Operate of the remote control of main engine.
EK4	Control and routine maintain main engine at work.
EK5	Cooperate of the main propulsion system: main engine - propeller - hull.
EK6	Obey safety and emergency procedures for operation of propulsion plant machinery including control systems.
EK7	Safe watchkeeping in engine room.

STRUCTURE OF THE SUBJECT	
Form of classes	Number of hours
Laboratory	60

SUBJECT MATTER CONTENT	
LAB01	Introduction - structure and operation of engine room simulator.
LAB02	Preparation, startup and maintenance of the installation of engine room: a) preparation and start-up of installations of diesel-generator, start-up and maintenance of diesel-generator, b) preparation and start-up sea water cooling system, c) preparation and start-up fresh water cooling system,
LAB03	Preparation, startup and maintenance of the installation of engine room:

	a) preparation and start-up fuel system, b)preparation and start-up lubricating oil system, c) preparation and start-up compressed air system, d) preparation and start-up of installations of reduction gear,
LAB04	Preparation, startup and maintenance of the installation of engine room: a) preparation and start-up of installations of controllable pitch propeller (CPP), b) preparation and start-up steam system, c) preparation and start-up steering gear system, d) preparation and start-up bilge and ballast system,
LAB05	Preparation, startup and maintenance of the installation of engine room: a) preparation and start-up sanitary water system, b) preparation and start-up fire fighting system, c) preparation and start-up refrigerating system, d) preparation and start-up sewage treatment plant system, e) preparation and start-up air conditioning system
LAB06	Preparation, startup and maintenance of the main engine.
LAB07	Preparation, startup and maintenance of the main engine.
LAB08	Operation of the remote control of main engine.
LAB09	Control and routine maintenance main engine at work.
LAB10	The cooperation of the main propulsion system: main engine - propeller - hull.
LAB11	Safety and emergency procedures for operation of propulsion plant machinery including control systems
LAB12	Watchkeeping in engine room.
LAB13	Watchkeeping in engine room.

TEACHING AIDS	
1	Multimedia presentations.
2	Whiteboard and colorful felt-tip pens**.**
3	UNITEST LER3D, MED, MER3D simulators installed on computers

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
F1	Practical test in the operation of ship's engine room.
F2-F14	Evaluation of laboratory exercises
PLec	F1
PLab	0,077*(F2+…+F14)

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**60**
Student work:	**60**
TOTAL NUMBER OF HOURS PER SEMETER	**120**
NUMBER OF ECTS POINTS	**6**

LITERATURE	
Basic	
1	Engine room simulator instructions ex. UNITEST LER3D, MED, MER3D

LECTURER (NAME AND SURNAME, E-MAIL)	
1	**Tomasz LUS, t.lus@amw.gdynia.pl**

I. DETAILED SUBJECT DESCRIPTION	
1. Title of subject (O/S)*:	**Poland in International Relations after 1989**
2. Code of subject:	**E_Pir**
3. Department:	**Mechanical & Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
9. Lecturer:	**Iwona Pisarska, PhD.**
0. Date of update:	**01 February 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT	
A1	To acquaint the student with the theoretical knowledge about history of Europe

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES	
1	Knowledge of history of Europe.
2	Intermediate level of English .

LEARNING OUTCOMES	
On successful completion on this subject, students should be expected to:	
LO1	Students understand the rules and methods of governing the country.
LO2	Students understand and know how to properly interpret the political facts
LO3	Student can write, build and modify a current reality with the historical background

STRUCTURE OF THE SUBJECT	
Form of classes	Number of hours
Lecture	10
Laboratory	10

SUBJECT MATTER CONTENT	
LEC01	International relations in XXI century
LEC02	Diplomacy nowadays
LEC03	The main players in the world
LEC04	Poland and its relations
LEC05	The main Polish issues in XXI century
LAB1	Big policy and big people in the world
LAB2	Data Import and Analysis – the main fact in modern policy
LAB3	How hard is it to be a part of the international relations? - discussion
LAB4	The future of the state – games

LAB5	I am a citizen – what does it mean?

TEACHING AIDS	
1	Multimedia presentations.
2	Copies and other materials

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
FL1 - FL5	discussion
PLec	Discussion and students speeches
PLab	

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**20**
Lectures and classes	**20**
Exam/tests	**0**
Student work:	100
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	70
Preparation for classes	10
TOTAL NUMBER OF HOURS PER SEMETER	**200**
NUMBER OF ECTS POINTS	**4**

LITERATURE	
Basic	
1	S. Lawson, International Relations, London, 2017
2	Ch.Brown Understanding International Relations, London 2009
3	S.C. Roach, International Relations: The Key Concepts, London 2013
Recommended	
4	T. Scott, The Global Resurgence of Religion and the Transformation of International Relations: The Struggle for the Soul of the Twenty-First Century (Culture and Religion in International Relations), 2005

LECTURER (NAME AND SURNAME, E-MAIL)	
1	**Iwona Pisarska i.pisarska@onet.pl**

I. DETAILED SUBJECT DESCRIPTION	
1. Title of subject (O/S)*:	**ELECTRONICS (S)**
2. Code of subject:	**Ee**
3. Department:	**Mechanical & Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian/Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer:	**Capt (Navy) Piotr Szymak, Assoc. Prof.**
12. Date of update:	**23 February 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT	
A1	The student knows the structure, principle of operation, parameters and characteristics of basic semiconductor devices: diode, bipolar and unipolar transistor
A2	The student knows the principle of operation, parameters and characteristics of basic optoelectronic components: LED, photodiode and optocoupler.
A3	The student knows the structure, principle of operation, parameters and characteristics of the basic RC amplifier circuits and operational amplifiers.
A4	The student knows the structure, principle of operation, parameters and characteristics of basic sinusoidal and pulsed oscillator systems.
A5	The student knows how to determinate the basic parameters of the work of amplifiers and generators based on them time and frequency characteristics.
A6	The student carefully follows the lecture, asks questions when having difficulty in understanding, takes part in discussions during the classes, searches for complementary information from others sources in order to better understand the subject.
A7	The student obeys the lectures rules. He discusses the possibilities of modifying the rules in order to increase the effectiveness of lecturing the other students.
A8	He actively participates in the lecture, exercise, laboratory and reports to the answer in case the lecturer asks a question about their content. Gives the lecturer comments or additions relating the content of the lectures and the laboratory. Provides the lecturer with new materials relating to the content of previous lectures and laboratory.

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES	
1	Knowledge of physics on high school level.
2	In the field of mathematics, knowledge of vector, differential and integral calculus, operator's account and complex numbers
3	Knowledge of basic issues in the field of electrical engineering.

LEARNING OUTCOMES	
On successful completion on this subject, students should be expected to:	
LO1	Student has formed knowledge in the fields of the electrical and electronic circuits as well as on methods and theory of signals processing.
LO2	Student can plan and carry out simulations and measurements of static and dynamic characteristics of elements and automation systems, as well as to extract basic material, elements and automation systems characterization parameters; student can present the

	obtained results in numerical and graphic form, make their interpretation and draw the right conclusions.
LO3	Student is aware of the responsibility for his own work and is ready to comply to the rules of a teamwork and take responsibility for shared tasks.
LO4	Student is aware of the importance of behavior in a professional manner, following the principles of professional ethics and respect for the difference of views and cultures.

STRUCTURE OF THE SUBJECT	
Form of classes	Number of hours
Lecture	12
Excercise	4
Laboratory	14

SUBJECT MATTER CONTENT	
LEC01	Semiconductors.
LEC02	Semiconductor elements.
LEC03	Optoelectronic elements.
LEC05	RC amplifier.
LEC07	Operational amplifier.
LEC08	Oscillators.
EXC01	Calculating the parameters of the amplifiers and generators.
EXC02	Test.
LAB1	Diodes.
LAB2	Bipolar transistors.
LAB3	Unipolar transistors.
LAB4	Optoelectronic elements.
LAB5	Operational amplifier.
LAB5	Oscillators.

TEACHING AIDS	
1	Notebook and the projector.
2	Whiteboard with color whiteboard markers
3	Laboratory stands for electronics

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
F1	Entry laboratory tests.
F2	Laboratory reports.
PLec	0,5*(Final test + (F1+F2))

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**30**
Lectures and classes	**28**
Exam/tests	**2**
Student work:	45
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	20

Preparation for classes	25
TOTAL NUMBER OF HOURS PER SEMETER	**75**
NUMBER OF ECTS POINTS	**3**

LITERATURE	
Basic	
1	A.Malvino, D.Bates Electronic principles, Eighth Edition
2	Lloyd P. Hunter Handbook of semiconductor *electronics*
3	William L. Faissle An introduction to modern *electronics*
LECTURER (NAME AND SURNAME, E-MAIL)	
1	Piotr Szymak, p.szymak@amw.gdynia.pl

I. DETAILED SUBJECT DESCRIPTION	
1. Title of subject (O/S)*:	**Vibration Theory (S)**
2. Code of subject:	**Utd**
3. Department:	**Mechanical & Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer:	**msc eng. Marcin Kluczyk**
12. Date of update:	**12 March 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT	
A1	To acquaint students with basic concepts in the analysis and description of vibration
A2	Familiarizing students with harmonic movement
A3	To familiarize students with models of vibrating systems and vibration processes
A4	To familiarize students with elements of the harmonic function analysis
A5	Familiarizing students with submission harmonic vibrations
A6	To familiarize students with the classification of vibrations
A7	Familiarizing students with the forces in vibrating movement
A8	Teaching students to form traffic equations

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES	
1	Knowledge of physics.
2	In mathematics, knowledge of differential calculus, integral calculus and operator calculus.

LEARNING OUTCOMES	
On successful completion on this subject, students should be expected to:	
LO1	Students should know the basic concepts of vibration theory and be able to identify the real vibrating objects

LO2	Students should be able to interpret the analysis of vibration parameters in the field time, frequency and in the phase plane
LO3	Students should know the status identification standards technical machines based on vibration analysis
LO4	The student adheres to the rules of the lectures. He discusses the possibilities of modifying the rules to increase the effectiveness of lecturing by other students.
LO5	Actively participates in the lecture, exercise, laboratory and reports to the answer in case the lecturer asks a question about their content. Instructs your lecturer for comments or additions relating to the content of lectures and the laboratory. provides the lecturer with new materials relating to the content of previous lectures and laboratory

STRUCTURE OF THE SUBJECT	
Form of classes	Number of hours
Lecture	12
Exercise	12
Laboratory	0

SUBJECT MATTER CONTENT	
LEC01	Vibrations of linear systems with one degree of freedom..
LEC02	Frequency and duration of damped oscillations. Logarithmic decrement of suppression.
LEC03	Vibrations forced. Amplitude of vibrations forced by forceharmonic.
LEC04	Application of complex functions for harmonic forced vibration analysis
LEC05	Pulse function of transition and transmittance of the vibrating system. Amplitude and frequency characteristics.
LEC06	The vibrations forced by the inertia of the unbalanced rotor. Vibrations forced kinematically
LEC07	Vibration damping. Examination and interpretation of vibrations at the phase surface
LEC08	Phase plane. Phase trajectories. Singular points. Phase image
LEC09	Vibration of linear systems with many degrees of freedom. Free, undamped vibrations.
LEC10	Own frequencies. Figures of own vibrations. The general solution of motion equations. Free vibration damped. Vibrations forced. Resonant curves.
LEC11	Normative regulations in the field of methods of measurement and identification of machine vibrations.
EXE1	Vibrations of linear systems with one degree of freedom
EXE2	Frequency and duration of damped oscillations. Logarithmic decrement of suppression.
EXE3	Vibrations forced. Amplitude of vibrations forced by forceharmonic.
EXE4	The vibrations forced by the inertia of the unbalanced rotor. Vibrations forced kinematically
EXE5	Own frequencies. Figures of own vibrations. The general solution of motion equations. Free vibration damped. Vibrations forced. Resonant curves

TEACHING AIDS	
1	Multimedia presentations.
2	Repository with laboratory materials

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
F1	Test no. 1
F2	Test no. 2
PLec	0,5*F1+0,5*F2

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**24**
Lectures and classes	**22**
Exam/tests	**2**
Student work:	24
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	12
Preparation for classes	12
TOTAL NUMBER OF HOURS PER SEMETER	**48**
NUMBER OF ECTS POINTS	**3**

LITERATURE	
Basic	
1	Mobley R.K., Root cause failure analysis 1999
2	Krodkiewski J.M., Mechanical vibration 2006
3	Harris C. M., Shock and vibration handbook
Recommended	
4	Girdhar P., Practical Machinery Vibration Analysis and Predictive Maintenance
LECTURER (NAME AND SURNAME, E-MAIL)	
1	Marcin Kluczyk, m.kluczyk@amw.gdynia.pl

I. DETAILED SUBJECT DESCRIPTION	
1. Title of subject (O/S)*:	**Safe ship operation (S)**
2. Code of subject:	**Ubz**
3. Department:	**Mechanical & Electrical Engineering**
4. Major:	**BSc in Mechanical Engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer:	**msc eng. Marcin Kluczyk**
12. Date of update:	**12 March 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT	
A1	Familiarizing students with the STCW convention
A2	To acquaint students with organizational structures of the ship and the principles of team management
A3	Familiarizing students with the ISM Code
A4	Familiarizing students with the ISPS code

A5	To acquaint students with other legal acts related to safe work at sea

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES

1	Basic knowledge of maritime law.

LEARNING OUTCOMES

On successful completion on this subject, students should be expected to:

LO1	The student knows the division of competences of crew members required by the STCW Convention. Teaching and on-board training: (a) the requirements of the STCW Convention for individual training positions on sea-going vessels, b) compulsory training of crew members on board after (c) training of crews on vessels in service.
LO2	The student knows the organizational structures of the ship's crew, organization of the machine department. Watching machinery, the work of an unattended engineroom: a) the rules for performing navigational watches, b) rules performing maneuvering watches. c) rules for preparing the engine room for unattended work, d) principles of supervising the work of an unattended engine room.
LO3	The student knows the principles of team management: a) awareness of position and assertiveness, b) recognition priorities, c) defining goals, d) formulating messages, e) organizing work, f) supervising commanding, g) motivating.
LO4	The student knows the ISM code on ships.
LO5	The student knows the ISPS code on seagoing ships
LO6	The student knows the laws, conventions and other documents regarding the safe operation of the ship
LO7	The student adheres to the rules of the lectures. He discusses the possibilities of modifying the rules to increase the effectiveness of lecturing by other students.
LO8	Actively participates in the lecture, exercise, laboratory and reports to the answer in case the lecturer asks a question about their content. Instructs your lecturer for comments or additions relating to the content of lectures and the laboratory. provides the lecturer with new materials relating to the content of previous lectures and laboratory

STRUCTURE OF THE SUBJECT

Form of classes	Number of hours
Lecture	20
Exercise	16
Laboratory	0

SUBJECT MATTER CONTENT

LEC01	Division of competencies of crew members required by the STCW Convention. Instruction and training on the ship: a) the requirements of the STCW Convention for training on individual ships positions on sea-going vessels, b) compulsory training of crew members after signing on board c) training of crews on vessels in service.
LEC02	Organizational structures of the ship's crew, organization of the machine department. Watching machinery, the work of an unattended engine room: a) the rules for performing navigational watches, b) the rules for performing maneuvering watches. c) the rules for preparing engine room for unmanned work, d) the rules of supervising the work of an unattended engine room.
LEC03	Principles of managing the team: a) awareness of position and assertiveness, b) recognition priorities, c) defining goals, d) formulating messages, e) organizing work, f) supervision over the execution of commands, g) motivating..
LEC04	Laws, conventions and other documents regarding the safe operation of the ship: a) SOLAS convention, b) MARPOL convention, c) ISO standards, d) legal acts on safe operation of the ship, IMO guidelines, MEPC guidelines.

LEC05	ISM Code on sea-going ships: a) SMS on sea-going vessels, b) role of DP (Designated Person) in the ISM system, c) procedures of operations and operations performed on ships, d) checklists (check lists), e) audits to confirm the SMS operation on the ship, f) reporting procedures incompatibility with SMS (NCR - Non Conformance Report, TLC - Total Lost Control, NM – Near Miss), g) emergency procedures.
LEC06	The ISPS Code on sea-going ships: a) ISPS on sea-going vessels, b) the role of CSO and SSO in the system, c) procedures of the ship's crew members' activities under ISPS, d) checklists, e) audits to confirm the operation of ISPS on the ship
LEC07	Organization of technical supervision of sea-going vessels: a) PMS system (planned maintenance system), b) the supervision rules of classification institutions over the technical operation of the ship, c)rules regarding scheduled and emergency technical inspections of machinery and marine equipment
LEC08	Rules for the organization and supervision of the safety of navigation and life saving at sea in situations failures: a) ship emergency plans, b) rules of conduct members of ship's crews during alarms and emergency situations, c) duties of crew members in emergency situations, d) the rules of conduct of crew members in special cases, e.g. blackout, failure of the main propulsion control of the ship, failure steering gear control
LEC09	Risk analysis in the technical operation of the ship: a) basic risk analysis (RA – Risk Assessment), b) procedures for the performance of RA, c) procedures for the analysis of the causes of the accident on the ship
LEC10	Ship emergency plans: a) rules of behavior during alarms and emergency situations, b) duties of ship's crew members in emergency situations, c) rules of conduct of members machine crew in special cases, e.g. blackout, failure of the drive control main ship, steering gear
LEC11	Ability of the ship and crew for safe shipping: a) Ship certificates, b) Requirements inspections of PSC (Port State Control), FSC (Flag State Control), OCIMF, USCG (US Coast Guard), c) preparing the ship for inspection.
EXE1	Division of competencies of crew members required by the STCW Convention. Instruction and training on the ship: a) the requirements of the STCW Convention for training on individual ships positions on sea-going vessels, b) compulsory training of crew members after signing on board (c) training of crews on vessels in service.
EXE2	Organizational structures of the ship's crew, organization of the machine department. Watching machinery, the work of an unattended engine room: a) the rules for performing navigational watches, b) the rules for performing maneuvering watches. c) the rules for preparing the engine room for unmanned work, d) the rules of supervising the work of an unattended engine room.
EXE3	Principles of managing the team: a) awareness of position and assertiveness, b) recognition priorities, c) defining goals, d) formulating messages, e) organizing work, f) supervision over the execution of commands, g) motivating
EXE4	Laws, conventions and other documents regarding the safe operation of the ship: a) SOLAS convention, b) MARPOL convention, c) ISO standards, d) legal acts on safe operation of the ship, IMO guidelines, MEPC guidelines
EXE5	ISM Code on sea-going ships: a) SMS on sea-going vessels, b) role of DP (Designated Person) in the ISM system, c) procedures of operations and operations performed on ships, d) checklists (check lists), e) audits to confirm the SMS operation on the ship, f) reporting procedures incompatibility with SMS (NCR - Non Conformance Report, TLC - Total Lost Control, NM – Near Miss), g) emergency procedures.
EXE6	The ISPS Code on sea-going ships: a) ISPS on sea-going vessels, b) the role of CSO and SSO in the system, c) procedures of the ship's crew members' activities under ISPS, d) checklists, e) audits to confirm the operation of ISPS on the ship
EXE6	Organization of technical supervision of sea-going vessels: a) PMS system (planned maintenance system), b) the supervision rules of classification institutions over the technical operation of the ship, c) rules regarding scheduled and emergency technical inspections of machinery and marine equipment
EXE6	Rules for the organization and supervision of the safety of navigation and life saving at sea in

	situations failures: a) ship emergency plans, b) rules of conduct members of ship's crews during alarms and emergency situations, c) duties of crew members in emergency situations, d) the rules of conduct of crew members in special cases, e.g. blackout, failure of the main propulsion control of the ship, failure steering gear control.
EXE6	Risk analysis in the technical operation of the ship: a) basic risk analysis (RA – Risk Assessment), b) procedures for the performance of RA, c) procedures for the analysis of the causes of the accident on the ship
EXE6	Ship emergency plans: a) rules of behavior during alarms and emergency situations, b) obligations of ship's crew members in emergency situations, c) rules of conduct of crew members in special cases, e.g. black-out, failure of steering the main propulsion of the ship, steering gear
EXE6	Ship emergency plans: a) rules of behavior during alarms and emergency situations, b) duties of ship's crew members in emergency situations, c) rules of conduct of members machine crew in special cases, eg blackout, failure of the drive control main ship, steering gear

TEACHING AIDS	
1	Multimedia presentations.
2	Repository with laboratory materials

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
F1	Test no. 1
F2	Test no. 2
PLec	0,5*F1+0,5*F2

STUDENT WORKLOAD

Form of activity	**Average number of hours**
Contact hours with the teacher:	**36**
Lectures and classes	**36**
Exam/tests	**2**
Student work:	36
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	18
Preparation for classes	18
TOTAL NUMBER OF HOURS PER SEMETER	**72**
NUMBER OF ECTS POINTS	**3**

LITERATURE

Basic	
1	Code of Safe Working Practices for Merchant Seafarers
2	ISM Code
3	SOLAS convention
4	ISPS Code
5	Marpol Convention

LECTURER (NAME AND SURNAME, E-MAIL)	
1	Marcin Kluczyk, m.kluczyk@amw.gdynia.pl

I. DETAILED SUBJECT DESCRIPTION	
1. Title of subject (O/S)*:	**MARINE MACHINERY AND EQUIPMENT(O)**
2. Code of subject:	**Un**
3. Department:	**Faculty of Mechanical and Electrical Engineering**
4. Major:	**Mechanical engineering**
5. Module:	**Civilian / Military**
6. Education cycle:	**I°**
7. Study mode:	**Full-time**
8. Profile:	**academic**
11. Lecturer:	**Tomasz Kniaziewicz, DSc., DEng.**
12. Date of update:	**13 March 2018**

** O/S – obligatory / selection*

AIM OF SUBJECT	
A1	To familiarize students with the purpose, failures and servicing of ship engine room mechanisms.
A2	To get engineering skills of proper exploitation of Marine Power plant mechanisms.
A3	To familiarize students with the construction, operation principle and parameters of pumps and pump systems.
A4	To familiarize students with the construction, operation principle and parameters of ship compressors.
A5	To familiarize students with devices which removes impurities from fuels and oils.
A6	To understand the purpose of the cleaning process in a drum centrifuge and developing engineering skills in the proper operation of centrifuges.
A7	To familiarize students with the construction and operation of filters.
A8	To familiarize students with the construction, principle of operation and phenomena occurring in ship heat exchangers.
A9	To familiarize students with theoretical basics and possible solutions of ship systems for power hydraulics.
A10	To familiarize students with deck mechanism.
A11	To familiarize students with the types and purpose of deck equipment.
A12	To familiarize students with the construction, principle of operation and phenomena occurring in steering gear mechanism and way of moving the rudder.
A13	To familiarize students with the construction, principle of operation and control systems of CPP.
A14	To familiarize students with the construction of hydraulically controlled deck devices.

PREREQUISITE KNOWLEDGE, SKILLS AND COMPETENCES	
1	Knowledge of physics at the high school level.
2	Knowledge of thermodynamics.
3	Knowledge of fluid mechanics.
4	Knowledge of the construction and operation of machines.
5	Knowledge of technology of materials.

6	Knowledge of technical drawing.

LEARNING OUTCOMES

On successful completion on this subject, students should be expected to:

LO1	Student knows the basic types of compressors, pumps and separators. Student understands the purpose of using these devices. Student knows the rules of proper servicing of Marine Power plant mechanisms. Student knows the typical malfunctions of these devices.
LO2	Student is able to start properly, supervise the work and disable the Marine Power plant equipment. Correctly uses the technical and operational documentation regarding these devices.
LO3	Student defines the terms concerning the operating parameters of the pumps and pump system. Student knows the construction and principle of operation of basic types of pumps. Student understands the purpose of using individual types of pumps on a vessel. Student knows the characteristics of the pumps. Student knows the typical phenomena associated with the operating of pumps. Student knows the conditions of cooperation of pumps with installations.
LO4	Student defines the terms concerning the operating parameters of the compressor. Student knows the construction and principle of operation of the basic types of air compressors. Student understands the purpose of using different types of air compressors on a vessel. Student knows the characteristics of the compressors. Student knows the terms of cooperation of the compressor with the wire and tank. Student knows the rules of classification societies which affects compressors.
LO5	Student defines the terms of methods and processes of separation of fuels and oils in drum centrifuges. Student knows the theoretical basics of the centrifugation process. Student knows the construction of centrifuges. Student knows the operating principles of centrifuges.
LO6	Student is able to start properly, supervise the work and turn off the drum centrifuge. Correctly uses the technical documentation of the device. Student is able to correctly select the parameters of the fuel and oil centrifuging process. Student can correctly evaluate the device operation indicators.
LO7	Student knows and practically uses the basic concepts of filters and the filtration process. Student knows the construction, operating principle and operating conditions of filters and separating devices.
LO8	Student defines the terms of heat exchange. Student knows the structure and principle of operation of the basic types of heat exchangers. Student understands the purpose of using different types of heat exchangers on a vessel. He knows the influence of exploitation factors on the efficiency of heat exchangers.
LO9	Student defines the terms of hydraulics. Student knows the basic schemes and symbols used in hydraulics. Student knows examples of solutions of a hydraulics installation.
LO10	Student knows the purpose, construction and operating principle of anchor and mooring windlasses.
LO11	Student knows the types and purpose of deck equipment. Knows steering, anchoring, mooring and reloading devices.
LO12	Student knows the types and purpose of the steering devices. Student knows the terms associated with the manoeuvrability and stability of the ship. Student knows the construction and operating principles of the electro-hydraulic steering device. Student knows the rules of classification society for steering devices. Student knows the

	principles of steering device operations.
LO13	Student knows the types and purpose of controllable pitch propellers. Student knows the construction and operation principles of CPP. Student knows the rules for the operation of CPP.
LO14	Student knows the construction and principles of operation of anchor windlasses and capstans.
LO15	Student carefully follows the content of the lecture, asks questions when student has difficulty to understand, discusses during classes, in order to better understand the material, student searches for additional information from other sources.
LO16	Student follows the rules of lectures. Student discusses the possibilities of modifying the rules in order to increase the effectiveness of lecturing by other students.
LO17	Student actively participates in the lecture, exercise, laboratory and reports to the answer when the lecturer asks a question about their content.

STRUCTURE OF THE SUBJECT

Form of classes	Number of hours
Lecture	80
Exercise	2
Laboratory	8

SUBJECT MATTER CONTENT

LEC01	Pump systems
LEC02	Pumps
LEC03	The influence of operational factors on pump characteristics.
LEC04	Jet pumps
LEC05	Compressors
LEC06	Equipment for separating of fuels and oils.
LEC07	Installations and devices for regulation of fuel viscosity before the engine
LEC08	Heat exchangers
LEC09	Equipment for obtaining fresh water from seawater
LEC10	Hydraulic marine installations
LEC11	Steering devices of the vessel
LEC12	The principle of operation and construction of thrusters and active steering system.
LEC13	Controllable pitch propellers
LEC14	Anchor devices
LEC15	Installations for opening and closing of hatch way covers
LEC16	Hydraulic installations of watertight doors
LEC17	Handling equipment
LEC18	Inclination stabilizers
LEC19	Boat lifts
LEC20	Shaft lines

LAB1	Cooperation of the centrifiugal pump with the pump system
LAB2	Measurement of the efficiency of the starting air compressor

TEACHING AIDS	
1	Multimedia presentations.
2	Laboratory with marine diesel engines.
3	Scientific aids: models, boards, exhibits of mechanisms and their components, ship documentation, catalogs and prospectuses of mechanism manufacturers.

METHOD OF ASSESSMENT (F – FORMATIVE, P - SUMMATIVE)	
F1	Test no. 1
F2	Test no. 2
F3-F10	Evaluation of laboratory exercises
PLec	0,5*F1+0,5*F2
PLab	0,125*(F3+F4+F5+F6+ F7+F8+F9+F10)

STUDENT WORKLOAD	
Form of activity	**Average number of hours**
Contact hours with the teacher:	**90**
Lectures and classes	**86**
Exam/tests	**4**
Student work:	110
Preparation of a plan-outline (plan work as an instructor at the point of teaching)	55
Preparation for classes	55
TOTAL NUMBER OF HOURS PER SEMETER	**200**
NUMBER OF ECTS POINTS	**8**

LITERATURE	
Basic	
1	Z. Górski, Budowa i działanie okrętowych urządzeń hydraulicznych – Construction and Operation of Marine Hydraulic Machinery, Trademark, Gdynia 2008
2	Z. Górski, Budowa i działanie okrętowych urządzeń oczyszczających – Construction and Operation of Marine Cleaning Machinery, Trademark, Gdynia 2009
3	Z. Górski, Budowa i działanie okrętowych urządzeń sterowych, śrub nastawnych i pochewałów śrubowych – Construction and Operation of Marine Steering Gears, Controllable Pitch Propellers and Stern Tubes, Trademark, Gdynia 2009
4	Z. Górski, Budowa i działanie pomp okrętowych – Construction and Operation of Marine Pumps, Trademark, Gdynia 2010
Recommended	
5	H.D. McGeorge Marine Auxiliary Machinery,1999

LECTURER (NAME AND SURNAME, E-MAIL)	
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