Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Environmental Protection**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	1	1	1	

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	45	15	0	0	0	60

Name of lecturer(s)	Roman Liberacki, Zbigniew Górski

Learning outcomes of the course unit

The student lists environmental hazards associated with the operation of ships and other technical objects operating at sea. The student lists the most important conventions for the protection of the marine environment. The student lists the environmental equipment used on ships. The student describes the construction of environmental protection equipment such as oil separator from bilge water, sewage treatment plant, waste incinerator. Student mentions ways of disposing of living organisms in ballast water. A student discusses ways to reduce emissions to the atmosphere. The student selects the devices for the prevention of the marine environment. The student describes the principles of safe bunkering of fuels and oils on board. The student describes the procedures and design ways to prevent oil spillages from tankers and drilling platforms.

Prerequisites and co-requisites

No requirements.

Course contents

Environmental hazards associated with the operation of ships and other technical objects operating at sea. The most important conventions for the protection of the marine environment (MARPOL, HELCOM). Construction, working principles and the methods of selecting the environmental protection equipment used on ships (oil separator from bilge water, sewage treatment plant, waste crambler and waste incinerator). Methods of disposing of living organisms in ballast water and selection of appropriate method for the ship. Principles of safe bunkering operations on the vessels and the technical means to prevent oil spills during these operations. Design solutions and procedures to be followed for safe operation of crude oil tankers and drilling platforms. Seminar: Selected problems of environmental management in the construction and repair of ships and ocean engineering units. The role and scope of interference of Classification Societies in maintaining the technical condition of units under their supervision. Systems inspection and repairs preventive and control. Ways to maintain the quality of hull corrosion protection. Environmental aspects in the rehabilitation and construction of ships and ocean engineering. Legal aspects of ecological docking process. Special Issues implementation of selected processes in the course of repairs. The seminar - drafting and review of the impact of work-related corrosion protection hull of the marine environment - working in teams multiplayer. Each team develops a different portion of the repair issues with particular emphasis on environmental aspects.

Recommended and requiered reading

Basic literature

1) Kaniewski E., Tymański S.: Ochrona środowiska. Gdynia, WSM, 1987. 2) Małaczyński M.: Ochrona środowiska morskiego przed zanieczyszczeniami ze statków. PG, Gdańsk, 1980. 3) Wiewióra A.: Ochrona środowiska morskiego w eksploatacji statków. WSM, Szczecin, 1999 r. 4) International Convention for the Prevention of Pollution from Ships MARPOL 73/78. 5) Konwencja o ochronie środowiska morskiego obszaru Morza Bałtyckiego. 6) PRS: Przepisy klasyfikacji i budowy statków morskich.

7)A. Matuszak-Flejszman- Benefits of Environmental Management System in Polish Companies Compliant with ISO 14001 – Polish J. of Environ. Stud. Vol. 18, No. 3 (2009), 411-419; 8)Environmental management- The ISO 14000 family of International Standards; 9)www.epa.gov/sectors/sectorinfo/sectorprofiles/shipbu.-“ EMS Implementation Guide for the Shipbuilding and Ship Repair Industry and 10) Findings and Recommendations on Lean Production and Environmental Management Systems in the Shipbuilding and Ship Repair Sector.

Supplementary literature

No requirements.

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	60%	50%
	Power point presentation	100%	50%

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Marine and Intermodal Transport**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	1	1	5	

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	30	15	-	-	30	75

Name of lecturer(s)	Mirosław Gerigk

Learning outcomes of the course unit

The learning outcomes of the course unit regarding the marine transport is to obtain the knowledge on the definitions, infrastructure, means and systems of the marine and intermodal transport. The first main part of the knowledge given to the students is connected with the infrastructure divided to marine transport infrastructure and intermodal transport infrastructure. The second main part concerns the means of transport concerning mainly the seagoing ships and inland ships including the intermodal means of transport. The third part is associated with the marine transport and intermodal transport systems. The final part of the course concerns the complex problems connected with the marine and intermodal transport.

Prerequisites and co-requisites

A student should have a good level of general knowledge on the marine and intermodal transport including the infrastructure, means and systems. The knowledge on the general issues of transportation, logistics, theory of systems, theory of safety, mathematical modeling, etc. are very important, too.

Course contents

The contents of the course are as follows:
- marine and intermodal transport in development of economy,
- definitions of the marine and intermodal transport,
- system of marine and intermodal transport, system elements and interrelations between the elements,
- infrastructure of the marine transport,
- infrastructure of the intermodal transport,
- means of marine transport (seagoing ships),
- means of intermodal transport (inland ships, railway, road means of transport),
- marine and intermodal transport systems including the management systems and safety assessment systems,
- complex approach to solve the problems concerning the marine and intermodal transport,
- challenges concerning the marine and intermodal transport.

Recommended and required reading

Basic literature

1. Rydzkowski W., Wojewódzka-Król. K. Transport. Problemy transportu w rozszerzonej UE. Wydawnictwo naukowe PWN Sp. z o.o., Warszawa 1997, 2000, 2005, 2009.
2. Krystek R. et al. Zintegrowany system bezpieczeństwa transportu. Tom I, II i III, Politechnika Gdańska 2009, Wydawnictwa Komunikacji i Łączności sp. z o.o., Warszawa 2009.

Supplementary literature

1. Jędrzejczak Z. et al. Badania operacyjne w przykładach i zadaniach. Wydawnictwo Naukowe PWN SA, Warszawa 1999, 2002, 2004.
2. Matulewski M. et al. Systemy logistyczne, komponenty, działania, przykłady. Biblioteka Logistyka, Instytut Logistyki i Magazynowania, Poznań 2008.
3. Niziński S. et al. Logistyka dla inżynierów. Wydawnictwa komunikacji i Łączności sp. z o.o., Warszawa 2011.

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Marine Applied Informatics, CAE and Design Tools I**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	1	1	5	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	30		30			

Name of lecturer(s)	A.Kniat, J. Kapcia, R. Szłapczyński, T. Niksa

Learning outcomes of the course unit

student formulates algorithms to solve simple engineering problems
student understands structural and object oriented programming
student implements algorithms in a programming language
student implements events handling in a window system
student solves equations in Matlab
student defines and solves optimization problems in Matlab

Prerequisites and co-requisites

proficiency in using PC computer, completed course of Mathematics for mechanical engineers

Course contents

PROGRAMMING:
- Programming language syntax,
- Program design phases: algorithm, implementation, debugging,
- Dialog with user : command line, windows interface,
- File system (files & streams): types of files and streams, opening, searching, reading/writing, closing.

MATLAB:
- Solving equation systems,
- Vectors and matrices processing,
- Interpolation and approximation,
- Optimization,
- Graphic results presentation: two and three dimensional graphs,
- Importing and exporting data.

Recommended and requiered reading

Basic literature

Moler C., Numerical Computing with MatLab, Copyright 2004, Cleve Moler
Petzold C., Programming Windows, Microsoft
Wirth N., Algorithms + Data Structures = Programs, Prentice Hall

Supplementary literature

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade

Field of study	Oceanotechnika	**Specialisation**	Ocean Engineering
Course unit title	**Material Engineering & Manufacturing Technology**		

Course unit code	**Year of study**	**Semester**	**Number of ECTS credit allocated**	**Type of course**
	1	1	6	

Planned learning activities and teaching methods	**Lecture**	**Tutorials**	**Laboratory**	**Project**	**Seminar**	**Sum**
	30	-	30	-	-	60

Name of lecturer(s)	Dr hab. inż. M. Jakubowski

Learning outcomes of the course unit

The student describes new and technological advanced structural materials designed for shipping and ocean objects. Student names basic kinds of new structural materials It exchanges the for shipbuilding and ocean technology as well as their properties. Student explains basic physical principles during their production and processing. Student describes principle of acceptance of these materials applied in industry. Student describes principle their selection for ship and offshore structures. Student makes the safe and exact measurements as well as opinions of new structural materials dedicated for ocean and ship structures in laboratory.

Prerequisites and co-requisites

Basic knowledge of subject: Materials Science for Naval Architectures & Marine engineers

Course contents

LECTURE
The most essential tasks to achievement by material science and material engineering in the closest decades. Historical development of engineering materials. Prognosis of development of engineering materials. The modern materials for marine technique as well as their development {Structural steels of mass use. Maraging steels . Duplex steels. Copper alloys. Alloys of aluminium and magnesium. Titanium"s and titanium alloys. Cobalt and cobalt alloys. Alloys Cr - Ni - N. Zinc, lead, tin and their alloys. The metals with shape memory. Super plasticity alloys. Hard magnetic materials. Metallic glasses. Electronic materials. Superconductive materials. Carbon materials. Ceramic materials. Super hard materials. Composites. The present methods of materials investigations for marine technology.
LABORATORY
Microstructures investigation of structural ferritic-martensitic and maraging steels. Microstructures investigation of duplex steels. New cast alloys designed for ship propellers. Application of new non-destructive (NDT) methods of investigations in engineering. Investigation of titanium"s and titanium alloys for marine technology. Investigation of new aluminium alloys for marine technology.

Recommended and requiered reading

Basic literature

1. RW. Cahn, P. Haasen, E. J. Kramer: Materials science and technology. Volume 1 - 18. Wiley-Vch, Verlag GmbH & Co, KGaA, Weinheim 2005.
2. ASM Handbook. Volume 1 - 9. Edited by ASM International**.**
3. Ashby M., Shercliff H., Cebon B, Materials engineering, science, processing and design. published by Elsevier Ltd., 2007, 2010

Supplementary literature

Assessment methods and criteria	**Course passing criteria**	**Passing threshold**	**Percentage of the final grade**
	Laboratory	100.00%	50.00%
	Midterm colloquium	60.00%	50.00%

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Manufacturing Technology I**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	1	1	3	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	30	-	-	15	-	45

Name of lecturer(s)	Dr hab. Inż, J. Kozak

Learning outcomes of	Student presents necessary shipyard facilities and suggests main characteristics of shipyard manufacturing process, can perform "design for production" analyses of hull structure. Student learns how to prepare and present a report on technical problems connected with shipbuilding technology.
Prerequisites and co-requisites	Fundamentals of Manufacturing of ship hulls, Fundamentals of Ship Structures, Ship structure drawing, Welding techniques in shipbuilding, Manufacturing and repair of ship hulls
Course contents	Lectures: Undersea oil and gas fields as hydrocarbon resources for energy generation. Technical aspects of undersea exploration drilling and development of undersea field. Kinds and types of technical installations for exploration and exploitation of undersea hydrocarbon reservoirs. Fixed platforms for drilling and servicing (production) of oil and gas sub-sea fields. Development of steel fixed platforms : types of structures, material and technological problems during their construction. Methods of manufacturing on land, transportation to undersea fields and their installation on fields. Jack-up platforms for drilling and servicing (production) of oil and gas undersea fields - principle of operation. Development of jack-up platforms : types of structures, material and technological problems during their construction on land. Transportation to sub-sea fields and their installation on fields. Semi-submersible platforms - principle of operation. Development of semi-submersible platforms : types of structures, material and technological problems during their construction on land. Transportation to undersea fields and their installation on fields. Mooring systems. Tension Leg Platforms (TLP) principle of operation and mooring systems and anchor types. Development of Tension Leg Platforms types of structures, material and technological problems during their construction on land. Transportation to undersea fields and their installation on fields. Floating Storage and Offloading units FSO; Conversions of crude-oil tankers into FSO and FPSO units. Floating Drilling, Production, Storage and Offloading systems - FDPSO. Platform Supply Vessels (PSV). Anchor Handling Tug Supply vessels (AHTS). Pipe lay and construction vessels - S-Lay and Vertical Lay (VLS) Systems. Floating cranes of very large capacities. Heavy Lift Vessels for transportation of jack-up platforms, semi-submersibles, SPAR and Tension Leg Platforms. Specialized ships for sea transportation of gas : LPG (Liquefied Petroleum Gas) carriers and LNG (Liquefied Natural Gas) carriers. LNG fleet. Production and transport chain for LNG. Methods of transportation and types of ships for carrying liquefied gas. LNG containment systems : self-supporting (prismatic and spherical) and membrane systems. Isolation types and methods CNG (Compressed Natural Gas) ships for gas transportation : types of vessels. Development of types of structures, material and technological problems during their manufacturing in shipyard. Comparison of safety problems in transportation by CNG and LNG ships. **Sem.2 - Project**: Instruction for manufacturing of ship hull in a shipyard 1. technical description of a vessel:1.1. selection of a shipyard and method of ship hull assembly , 1.2. division of hull into blocks and units ,1.3. analysis of applied structural materials , 1.4. design-for-production aspects of hull and elements of structure 2. Instruction for manufacturing of ship hull: 2.1. listing of elements of selected blocks and units, mass calculation , 2.2. instruction for hull block assembly, 2.3. measurements during hull block assembly, dimensional standards , 2.4. welding instruction of hull block , 2.5. fillet welds dimensions according to rules of classification society , 2.6. instruction for quality acceptance of hull block, dimensional standards , 2.7. instruction for transportation of hull block to ship assembly ,2.8. preparatory works for hull launching 3. Literature elaboration of selected topic: selection of literature, written report, preparation and delivery of presentation
Recommended and requiered reading	**Basic literature** 1. Ffooks R. "Natural Gas by Sea - The Development of a New Technology", Witherby, London, 1993, ISBN 1 85609 052 3 ;2. Ben C. Gerwick, Jr., A. Wiley -Construction of Offshore Structures, Interscience Publication John Wiley & Sons -USA 1986; 3. Barreto A. et al., New generation of completion technology, Offshore, February 2003; 4. ValsgÍrd S., O Reepmeyer, P Lothe, NK Str¸m, K., The Development of a Compressed Natural Gas Carrier; PRADS 2004, Lubeck; 5,Floating cranes _ http://www.oobject.com/category/10-enormous-floating-cranes/ **Supplementary literature** 1.A Mather: OFFSHORE ENGINEERING- An Introduction (2 Edition), RINA 2006 ;2. K. Van Dokkum: SHIP KNOWLEDGE - A MODERN ENCYCLOPAEDIA ISBN: 90-806330-2-X ;3. Offshore monthly technical magazine 4.S. Harris: FULLY REFRIGERATED LPG CARRIERS RINA 2006; ISBN: 1 85609266

Assessment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade
	Project	80.00%	60.00%
	Midterm colloquium	60.00%	40.00%

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Ship and Offshore Processes and Operations**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	1	1	5	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	30	15	15	-	-	60

Name of lecturer(s)	

Learning outcomes of the course unit	The learning outcomes of the course unit is to obtain the knowledge on the definitions and basic problems concerning the ship and offshore processes and operations. The key issues to be presented are the harsh conditions, new technologies and multiple operations of modern vessels and offshore structures which are increasingly complex. It is very important to present an approach of a zero tolerance for failure. Additionally, the managing risk techniques will be presented where the efficient, reliable and safe operations are the key for success.
Prerequisites and co-requisites	A student should have a good level of general knowledge on the ship and offshore processes and operations. The knowledge on the general issues of ship processes, ship operations, offshore processes, offshore operations, logistics, theory of systems, theory of safety, mathematical modeling, etc. are very important, too.
Course contents	The general contents of the course are as follows: - fleet and offshore condition management - ship processes (arrival, unloading/loading, transport of cargo, stack, terminal, other processes) - offshore structure processes (drilling, loading/unloading oil, transport of oil, oil transfer to terminal or other offshore structure, oil transfer - FPSO, other processes) - selected loading and unloading operations - vessel and offshore structure hull integrity management - vessel and offshore structure maintenance management - vessel and offshore structure docking management - vessel and offshore structure lay-up - vessel and offshore structure recycling - incident investigation - safety and risk management, risk assessment - safety equivalence and safety barrier management - safety culture and human factor - navigational risk assessment; arctic shipping risk; risk of offshore operations in arctic
Recommended and requiered reading	**Basic literature** 1. Rydzkowski W., Wojewódzka-Król. K. Transport. Problemy transportu w rozszerzonej UE. Wydawnictwo naukowe PWN Sp. z o.o., Warszawa 1997, 2000, 2005, 2009. 2. Krystek R. et al. Zintegrowany system bezpieczeństwa transportu. Tom I, II i III, Politechnika Gdańska 2009, Wydawnictwa Komunikacji i Łączności sp. z o.o., Warszawa 2009. 3. The Oceanengineering Committee. 26th International Towing Tank Conference, Rio de janeiro, Brasil, 28th August - 3rd September 2011. 4. Moan T. Marine structures for the future. Centre for Offshore Research and Engineering. National University of Singapore, CORE Report No. 2003-01. 5. Faltinsen O.M. Sea Loads on Ships and Offshore Structures. Cambridge University Press, 1990. **Supplementary literature** 1. Jędrzejczak Z. et al. Badania operacyjne w przykładach i zadaniach. Wydawnictwo Naukowe PWN SA, Warszawa 1999, 2002, 2004. 2. Matulewski M. et al. Systemy logistyczne, komponenty, działania, przykłady. Biblioteka Logistyka, Instytut Logistyki i Magazynowania, Poznań 2008. 3. Niziński S. et al. Logistyka dla inżynierów. Wydawnictwa komunikacji i Łączności sp. z o.o., Warszawa 2011.

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade

Subject name	Stability & Dynamics of Ship and Offshore Structures
Subject code	O:096050
Faculty	
Course name	Ocean Engineering
Learning area	technical sciences

Learning profile	general academic profile	Study year	1
Type of subject	Obligatory	Study semester	1
Study level	Full-time studies postgraduate studies	ECTS	3

ECTS details

Activity	gk	pw
Lecture	30	
Excerciese	15	
Consulation	5	
Lecture studies		25
Sum	50	25
Parameter ECTS	25	25
ECTS components	2	1
ECTS sum	3	

Name of lecturer	dr inż. Paweł Dymarski dr inż. Paweł Dymarski
Subject objectives	The aim of the course is to familiarize students with the basic (applied) methods of modeling problems of stability and dynamics of ships and offshore structures.

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_U05	The student can use simple and more complex computational tools to solve problems with stability / dynamics of offshore structures (eg .: spreadsheet and / or Matlab, and / or C ++)	[SU1] Assessment of task fulfilment
K_W02	The student learns the methods (used in ocean engineering) of modeling of the impact of the environment: wind, sea current and wave	[SU1] Assessment of task fulfilment
K_W03	On the basis of calculations of static and / or dynamics of offshore structure student is able to determine the forces acting on the elements of the construction	[SU3] Assessment of ability to use knowledge gained in the different modules
K_W04	The student knows the main elements of the construction of offshore facilities, for selected cases he can perform an analysis of the mechanics of the structure (eg TLP, monopile, spar)	[SU1] Assessment of task fulfilment
K_W09	Student can use basic computational methods for solving tasks of static / dynamic of offshore facilities (methods based on Morison equation)	[SK5] Assessment of ability to resolve work-related problems

Mode of delivery	at the university

Prerequisites	- Knowledge of general mechanics -- The concept of force and torque -- Equations of balance of forces and moments -- Newton's Laws -- The ability of integration of equations of motion - Basic knowledge of strength of materials -- Ability to determine forces in statically determinated structures: --- Ability to determine the internal forces and the reaction of the beams, --- Ability to determine the internal forces in the frames (basic configurations). --- Basic knowledge about the characteristics of the sections, stiffness, etc. - Basic knowledge of fluid mechanics -- Hydrostatic pressure, -- Buoyancy, -- Resistance force (drag), - Basic knowledge of the theory of ship -- The stability of the ship in the scope of the metacentric formula -- Buoyancy in the range of linear equations -- Basic knowledge of the ship's seakeeping --- the concept of added masses - Basic knowledge of computer tools and programming languages -- The use of spreadsheets (eg .: Excel, OpenOffice Calc) -- Indicated basic knowledge of C / C ++, -- Or basic knowledge of Matlab / Octave, -- The ability to create graphs (visualization of results) (Gnuplot / Matlab / Octave, or Excel) - Basic knowledge of numerical methods -- Numerical integration: midpoint rule, trapezoid rule -- Basic methods for solving initial value problems (ODEs): --- Euler method (explicit Euler) --- Runge-Kutta methods
Recommended components	For students who have not mastered the issues mentioned above we recommend additional classes on selected issues

Subject contents	1.Types of offshore platforms – basic konowlage - Fixed platform stryctures -- Steel jacket -- Compliant tower -- Concrete gravity structure or concrete base structure (CBS) - Floating platform structures -- Tension Leg Platform -- Semi submersible -- Spar -- Ship shaped vessel (FPSO) 2. Definition of rigid-body motion modes 3. Static stability of ship and offshore structures - The concepts of three types of equilibrium: stable, neutral and unstable - Analysis of the mechanisms of the restoring force, depending on the degree of freedom: – heave – roll – pitch - analysis of motion at the other degrees of freedom (surge, sway, yaw) 4. Dynamics of floating body structures. - Single degree of freedom problems – General equation of motion (based on Newton's second law) – Determination of the main parameters of a dynamical system: --- Added mass (or virtual mass) --- Linear damping coefficient --- Viscous drag coefficient – Basic numerical methods for sloving ODEs: --- explicit (or forward) Euler method –- implicit (or backward) Euler method –- midpoint rule –- trapezoid rule - Exercise 1: Calculation of the movements of cylindrical buoy, floating in calm water, which was displaced from the equilibrium position 5. Dynamics of the environment. Structure-environmental force interactions - Intoduction to ocean wave modelling. Airy wave theory (regular wave) - Model of wind velocity profile - Current velocity profile modeling (wind current, tidal current) - Exercise 2: Calculate the movements of cylindrical buoy, floating in (deep) water, which was treated with regular wave. - Fluid-induced structural forces -- Morison equation --- Keulegan Carpenter number, beta number - Exercise 3: Calculate the forces and moment on cylindrical, vertical monopile subjected to a regular wave. 6. Stablity of Offshore Structures (Stability of Tension Leg Platforms) - Equations of Equilibrium of forces -- Determination of the restoring force due to anchoring system -- Determination of platform displacement due to environmental influences -- Determination of reaction forces in the tendons - Exercise 4: Determine the static displacement of TLP platform for given platform geometry and mass, and give sea current and wind strength. Determine forces in the tendons. 7. Response in irregular waves - ocean waves – a short term model -- Wave energy spectra –- The Pierson-Mostkowitz Spectrum --- The JONSWAP Spectrum - Exercise 5: Draw a graph of the wave spectrum for given data: Hs and Tp - Response Amplitude Operator - Response in irregular wave (linear model) - Exercise 6: Estimate the significant and maximum amplitude of heave of a cylindrical buoy, during a storm lasting two hours.

Recommended and required reading	**Required reading** James F. Wilson: „Dynamics of Offshore Structures”. WILEY 2003 Targut Sarpkaya: „Wave Forces on Offshore Structures”. Cambridge University Press 2010 **Recommended reading** „Principles of Naval Architecture”, vol. 1,3. SNAME 1988 O.M. Faltinsen: „Sea Loads on Ships and Offshore Structures”. Cambridge University Press 1990 S.K. Chakrabarti: „Offshore Structure Modeling” (Advanced Series on Ocean Engineering, Vol. 9). World Scientific 1994 S.K. Chakrabarti: „Handbook of Offshore Engineering”. Elsevier Science 2005 J.M.J. Journée and W.W. Massie: "OFFSHORE HYDROMECHANICS". Delft University of Technology 2001 http://www.shipmotions.nl/DUT/LectureNotes/OffshoreHydromechanics.pdf

Planned learning activities

Lecture	Exercise	Laboratory	Project	Seminar	Sum
30	15	0	0	0	45

W tym nauczanie na odległość: 0.0

Assesment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lectures	50.0	50.0
	Activity	0.0	10.0
	Exercises	80.0	40.0

Example issues / example questions / tasks completed

Exercise 1:
Calculate the movements of cylindrical buoy, floating in calm water, which was displaced from the equilibrium position of the δz = 1m.
D = 2m - diameter of the buoy,
T0 = 4m - initial draught (in equilibrium),
H = 6m - depth (or height),
ρ = 1025 kg/m3 - water density,
CA = 0.2 - added mass coefficient,
CD2 = 0.82 - drag coef. for fully submerged cylinder (both bases submerged).
CD = CD2/2
b33 = ? - neglected

Exercise 2:
Calculate the movements of cylindrical buoy, floating in (deep) water, which was treated with regular wave:
a = 0,5 m - wave amplitude,
T = 3 s - wave period,
D = 2m - diameter of the buoy,
T0 = 4m - initial draught (in equilibrium),
H = 6m - depth (or height),
ρ = 1025 kg/m3 - water density,
CA = 0.2 - added mass coefficient,
CD2 = 0.82 - drag coef. for fully submerged cylinder (both bases submerged).
CD = CD2/2
b33 = ? - neglected

Exercise 3:
Calculate the forces and moment on cylindrical, vertical monopile stuck in the seabed which is subjected to a regular wave during extreme storm:

a = 4.5 m - wave amplitude,
T = 11.3 s - wave period,
D = 6.5m - diameter of the buoy,
d = 40 m - water depth,
ρ = 1025 kg/m3 - water density,
CM = ? - inertia coef. (rough surface) from CM(KC) plot,
CD = ? - drag coef. (rough surface) from CD(KC) plot,

Exercise 4:
Determine the static displacement of TLP platform, if the strength of the wind is:
uw=48 m/s and the speed of the sea current uc=2.37 m/s [DNV-OS-E301, October 2010]

Location Mississippi Canyon, Block 243
Water Depth: d=860 m

SeaStar® TLP Specifications:
Payload (deck/facilities/risers): 8 425 tons
Main column dimensions: Dc=17.8 m ; hc=38.1 m
Pontoon dimensions: rp=54.7 m; hp,max=12.8 m
lp=rp-0.5Dc=45.8 m
(3pontoons)
Draft: T=31.7 m
Deck Dimensions: Bd=42.7m x Ld=42.7m
(3 levels)
[http://www.zerohedge.com/article/possible-new-oil-spill-100-10-miles-reported-gulf-mexico]

Additional assumptions:
Level Hight: hl=8m;
Total Weight: W=0.75D0; (including risers)
Pontoon width, mean height: wp=6m; hp=9.4 m;
Deck Freeboard: 17.5 m

Exercise 4.1: Additional task
Determine the tension of each of the tendons.

Exercise 5
Draw a graph of the spectrum of waves for given data:
- The Pierson-Mostkowitz Spectrum
- The JONSWAP Spectrum
Draw a graph of an exemplary waveform for a given point x and a specified range of time. Calculate the following statistical values: Hw1/3 ; Hw1/10 ; Hw1/100 ; Hw1/1000
Hs=9.01 m
Tp=11.3 s
t = 600 s

Exercise 6

	Estimate the significant and maximum amplitude of heave of a cylindrical buoy, during a storm lasting two hours. For the following data: Wave data: Significant wave height: Hs=3.2 m; Peak period: Tp = 7.8s Buoy geometry: D = 2m - diameter of the buoy, T0 = 6m - initial draught (in equilibrium), H = 10m - depth (or height), ρ = 1025 kg/m3 - water density, CA = 0.2 - added mass coefficient, CD = 0.41 - drag coef. Note: use the worksheet from exercise 2 (but remember: change the geometric data)
Language of instructions	English
Work placement	Not applicable

Subject name	Finance and Economy in Engineering Design		
Subject code	O:096100		
Faculty	Department of Energy and Industrial Apparatus		
Course name	Ocean Engineering		
Learning area	technical sciences		
Learning profile	general academic profile	Study year	1
Type of subject	Obligatory	Study semester	2
Study level	Full-time studies postgraduate studies	ECTS	3

ECTS details

Activity	gk	pw
Lecture	15	
Excerciese	30	
Consulation	2	
Lecture studies		6
Excerciese preparation		6
Test preparation		8
Final test preparation		8
Sum	47	28
Parameter ECTS	25	25
ECTS components	1,88	1,12
ECTS sum	3	

Name of lecturer	dr inż. Aleksandra Wiśniewska dr inż. Aleksandra Wiśniewska
Subject objectives	The aim of the course is to acquaint students with modern methods of project management, supervision of them for the use of practical tools for project management and the achievement of the business objectives of the project. The issues of strategic project management, financial aspects of project management, organization and planning of the project, methods of team management and communication in project management are discussed during the course. The course should prepare students for effective participation in the team projects.

Learning outcomes	Course outcome	Subject outcome	Method of veryfication
	K_K08	The student correctly identifies and resolves dilemmas related to the profession of engineer assesses the risks and able to assess the effects of the activity in the field of engineering profession. The student has an awareness of his own limitations and knows when to ask the experts	[SW1] Assessment of factual knowledge [SU2] Assessment of ability to analyze information [SK4] Assessment of communication skills
	K_K12	The student has a sense of the weight of social attitudes and personal qualities: teamwork, fair play, applying the principles of fair play, conscientiousness in work, responsibility, strength of purpose.	[SK1] Assessment of group work skills [SK4] Assessment of communication skills [SU1] Assessment of task fulfilment [SK3] Assessment of ability to organize work
	K_U11	The student can assess the suitability of methods and tools for solving engineering tasks involving the construction and operation of facilities and equipment of ocean, and recognize their limitations and choose and apply the right method and tools to solve complex design tasks associated with the economic analysis and financial control of the project.	[SW1] Assessment of factual knowledge [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained in the different modules [SK5] Assessment of ability to resolve work-related problems
	K_W10	The student has knowledge of the prospects for the development of facilities and equipment of ocean, and understand the new, the most important achievements in the field of Ocean. The student has extensive knowledge in the natural sciences possible an assessment of the design objects interact with their surroundings.	[SW1] Assessment of factual knowledge [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained in the different modules [SK5] Assessment of ability to resolve work-related problems [SU2] Assessment of ability to analyze information
	K_W12	The student has the mathematical knowledge relating to the description and analysis of the operation of machinery and equipment, as well as the associated technical processes, mastering the basics of diagnostics of technical equipment and security systems.	[SW1] Assessment of factual knowledge [SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained in the different modules
Mode of delivery	at the university		
Prerequisites			
Recommended components			

Subject contents	1. Engineering Economic: Establishing Economic Equivalence, Interest: The cost of money, the elements of transactions, involving interest, equivalence calculations, interest formulas, nominal and effective interest rates, loss of purchasing power. 2. Measures of Project Worth: describing project cash flows, present worth analysis, annual equivalent method, rate of return analysis, accept/reject decision rules, mutually exclusive alternatives. 3. Cash and Flow Projections: operating profit - net income, tax treatment, effects of inflation. 4. Sensitivity and Risk Analysis: project risk, risk analysis, expected value and variance, decision rule. 5. Design Economics: capital costs vs. operating costs, minimum-cost function 6. Project management: Engineers, projects, management, planning and scheduling, staffing and organizing, team building, project control, estimation and contracting. Exercises: 1. Team building: types of personality, effectiveness of the team. 2. Project Management: WBS, Gantt, Earned Value Method, Critical Path Method, risk management.
Recommended and required reading	**Required reading** • Peterson, S. J. "*Construction Accounting and Financial Management*", Prentice Hall, New York, 2004. • Palmer, W., Palmer, W. J., Coombs, W. E. and Smith, K. A., "*Construction Accounting and Financial Management*", McGraw Hill, New York, 1999. • Pilcher, R., "*Principles of Construction Management*", McGraw-Hill, 1992. • Gibson, C. H., "*Financial Statement Analysis*" International Thomson Publishing, 1998. • Brigham, E. F., Gapenski, L. C. and Erhardt, M. C., "Fin*ancial Management: Theory and Practice*", The Dryden Press, 1999. • PMBOK **Recommended reading** • Dell'Isola, A. "*Value Engineering: Practical Applications for Design, Construction, Maintenance and Operations* ", MRS. Means Company Ltd, 1997. • Kelly, J., Male, S. and Graham, D. "*Value Management of Construction Projects*" Blackwell Sciences, 2004. • Parker, D. E., "*Management Application of Value Engineering: For Business and Government*", The Value Foundation, Washington D.C., 1994. • Kumar, S., "*Value Engineering: A Fast Track to Profit Improvement and Business Excellence*", Narosa Publishing House, 2004. • Barrie, D. S. and Paulson, B. C., "*Professional Construction Management*", McGraw-Hill, 1992.
Planned learning activities	Lecture: 15; Exercise: 30; Laboratory: 0; Project: 0; Seminar: 0; Sum: 45 W tym nauczanie na odległość: 0.0

Assesment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final test	49.0	100.0

Example issues / example questions / tasks completed

1. Team Building: Types of Personalities (2x2h),
2. Effectivness of the Team (2x2h).
3. Project Management: WBS (2x2h),
4. Gantt (1x2h),
5. Earned Value Method (2x2h),
6. Project’s Nets 1&2 Method (Critical Path Method) (3x2),
7. Risk Management (2x2h).
8. Test (1x2h)

Language of instructions	English
Work placement	Not applicable

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Modelling and Simulation in Ocean Engineering**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	1	2	4	obligatory

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	30	-	30	-	-	60

Name of lecturer(s)	

Learning outcomes of the course unit	student is able to explain mathematcal modelling role, student is able to formulate mathematical modelling principles, student is able to apply mathematical modelling methods,
Prerequisites and co-requisites	Knowledge of mathematics fundamentals
Course contents	Mathematical Modelling Principles, Inverse Problem in Physics, Model Classification, Linearization, Empirical Modelling, Mathematical Model Equivalence, Parameter Estimation, Model Validation, Distributed Parameter Modelling, Random Process Modelling, Mathematical Model Sensitivity
Recommended and requiered reading	**Basic literature** **1. Babatunde A. Ogunnaike, W. Harmon Ray: Process Dynamics, Modelling, and Control, Oxford University Press , Oxford, New York, 1994, 2. Cooper G.R., Mc Gillem C.D.: Probabilistic Methods of Signal and Systems Analysis, Oxford University Press, Oxford, New York, 1999, 3. Jordan D.W., Smith P.: Mathematical Techniques, Oxford University Press, Oxford, New York, 1998, 4. Lathi B.P.: Signal Processing and Linear Systems, Berkeley Cambridge Press, 1998** **Supplementary literature** 1. Paulo S R. Diniz, Eduardo A.B. da Silva, Sergio L. Netto: Digital Signal Processing, System Analysis and Design, Cambridge University Press, 2002

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloqia	50%	50%
	test	50%	50%

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Reliability, Safety and Risk Analysis I**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	1	2	3	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	30	15	-	-	-	45

Name of lecturer(s)	Roman Liberacki

Learning outcomes of the course unit	The student defines the terms of reliability, safety and risk. The student identifies and explains the reasons for the application of basic mathematical models in reliability studies. The students calculate the reliability indexes of simple and complex structures. Student discusses the criteria for acceptable risk level. The student uses the method of assessing the probabilities of human errors. The student uses the methods prescribed in the FSA and QRA. Student discusses the procedures and technical means taken to ensure safety during the ships and their systems operation. Student presents ways to reduce the negative effects of the accidents at sea.
Prerequisites and co-requisites	No requirements
Course contents	The main terms of reliability and safety. Reliability of simple and complex objects. Physical aspects of reliability. Empirical indexes of reliability. Basic mathematical models for testing the reliability and safety of complex systems.. Risk and reliability analysis of technical systems. The terms of safety and risk. Risk as a measure of safety. The criteria for acceptable risk. The human factor and the risk. Methods of assessing human error probabilities. Formal safety assessment (FSA). Quantitative safety analysis (QRA). Procedures and technical means taken to ensure security during the operation of ships and their systems. Ways to reduce the negative effects of the accidents at sea.
Recommended and requiered reading	**Basic literature** 1. Brandowski A.: Nauka o bezpieczeństwie. Polit. Warszawska 1993. 2. Melnick E.: Encyclopedia of Quantitative Risk Analysis and Assessment. Viley & Sons. 2008. 3. Modarres M.: What Every Engineer Should Know about Reliability and Risk Analysis. New York, 1993. 4. Swain A.D., Guttman H.E.: Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications. Final Report, prepared for U.S. Nuclear Regulatory Commision. August, 1983. 5. IMO (MSC 66/INF.8): A methodology for formal safety assessment of shipping. 1996. **Supplementary literature** No reqiurements

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	60%	50%
	Reports	100%	50%

Nazwa przedmiotu	Advanced Mechanics of Marine Structures		
Kod przedmiotu	O:096130		
Jednostka	Katedra Projektowania Okrętów i Robotyki Podwodnej		
Kierunek	Oceanotechnika (studia w jęz. angielskim)		
Obszary kształcenia	Nauki techniczne		
Profil kształcenia	ogólnoakademicki	Rok studiów	1
Typ przedmiotu	Obowiązkowy	Semestr studiów	2
Poziom studiów	stacjonarne II stopnia	ECTS	3
Wykładowcy	dr inż. Bogdan Rozmarynowski dr inż. Bogdan Rozmarynowski		
Cel przedmiotu	Zrozumienie zagadnienia interakcji fale morskie - wiatr - podłoże gruntowe - konstrukcja, specyfika dynamiki konstrukcji morskich w dziedzinie czasu i częstości, w ujęciu deterministycznym i losowym.		

Efekty kształcenia

Odniesienie do efektów kierunkowych	Efekt kształcenia z przedmiotu	Sposób weryfikacji efektu
K_U12	Student klasyfikuje, identyfikuje i definiuje zdarzenia w obiektach oceanotechnicznych.	[SK2] Ocena postępów pracy [SU2] Ocena umiejętności analizy informacji
K_U14	Student ma świadomość przyjętych założeń w zdefiniowanych modelach fizycznych z parametrami deterministycznymi i stochastycznymi	[SU2] Ocena umiejętności analizy informacji
K_W03	Student formułuje i rozwiązuje zadania zgodnie z filozofią MES.	[SU4] Ocena umiejętności korzystania z metod i narzędzi [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach różnych modułów [SU1] Ocena realizacji zadania
K_W04	Student ma pogłebiona wiedzę nt. analizy struktur inzynierskich w złożnych stanach obciażeń środowiskowych.	[SU4] Ocena umiejętności korzystania z metod i narzędzi [SU2] Ocena umiejętności analizy informacji
K_W14	Student stosuje aparat matematyczny związany z dynamiką prostych modeli w ujęciu deterministycznym i stochastycznym.	[SK2] Ocena postępów pracy [SU4] Ocena umiejętności korzystania z metod i narzędzi [SU3] Ocena umiejętności wykorzystania wiedzy uzyskanej w ramach różnych modułów [SK4] Ocena umiejętności komunikacji

Sposób realizacji	na uczelni
Wymagania wstępne i dodatkowe	Umiejętności teoretyczne i praktyczne z matematyki, mechaniki technicznej i wytrzymałości materiałów.
Zalecane komponenty przedmiotu	
Treść przedmiotu	1. Omówienie literatury przedmiotu, definicja typów konstrukcji morskich, inzynieria oceanotechniczna - przedstawienie aspektów technologicznych i mechanicznych, stosowane systemy konstrukcji, omówienie elementów konstrukcji jac-up na przykładzie platformy Petrobaltic. 2. Wstep do algebry tensorowej, tensor naprężeń i odkształcń ciała stałego, zwiazki konstytutywne. 3. Dynamika układów konstrukcji modelowanych jednym i wieloma stopniami swobody, rola tłumienia i mas dodanych w drganiach offshore, uogólniony problem drgań własnych, drgania wymuszone w inzynierii offshore. 4. Zmienne losowe, prcesy stochastyczne , pola losowe, losowe wymuszenia. 5. Opis specyfiki wiatru, fal morskich i pradu morskiego, zagadnienia interakcji wiatr - fala morska - konstrukcja - podłoże gruntowe. 6. Obciążenia wiatrem i falą morską - opis spektralny. 7. Sztywność i tłumienie gruntu, fundamenty konstrukcji offshore. 8. Przykłady numeryczne na podstawie danych platformy Petrobaltic.

Zalecana lista lektur	**Literatura podstawowa** 1. S. Chakrabarti: Handbook of offshore engineering. Vol. I, II. Elsevier 2005 2. J.F. Wilson: Dynamics of offshore structures. John Willey & Sons 2003 **Literatura uzupełniająca** K.J. Bathe: Finite element procedures. Prentice-Hall, 1996. R.W. Clough, J. Penzien: Dynamics of structures. McGraw-Hill, 1993
Metody nauczania	Wykład: 30; Ćwiczenia: 0; Laboratorium: 0; Projekt: 0; Seminarium: 0; Suma godzin: 30 W tym nauczanie na odległość: 0.0
Metody i kryteria oceniania	Kryteria oceniania: składowe – Test egzaminacyjny; Próg zaliczeniowy: 60.0; Procent oceny końcowej: 100.0 **Przykładowe zagadnienia / przykładowe pytania / realizowane zadania** Wymień i krótko opisz konstrukcje typu MODU Wyjaśnij elementy formuły Morisona dla odkształcalnego walca
Język wykładowy	angielski
Praktyki zawodowe	Nie dotyczy

Wykład	Ćwiczenia	Laboratorium	Projekt	Seminarium	Suma godzin
30	0	0	0	0	30

Kryteria oceniania: składowe	Próg zaliczeniowy	Procent oceny końcowej
Test egzaminacyjny	60.0	100.0

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Manufacturing Technology II**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	1	2	3	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	-	-	15	30	-	45

Name of lecturer(s)	Dr hab. Inż, J. Kozak

Learning outcomes of	Student presents necessary shipyard facilities and suggests main characteristics of shipyard manufacturing process, can perform "design for production" analyses of hull structure. Student learns how to prepare and present a report on technical problems connected with shipbuilding technology.
Prerequisites and co-requisites	Fundamentals of Manufacturing of ship hulls, Fundamentals of Ship Structures, Ship structure drawing, Welding techniques in shipbuilding, Manufacturing and repair of ship hulls
Course contents	Lectures: Undersea oil and gas fields as hydrocarbon resources for energy generation. Technical aspects of undersea exploration drilling and development of undersea field. Kinds and types of technical installations for exploration and exploitation of undersea hydrocarbon reservoirs. Fixed platforms for drilling and servicing (production) of oil and gas sub-sea fields. Development of steel fixed platforms : types of structures, material and technological problems during their construction. Methods of manufacturing on land, transportation to undersea fields and their installation on fields. Jack-up platforms for drilling and servicing (production) of oil and gas undersea fields - principle of operation. Development of jack-up platforms : types of structures, material and technological problems during their construction on land. Transportation to sub-sea fields and their installation on fields. Semi-submersible platforms - principle of operation. Development of semi-submersible platforms : types of structures, material and technological problems during their construction on land. Transportation to undersea fields and their installation on fields. Mooring systems. Tension Leg Platforms (TLP) principle of operation and mooring systems and anchor types. Development of Tension Leg Platforms types of structures, material and technological problems during their construction on land. Transportation to undersea fields and their installation on fields. Floating Storage and Offloading units FSO; Conversions of crude-oil tankers into FSO and FPSO units. Floating Drilling, Production, Storage and Offloading systems - FDPSO. Platform Supply Vessels (PSV). Anchor Handling Tug Supply vessels (AHTS). Pipe lay and construction vessels - S-Lay and Vertical Lay (VLS) Systems. Floating cranes of very large capacities. Heavy Lift Vessels for transportation of jack-up platforms, semi-submersibles, SPAR and Tension Leg Platforms. Specialized ships for sea transportation of gas : LPG (Liquefied Petroleum Gas) carriers and LNG (Liquefied Natural Gas) carriers. LNG fleet. Production and transport chain for LNG. Methods of transportation and types of ships for carrying liquefied gas. LNG containment systems : self-supporting (prismatic and spherical) and membrane systems. Isolation types and methods CNG (Compressed Natural Gas) ships for gas transportation : types of vessels. Development of types of structures, material and technological problems during their manufacturing in shipyard. Comparison of safety problems in transportation by CNG and LNG ships. **Sem.2 - Project**: Instruction for manufacturing of ship hull in a shipyard 1. technical description of a vessel:1.1. selection of a shipyard and method of ship hull assembly , 1.2. division of hull into blocks and units ,1.3. analysis of applied structural materials , 1.4. design-for-production aspects of hull and elements of structure 2. Instruction for manufacturing of ship hull: 2.1. listing of elements of selected blocks and units, mass calculation , 2.2. instruction for hull block assembly, 2.3. measurements during hull block assembly, dimensional standards , 2.4. welding instruction of hull block , 2.5. fillet welds dimensions according to rules of classification society , 2.6. instruction for quality acceptance of hull block, dimensional standards , 2.7. instruction for transportation of hull block to ship assembly ,2.8. preparatory works for hull launching 3. Literature elaboration of selected topic: selection of literature, written report, preparation and delivery of presentation
Recommended and requiered reading	**Basic literature** 1. Ffooks R. "Natural Gas by Sea - The Development of a New Technology", Witherby, London, 1993, ISBN 1 85609 052 3 ;2. Ben C. Gerwick, Jr., A. Wiley -Construction of Offshore Structures, Interscience Publication John Wiley & Sons -USA 1986; 3. Barreto A. et al., New generation of completion technology, Offshore, February 2003; 4. ValsgÍrd S., O Reepmeyer, P Lothe, NK Str¸m, K., The Development of a Compressed Natural Gas Carrier; PRADS 2004, Lubeck; 5,Floating cranes _ http://www.oobject.com/category/10-enormous-floating-cranes/ **Supplementary literature** 1.A Mather: OFFSHORE ENGINEERING- An Introduction (2 Edition), RINA 2006 ;2. K. Van Dokkum: SHIP KNOWLEDGE - A MODERN ENCYCLOPAEDIA ISBN: 90-806330-2-X ;3. Offshore monthly technical magazine 4.S. Harris: FULLY REFRIGERATED LPG CARRIERS RINA 2006; ISBN: 1 85609266

Assessment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade
	Project	80.00%	60.00%
	Midterm colloquium	60.00%	40.00%

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Marine Applied Informatics, CAE and Design Tools II**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	2	3	5	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	15	-	45	-	-	60

Name of lecturer(s)	C. Żrodowski, K. Niklas, P. Dymarski, P. Flaszyński

Learning outcomes of the course unit

Student builds geometric models of real objects for numerical analysis
Student exports different forms of discretized models to a FEA program
Student understands and applies boundary conditions and loads to the model
Student performs FEM calculations
Student visualize and assesses results of FEM calculations

Prerequisites and co-requisites

???

Course contents

Exercising novel strength analysis, fatigue and CFD software students will gain practice in:

- creative design concepts
- calculations results assessment
- optimization
- prototyping
- parametric design of series of products
- manufacturing and life-cycle analysis
- realistic visualizations

Recommended and requiered reading

Basic literaturę

electronic and on-line manuals for NX, Creo-Parametric, Finemarine, ANSYS, Fluent, NASTRAN

Supplementary literaturę

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade

Subject name	Ship and Offshore Processes and Operations II		
Subject code	O:09061		
Faculty	Department of Marine Mechatronics		
Course name	Ocean Engineering		
Learning area	technical sciences		
Learning profile	general academic profile	Study year	1
Type of subject	Obligatory	Study semester	2
Study level	Full-time studies postgraduate studies	ECTS	5

ECTS details

Activity	gk	pw
Lecture	30	
Excerciese	15	
Laboratories	15	
Consulation	10	
Lecture studies		55
Sum	70	55
Parameter ECTS	25	25
ECTS components	2,8	2,2
ECTS sum	5	

Name of lecturer	prof. dr hab. inż. Czesław Dymarski mgr inż. Tomasz Pająk prof. dr hab. inż. Czesław Dymarski
Subject objectives	Acquisition of knowledge about the new facilities and technologies ocean engineering technical activities used in the offshore industry, and related mainly to the exploitation of submarine mineral resources

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_U09	Student analyzes technical achievements and can choose the best one to use in newly-designed facilities and equipment relevant in the offshore industry	[SU3] Assessment of ability to use knowledge gained in the different modules [SK5] Assessment of ability to resolve work-related problems
K_W02	Can explain process of forming the raw materials especially offshore oil and gas and the conditions of their formation and possible places of occurrence.	[SU3] Assessment of ability to use knowledge gained in the different modules
K_W05	Analyzes and evaluates the impact of the proposed objects and devices on the environment, both during the construction and installation and especially during the long life exploitation	[SU2] Assessment of ability to analyze information
K_W08	It keeps track of the latest technical and can display trends in the development of methods and acquisition of offshore mineral resources and the necessary facilities. achievements	[SU2] Assessment of ability to analyze information
K_W13	He can explain the functions and priciple of operation of devices and systems of platforms and other offshore objects equipment, and physical processes during the operation of these devices	[SU3] Assessment of ability to use knowledge gained in the different modules [SU2] Assessment of ability to analyze information

Mode of delivery	at the university
Prerequisites	
Recommended components	

Subject contents	Types, functions and operation of specialized systems and equipment vessels and objects used in the offshore industry. Analysis of environmental conditions and determining the extreme operating conditions of facilities and equipment while performing certain operations. The methodology followed during the calculation of work loads systems and devices during operations such as: towing, anchoring, foundation on the bottom, piling and installation of a platform deck, as well as lowering the bottom units over subsea oilfield equipment. Determination of technical parameters and selection of appropriate equipment and an estimate of power demand. Exercises. Load calculation and technical parameters of systems and specialized equipment at the examples of offshore operation which were discussed in the lecture Laboratory . The participation of students in testing by the manufacturer and shipyard cranes destined for big rigs, cranes of boat and other marine equipment. Measurements of ship equipment parameters present in the laboratory faculty
Recommended and required reading	**Required reading** 1. Rules DNV. 2. Bai Yong, Bai Qiang: Subsea Enginering Handbook,Elsevier New York 2012. 3.] S. Chakrakarti: **Handbook of Offshore Engineering II.** Offshore Structure Analysis, Inc. Plainfield, Illinois, USA, 2005. **Recommended reading** 1.Dietrich M. : Fundamentals of machine construction. WNT 1999. 2.Stryczek S .: The hydrostatic drive. Scientific and Technical Publishing - Warsaw 19,994th 3. Specialized magazines such as: Offshore, Oil World Ocean Industry and others. 4. Websites www.offshore-technology.com/contractors/lifting/dreggen/ and other
Planned learning activities	Lecture: 30; Exercise: 15; Laboratory: 15; Project: 0; Seminar: 0; Sum: 60 W tym nauczanie na odległość: 0.0
Assesment methods and criteria	see table below **Example issues / example questions / tasks completed**
Language of instructions	English
Work placement	Not applicable

Planned learning activities:

Lecture	Exercise	Laboratory	Project	Seminar	Sum
30	15	15	0	0	60

W tym nauczanie na odległość: 0.0

Assesment methods and criteria:

Subject passing criteria	Passing threshold	Percentage of the final grade
laboratory	100.0	35.0
exercises	70.0	35.0
lecture	60.0	30.0

Subject name	Stability & Dynamics of Ship and Offshore Structures II
Subject code	O:096051
Faculty	
Course name	Ocean Engineering
Learning area	technical sciences

Learning profile	general academic profile	Study year	1
Type of subject	Obligatory	Study semester	2
Study level	Full-time studies postgraduate studies	ECTS	4

ECTS details

Activity	gk	pw
Lecture	15	
Laboratories	30	
Consulation	10	
Lecture studies		45
Sum	55	45
Parameter ECTS	25	25
ECTS components	2,2	1,8
ECTS sum	4	

Name of lecturer	dr inż. Paweł Dymarski dr inż. Paweł Dymarski
Subject objectives	The aim of the course is to familiarize students with the basic (applied) methods of modeling problems of stability and dynamics of ships and offshore structures. Execution of laboratory (numerical and experimental) exercises in the field of studying the dynamics of offshore structures.

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_U05	The student can use simple and more complex computational and tools as well as use of experimental methods to solve problems with stability / dynamics of offshore structures (eg .: spreadsheet and / or Matlab, and / or C ++)	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
K_W03	On the basis of calculations of static and / or dynamics of offshore structure student is able to determine the forces acting on the elements of the construction	[SU3] Assessment of ability to use knowledge gained in the different modules
K_W04	The student knows the main elements of the construction of offshore facilities, for selected cases he can perform an analysis of the mechanics of the structure (eg TLP, monopile, spar)	[SU1] Assessment of task fulfilment
K_W09	Student can use basic computational methods for solving tasks of static / dynamic of offshore facilities (methods based on Morison equation). The student can calculate and analyze model tests results	[SK5] Assessment of ability to resolve work-related problems
K_W13	The student is able to model (numerically and experimentally) physical phenomena related to the dynamics of floating objects	[SU3] Assessment of ability to use knowledge gained in the different modules [SU1] Assessment of task fulfilment

Mode of delivery	at the university

Prerequisites	-Knowledge of general mechanics -- The concept of force and torque -- Equations of balance of forces and moments -- Newton's Laws -- The ability of integration of equations of motion - Basic knowledge of strength of materials -- Ability to determine forces in statically determinated structures: --- Ability to determine the internal forces and the reaction of the beams, --- Ability to determine the internal forces in the frames (basic configurations). --- Basic knowledge about the characteristics of the sections, stiffness, etc. - Basic knowledge of fluid mechanics -- Hydrostatic pressure, -- Buoyancy, -- Resistance force (drag), - Basic knowledge of the theory of ship -- The stability of the ship in the scope of the metacentric formula -- Buoyancy in the range of linear equations -- Basic knowledge of the ship's seakeeping --- the concept of added masses - Basic knowledge of computer tools and programming languages -- The use of spreadsheets (eg .: Excel, OpenOffice Calc) -- Indicated basic knowledge of C / C ++, -- Or basic knowledge of Matlab / Octave, -- The ability to create graphs (visualization of results) (Gnuplot / Matlab / Octave, or Excel) - Basic knowledge of numerical methods -- Numerical integration: midpoint rule, trapezoid rule -- Basic methods for solving initial value problems (ODEs): --- Euler method (explicit Euler) --- Runge-Kutta methods,
Recommended components	For students who have not completed the ocean engineering at the Department of Ocean Engineering and Ship Technology classes recommended (see above)
Subject contents	1. Dynamics of floating structures baased on example of TLP (1 degree of freedom) - Equations of Equilibrium of forces (including inertia forces) -- Determination of the restoring force due to anchoring system -- Determination of platform displacement due to environmental dynamic forces (wave current wind) -- Determination of reaction forces in the tendons Laboratory Exercise 1.Numerical modelling of offshore structure dynamics (2D problem): ex. 1.1 Modelling of regular and irregular wave ex. 1.2 Calculation of the forces acting on an floating structre ex. 1.3 Modelling of mooring system ex. 1.4 The formulation of equations of motion of the structure ex. 1.5 Modelling of motion of the structure on ragular and irregular wave Laboratory Exercise 2. Experimental Modelling of floating structure dynamics (TLP platform and Spar platform): ex. 2.1 Determination of the hydromechanical coefficients based on a free decay test (drag coefficient, added mass coefficient). Determination of static characteristics of anchoring system ex. 2.2 Determination of motion (surge (TLP) / heave and pitch (Spar)) amplitude spectrum ex. 2.3 Determination of second order forces ex. 2.4 Prediction of maximum amplitudes of motions and accelerations for a given wave spectrum. 2. Stability and dynamics of fixed bottom offshore structures -- stability of fixed bottom offshore structures -- dynamics of multi-degree fixed bottom structures

Recommended and required reading	**Required reading** James F. Wilson: „Dynamics of Offshore Structures”. WILEY 2003 Targut Sarpkaya: „Wave Forces on Offshore Structures”. Cambridge University Press 2010 J.M.J. Journée and W.W. Massie: "OFFSHORE HYDROMECHANICS". Delft University of Technology 2001 http://www.shipmotions.nl/DUT/LectureNotes/OffshoreHydromechanics.pdf **Recommended reading** „Principles of Naval Architecture”, vol. 1,3. SNAME 1988 O.M. Faltinsen: „Sea Loads on Ships and Offshore Structures”. Cambridge University Press 1990 S.K. Chakrabarti: „Offshore Structure Modeling” (Advanced Series on Ocean Engineering, Vol. 9). World Scientific 1994 S.K. Chakrabarti: „Handbook of Offshore Engineering”. Elsevier Science 2005 Moo-Hyun Kim: "SPAR Platforms: Technology and Analysis Methods". American Society of Civil Engineers 2012 - http://app.knovel.com/web/toc.v/cid:kpSPTAM001/viewerType:toc/root_slug:spar-platforms-technology/url_slug:spar-platforms-technology?b-q=spar%20platforms&sort_on=default&b-group-by=true&b-search-type=tech-reference&b-sort-on=default - Moo-Hyun Kim: "SPAR Platforms: Technology and Analysis Methods". American Society of Civil Engineers 2012 - http://www.shipmotions.nl/DUT/LectureNotes/OffshoreHydromechanics.pdf - J.M.J. Journée and W.W. Massie: "OFFSHORE HYDROMECHANICS". Delft University of Technology 2001

Planned learning activities

Lecture	Exercise	Laboratory	Project	Seminar	Sum
15	0	30	0	0	45

W tym nauczanie na odległość: 0.0

Assesment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Reports of laboratory exercises	70.0	67.0
Colloquium (final test)/oral exam	50.0	33.0

Example issues / example questions / tasks completed

Laboratory Exercise 1.Numerical modelling of offshore structure dynamics (2D problem):
ex. 1.1 Modelling of regular and irregular wave
ex. 1.2 Calculation of the forces acting on an floating structre
ex. 1.3 Modelling of mooring system
ex. 1.4 The formulation of equations of motion of the structure
ex. 1.5 Modelling of motion of the structure on ragular and irregular wave

Laboratory Exercise 2. Experimental Modelling of floating structure dynamics (TLP platform and Spar platform):
ex. 2.1 Determination of the hydromechanical coefficients based on a free decay test (drag coefficient, added mass coefficient). Determination of static characteristics of anchoring system
ex. 2.2 Determination of motion (surge (TLP) / heave and pitch (Spar)) amplitude spectrum
ex. 2.3 Determination of second order forces
ex. 2.4 Prediction of maximum amplitudes of motions and accelerations for a given wave spectrum.

Language of instructions	Polish
Work placement	Not applicable

Subject name	Project Management		
Subject code	O:096160		
Faculty	Department of Ship Manufacturing Technology, Quality Systems and Materials Science		
Course name	Ocean Engineering		
Learning area	technical sciences		
Learning profile	general academic profile	Study year	2
Type of subject	Obligatory	Study semester	3
Study level	Full-time studies postgraduate studies	ECTS	5

ECTS details

Activity	gk	pw
Lecture	30	
Project	45	
Consulation	5	
Lecture studies		25
Homework creation		20
Sum	80	45
Parameter ECTS	25	25
ECTS components	3,2	1,8
ECTS sum	5	

Name of lecturer	mgr inż. Zbigniew Górski
Subject objectives	Project Management- scope of the project and its organizational structure. Presentation of the methodology of project management with its practical application

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_K01	Student is able to think and act in a creative manner, has the ability to learn himself	[SK5] Assessment of ability to resolve work-related problems
K_U01	A student at the end of the course will: • Understand project management related dictionary and specific expressions • Know the tools and methods characteristic for each phase of a project life cycle • Understand the concept of project management knowledge areas • Master the project scope management selected topics • Know the project time management selected topics • Know the project cost management selected topics • Know the project quality management selected topics • Know the project human resources management selected topics • Know the project communication management selected topics • Know the project procurement management related topics • Know the project stakeholder management related topics • Understand the strategic dimension of project management	[SU3] Assessment of ability to use knowledge gained in the different modules
K_W07	Student is able to distinguish project stages, project organisation structure. Student plans methods of project realisation and prepares specification of documentation needed for project. Project schedule is worked out by student as well as risk project evaluation. Student is able to use rules of project management.	[SK2] Assessment of progress of work

Mode of delivery	at the university
Prerequisites	
Recommended components	
Subject contents	Definition of PROJECT. Rules of project management Project budget, cost control and response for critical situation. .Project planning and documentation. Management of risk project .Project management process. Project stages:•Initiation,• Planning,• Realizations,• Monitoring and project controlling,• Validation,• Project completion –closing validation .Resume of good project management practice Project: Planning process of project. Individual preparation of project card, project schedule, project costs. Estimation of project risk. Preparation of project specification. Report of chosen project connected with project mile stone. Closing report.

<table>
<tr><td>Recommended and required reading</td><td>Required reading

A Guide to the Project Management Body of Knowledge (PMBOK® Guide)—Fifth Edition

• The Scrum Guide™, The Definitive Guide to Scrum: The Rules of the Game, July 2013

• Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Harold R. Kerzner, 11th Edition

• Linking Project Management to Business Strategy Hardcover, Aaron J Shenhar – October 1, 2007

• PMP Exam Prep, Eighth Edition - Updated: Rita's Course in a Book for Passing the PMP Exam Eighth Edition

Recommended reading

Literature in the Polish language:

1. Michał Trocki, Bartosz Grucza, Krzysztof Ogonek, Zarządzanie Projektami
2. Trevor L.Young „Skuteczne zarządzanie projektami”;
3. Marek Pawlak „Zarządzanie projektami”;
4. Patrick Lencioni „Pięć dysfunkcji pracy zespołowej’;
5. Scott Berkun „Sztuka zarządzania projektami’</td></tr>
<tr><td>Planned learning activities</td><td><table><tr><th>Lecture</th><th>Exercise</th><th>Laboratory</th><th>Project</th><th>Seminar</th><th>Sum</th></tr><tr><td>30</td><td>0</td><td>0</td><td>45</td><td>0</td><td>75</td></tr></table>W tym nauczanie na odległość: 0.0</td></tr>
<tr><td>Assesment methods and criteria</td><td><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Midterm colloquium</td><td>60.0</td><td>50.0</td></tr><tr><td>Project</td><td>80.0</td><td>50.0</td></tr></table>
Example issues / example questions / tasks completed</td></tr>
<tr><td>Language of instructions</td><td>English</td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
</table>

Subject name	Advanced Mechanics of Marine Structures II		
Subject code	O:096131		
Faculty			
Course name	Ocean Engineering		
Learning area	technical sciences		
Learning profile	general academic profile	Study year	2
Type of subject	Obligatory	Study semester	3
Study level	Full-time studies postgraduate studies	ECTS	6

ECTS details

Activity	gk	pw
Lecture	15	
Laboratories	60	
Consulation	10	
Lecture studies		65
Sum	85	65
Parameter ECTS	25	25
ECTS components	3,4	2,6
ECTS sum	6	

Name of lecturer	dr inż. Paweł Dymarski dr inż. Paweł Dymarski
Subject objectives	The aim of the course is to familiarize students with the basic (applied) methods of modeling problems of dynamics of marine structures.

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_U13	The student is able to use appropriate methods for modeling the dynamics of simple marine structures	[SU4] Assessment of ability to use methods and tools
K_U14	The student knows the methods for verifying numerical tools for modeling the dynamics of marine structures	[SU2] Assessment of ability to analyze information
K_W03	On the basis of static and / or dynamic computational analysis a student is able to determine the forces acting on the elements of the construction, as well as internal forces inside structure elements (for basic issues)	[SU1] Assessment of task fulfilment
K_W04	The student knows the main elements of the construction of offshore facilities, for selected cases he can perform an analysis of the mechanics of the structure (jackup platform, jacket template)	[SU3] Assessment of ability to use knowledge gained in the different modules
K_W14	The student is able to use computational methods to solve issues related to preliminary design of offshore facilities	[SU4] Assessment of ability to use methods and tools

Mode of delivery	at the university

Prerequisites	-Knowledge of general mechanics -- The concept of force and torque -- Equations of balance of forces and moments -- Newton's Laws -- The ability of integration of equations of motion - Basic knowledge of strength of materials -- Ability to determine forces in statically determinated structures: --- Ability to determine the internal forces and the reaction of the beams, --- Ability to determine the internal forces in the frames (basic configurations). --- Basic knowledge about the characteristics of the sections, stiffness, etc. - Basic knowledge of fluid mechanics -- Hydrostatic pressure, -- Buoyancy, -- Resistance force (drag), - Basic knowledge of the theory of ship -- The stability of the ship in the scope of the metacentric formula -- Buoyancy in the range of linear equations -- Basic knowledge of the ship's seakeeping --- the concept of added masses - Basic knowledge of computer tools and programming languages -- The use of spreadsheets (eg .: Excel, OpenOffice Calc) -- Indicated basic knowledge of C / C ++, -- Or basic knowledge of Matlab / Octave, -- The ability to create graphs (visualization of results) (Gnuplot / Matlab / Octave, or Excel) - Basic knowledge of numerical methods -- Numerical integration: midpoint rule, trapezoid rule -- Basic methods for solving initial value problems (ODEs): --- Euler method (explicit Euler) --- Runge-Kutta methods, - Finished course "Stability & Dynamics of Ship and Offshre Structures"
Recommended components	For students who have not mastered the issues mentioned above we recommend additional classes on selected issues
Subject contents	1. Stability of gravity platforms - solid foundation - liquified foundation 2. Introduction to structural mechanics - structural mass and stiffness, - dumping, - mechanical model of soil foundation - virtual mass, Rayleigh method - structural model of a jackup platform - mechanical model of cable (optionally) 3. Single-degree of freedom structures – response function of linear structures – equation of motion for a typical example: -- jackup platform -- monopile (optionally) 4. Multi-degree of freedom linear structure – the Mass Matrix, the stiffness matrix, the dumping matrix – Equations of motions for (simple) jacket template structure

Recommended and required reading	**Required reading** James F. Wilson: „Dynamics of Offshore Structures”. WILEY 2003 Targut Sarpkaya: „Wave Forces on Offshore Structures”. Cambridge University Press 2010 J.M.J. Journée and W.W. Massie: "OFFSHORE HYDROMECHANICS". Delft University of Technology 2001 http://www.shipmotions.nl/DUT/LectureNotes/OffshoreHydromechanics.pdf **Recommended reading** „Principles of Naval Architecture”, vol. 1,3. SNAME 1988 O.M. Faltinsen: „Sea Loads on Ships and Offshore Structures”. Cambridge University Press 1990 S.K. Chakrabarti: „Offshore Structure Modeling” (Advanced Series on Ocean Engineering, Vol. 9). World Scientific 1994 S.K. Chakrabarti: „Handbook of Offshore Engineering”. Elsevier Science 2005

Planned learning activities

Lecture	Exercise	Laboratory	Project	Seminar	Sum
15	0	60	0	0	75

W tym nauczanie na odległość: 0.0

Assesment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written and oral examination	50.0	50.0
	Laboratory report	75.0	50.0

Example issues / example questions / tasks completed

Exercise 1.
Examine the stability of the gravity platform supported by a liquefied soil foundation for the following data:

ρw =1025 kg/m3
ρm =1840 kg/m3
dw = 80 m
dm = 12 m
Dc = 35 m
Hc = 30 m
Dl1 = 9 m
Dl2 = 6 m
Hl1 = 18 m
Hl2 = 54 m
Nl = 3 – number of legs (columns)
KG = 25 m – high of centre of gravity

Tips to Exercise:
- Calculate the weight of the structure mbg as the sum of the buoyant force of individual parts γi Vi
- Determine the location of the center of buoyancy hb (or KB) as a weighted average of ordinates of B of individual parts of the structure
- If necessary, designate the position (height KM) of the metacentre point M

Exercise 2.
At the stage of preliminary design of the jack-up vessel, the following dimensions of structure and the following loads has been assumed.
Calculate the maximum moments in the legs and the maximum displacement of the hull.

Hull:
L=68 m
B =24 m
H = 10 m
CD,Hull =2.0

Suprstructure:
LS = 10 m
HS = 10 m
BS = 10 m
CD,Sup =2.0

Legs:
N=4
Ll = 55 m
Dl = 2 m
tl = 24 mm
d = 40 m
CD,leg =1.0

Equipment:
AEq = 40 m2
CD,Eq =1.2

Steel:
E=200 Gpa

Uw = 15 m/s
Ucurr = 1 m/s

Water and air density:
ρ=1025 kg/m3
ρair=1.2 kg/m3

Exercise 3.1.
Determine the static displacement of the gondola of offshore wind turbine due to wind action (include thrust on the turbine and the forces induced on the tower).
The supporting structure is a monopile of the data listed below.
Investigate the effect of the physical properties of the material of the seabed in the stiffness of the supporting structure.

Dturb = 120 m
Hturb = 100 m
Dtower = 6.2 m
ttower = 50 mm
D = 40 m
lu = ?
N0 from 1.2 MN/m3 to 10.7 MN/m3

	Data of the turbine thrust from Design of Floating Wind Turbine Structures. DNV-OS-J103, “SECTION 10 FLOATING STABILITY” Exercise 3.2. a) Determine the equivalent drag coefficient of the monopile fully immersed, fully fixed to the bottom: b) Determine the virtual mass of the structure using lumped mass model f1 = 0.3: l = 40 m D = 4 m t = 30 mm E = 200 GPa ρsteel = 7800 kg/m3 ρ = 1025 kg/m3 Exercise 3.2. Use Rayleigh method to determine the virtual mass of the structure from 3.2. Problem 4. Derivation of dynamics equations structure with one degree of freedom (jackup platform). The solution of the equation in the time domain Problem 5. Derivation of dynamics equations structure with multiple (two) degres of freedom (jacket template platform). The solution of the system of equations in the time domain
Language of instructions	English
Work placement	Not applicable

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	Engineering Design - Group Project I		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	2	3	2	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	-	-	-	30	-	30

Name of lecturer(s)	

Learning outcomes of the course unit

For a given ship requirements student can perform the following designing procedures:

- for the designed ship chooses a correct reference (parent) ship;
- calculates parameters of the designed ship: displacement, main dimensions, volumes, deadweight, ship body form coefficients;
- prepares theoretical lines using computer system TRIBON INITIAL DESIGN;
- creates design documentation of the lines using AutoCAD;
- calculates characteristics of the ship resistance, hydrodynamic characteristics of the propeller, chooses correct main engine, predicts the ship's speed in the specified acceptance trials conditions ;
- sets and verifies the stability safety measures of the designed ship;
- creates stability documentation (metacentric height, cross curves, Reed's curves) and confronts the results with requirements of international conventions, classification societies rules and administration law;
- sets and verifies the ship's resistance, main engine power and ship's velocity;
- creates stability documentation: Bonjean scale, hydrostatic curves, freeboard and confronts the results with the requirements of: international conventions, classification societies and administration;
- prepares documentation of the ship's general plan and its technical description;
- prepares a compact report which contains professional documentation of the ship's preliminary design.

Prerequisites and co-requisites

Subject: Ship Theory;
Subject: Ship and Yachts Design I;
Subject: Computer Aided Design Systems.

Course contents

Course in the computer laboratory equipped with TRIBON INITIAL DESIGN computer system;

The course features initial computer-aided ship design scope. Project is carried out by the project teams of three or four students – based on the synthesis of acquired knowledge concerning different aspects of shipbuilding. The project prepares students for master's thesis in the ship design. The characteristic feature of the group project is the type of designed vessel, other than a classic general cargo ship. Additionally, it also features an extended project documentation which includes the scope of preliminary project. The group project covers following topics:

- Discussion and analysis of the owner's (functional) requirements of the design ship;
- Evaluation of design materials and tools available for use;
- Creation of necessary and complementary project assumptions;
- Selection of the reference (parent) vessel based on ships similarities metric;
- Application of advanced nonlinear models of algorithms for ship's main design parameters estimation: the main dimensions and ship body form coefficients;
- A preliminary calculation of the designed vessels initial, static and dynamic stability;
- A preliminary design of the ship's propulsion system: resistance, cavitations, propeller, main engine, ship speed verification, power and trust driven characteristics;
- Design of the ship body form using a professional TRIBON INITIAL DESIGN computer system;
- Documentation of the designed ship theoretical lines in the AutoCAD computer program;
- Verifications and creation of the ship's characteristics involving: buoyancy, volume, freeboard, tonnage, stability and ship propulsion using TRIBON INITIAL DESIGN computer program;
- Design of the ship's general plan using AutoCAD computer program;
- Critical analysis of the project's results and further improvement proposals;

Recommended and requiered reading

Basic literature

Watson D.G.M.: *Practical ship design*. Elsevier 1998.
Bertram V.: *Practical ship hydrodynamics.* Butterworth Heinemann 2000.
Podręcznik: *Tribon User Manual*. Kockums Computer Systems.

Supplementary literature

Michalski J.P.: *Podstawy teorii projektowania okrętów.* Wydawnictwo Politechniki Gdańskiej. Gdańsk 2013.
Dudziak J.: *Teoria Okrętu*. Wydawnictwo Morskie. Gdańsk 1988.

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade
	Project documentation	100%	25%
	Exam	50%	75%

Subject name	Marine Applied Informatics, CAE and DesignTools III
Subject code	O:096022
Faculty	Department of Marine Mechatronics
Course name	Ocean Engineering
Learning area	technical sciences

Learning profile	general academic profile	Study year	2
Type of subject	Obligatory	Study semester	3
Study level	Full-time studies postgraduate studies	ECTS	3

ECTS details

Activity	gk	pw
Laboratories	45	
Consulation	5	
Lecture studies		25
Sum	50	25
Parameter ECTS	25	25
ECTS components	2	1
ECTS sum	3	

Name of lecturer	dr inż. Cezary Żrodowski dr inż. Cezary Żrodowski
Subject objectives	Introducing novel computer methods in creative design and product life-cycle

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_U01	Student is able to perform initial 3D hull model, covering hull shape and compartmentation, based on lines plan, tank plan and general arrangement drawings.	[SU3] Assessment of ability to use knowledge gained in the different modules
K_U04	Student is able to independent preparation of data necessary for performing simple design task, as well as to present results of his work.	[SK5] Assessment of ability to resolve work-related problems [SU2] Assessment of ability to analyze information
K_U05	Student can realize mid-advanced design of parametric hull model or ship machinery using 3D CAD system (preferred: Siemens NX, Solid Edge , Solid Works lub Creo Parametrics)	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
K_U09	Student can select CAD/CAE tool properly adjusted for solving defined design problem.	[SK5] Assessment of ability to resolve work-related problems [SU2] Assessment of ability to analyze information
K_W06	Student can write instruction for his colleagues, allowing for independent completing of exercise designed and solved by author.	[SK1] Assessment of group work skills [SW2] Assessment of presentation [SK4] Assessment of communication skills
K_W09	Student can perform FEA and CFD analysis for simple design task with special focus on automatic process development.	[SU3] Assessment of ability to use knowledge gained in the different modules [SK3] Assessment of ability to organize work

Mode of delivery	at the university
Prerequisites	Ability to use PC computer Some experience in using parametric 2D and 3D CAD programs Knowledge about numeric calculations and finite element method Fundamentals of optimisation
Recommended components	Students' CAD/CAE research club PIKSEL

Subject contents	Exercising novel strength analysis, fatigue and CFD software students will gain practice in: • creative design concepts • calculations results assessment • optimization • prototyping • parametric design of series of products • manufacturing and life-cycle analysis • realistic visualizations
Recommended and required reading	**Required reading** elektroniczna dokumenatcja do programów: NX, Creo-Parametric, Finemarine, Star CCM+, ANSYS, Fluent, NASTRAN **Recommended reading** proprietary teaching aids of the teacher

Planned learning activities

Lecture	Exercise	Laboratory	Project	Seminar	Sum
0	0	45	0	0	45

W tym nauczanie na odległość: 0.0

Assesment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Work progress	50.0	25.0
Presentation	50.0	25.0
Project	50.0	50.0

Example issues / example questions / tasks completed

Projects and exercises:

1. Project of parametric ship hull shape
2. Associative model of ship hull compartmentation
3. Modelling of part family
4. Performing FEA and CFD analysis for selected details.

Language of instructions	English
Work placement	Not applicable

Subject name	Modelling and Simulation in Ocean Engineering II		
Subject code	O:096111		
Faculty	Department of Control and Power Engineering		
Course name	Ocean Engineering		
Learning area	technical sciences		
Learning profile	general academic profile	Study year	2
Type of subject	Obligatory	Study semester	3
Study level	Full-time studies postgraduate studies	ECTS	3

ECTS details

Activity	gk	pw
Lecture	15	
Laboratories	30	
Consulation	5	
Lecture studies		5
Test preparation		10
Laboratories preparation		10
Sum	50	25
Parameter ECTS	25	25
ECTS components	2	1
ECTS sum	3	

Name of lecturer	prof. dr hab. inż. Zygfryd Domachowski, prof. zw. PG mgr inż. Natalia Szewczuk-Krypa prof. dr hab. inż. Zygfryd Domachowski, prof. zw. PG
Subject objectives	mathematical modelling of wind, and wind-induced waves, and currets onto marine structures, mathematical modelling of marine stucture response to ocean disturbances

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_U02	student applies all accessible means and methods in professional and social communication	[SK1] Assessment of group work skills [SU4] Assessment of ability to use methods and tools [SK4] Assessment of communication skills [SK3] Assessment of ability to organize work
K_U05	student is able to model and simulate the influence of wind, and wind-induced waves, and currents on marine structures, student is able to analyse the response of marine structure to ocean disturbances	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained in the different modules [SK5] Assessment of ability to resolve work-related problems [SU2] Assessment of ability to analyze information
K_W01	student is able to apply mathematical modelling and simulation in design, optimization, and diagnostics of technical systems	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained in the different modules [SK5] Assessment of ability to resolve work-related problems [SU2] Assessment of ability to analyze information
K_W02	student is conscious of ocean environmental inffluence	[SW1] Assessment of factual knowledge [SU3] Assessment of ability to use knowledge gained in the different modules [SU2] Assessment of ability to analyze information

Mode of delivery	at the university
Prerequisites	mathematical modelling background, stochastic process background

Recommended components	marine structures review
Subject contents	environmental disturbances (wind, wind-generated waves, currents), stochastic spectra, induced forces and moments, equtions of motion for dynamic structures, loads responses of dynamic stuctures, fatgue design method, fatigue damage
Recommended and required reading	**Required reading** 1. Fossen T.I. : Guidance and Control of Ocean Vehicles. John Wiley and Sons, Chichester, New York, Brisbane, Toronto, Singapore, 1994, 2. Hogben N., Dacunha N.M.C. : Global Waves Statistcs. British Maritime Technology Ltd, 1986, 3. Naess A., Moan T. : Stochastic dynamics of marine structures. Cambridge University Press, New York, 2013, 4. Spanos P.D (Editor) . : Probabilistic Offshore Mechanics. A Computational Mechanics Publication, 1985. **Recommended reading** Cooper G.R.: Probabilistic Methods of Signal and System Analysis

Planned learning activities	Lecture	Exercise	Laboratory	Project	Seminar	Sum
	15	0	30	0	0	45

W tym nauczanie na odległość: 0.0

Assesment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	lecture - test, laboratory - reports	50.0	100.0

Example issues / example questions / tasks completed

Language of instructions	Polish
Work placement	Not applicable

Subject name	Optimisation in Engineering Design		
Subject code	O:096180		
Faculty	Department of Theory and Ship Design		
Course name	Ocean Engineering		
Learning area	technical sciences		
Learning profile	general academic profile	Study year	2
Type of subject	Obligatory	Study semester	3
Study level	Full-time studies postgraduate studies	ECTS	3

ECTS details

Activity	gk	pw
Lecture	30	
Laboratories	15	
Consulation	5	
Lecture studies		25
Sum	50	25
Parameter ECTS	25	25
ECTS components	2	1
ECTS sum	3	

Name of lecturer	dr inż. Cezary Żrodowski dr inż. Cezary Żrodowski
Subject objectives	Introduction to basic optimization techniques, used in context of computer aided design process. Activities cover parametric, boundary and topology optimization of 3D CAD geometry, based on defined structure loads.

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_U12	Student can propose alternative solution of defined design problem.	[SU5] Assessment of presentation [SK5] Assessment of ability to resolve work-related problems
K_W03	Student can perorm complete FEA analysis of selected selected ship hull detail, including interpretation of obtained results.	[SK2] Assessment of progress of work [SU1] Assessment of task fulfilment
K_W04	Student can apply 3D parametric modelling approach, including automatic design modification.	[SK2] Assessment of progress of work [SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment
K_W14	Student can carry optimization of selected ship hull detail, based on 3D parametric geometry and dedicated software (modeFrontier)	[SK2] Assessment of progress of work [SU1] Assessment of task fulfilment
K_W15	Student can perform comparative analysis of the structure, made of different materials and with usage of different technologies.	[SK2] Assessment of progress of work [SU1] Assessment of task fulfilment

Mode of delivery	at the university
Prerequisites	Marine Applied Informatics, CAE and Design Tools III
Recommended components	
Subject contents	Introduction to optimization theory (systematic, random, gradient and evolutionary methods) Optimization of 3D geometry (parametric, boundary, topology) Project of optimization of simple 3D part using 3D CAD and modeFrontier.

Recommended and required reading	**Required reading** Practical Aspects of Finite Element Simulation; Altair University, 3rd edition 03/2015 Practical Aspects of Structural Optimization - a Study Guide; 2nd edition 0362015 **Recommended reading** Siemens NX - User Guide modeFrontier - User Guide
Planned learning activities	see table below
Assesment methods and criteria	see table below
Language of instructions	English
Work placement	Not applicable

Planned learning activities:

Lecture	Exercise	Laboratory	Project	Seminar	Sum
30	0	15	0	0	45

W tym nauczanie na odległość: 0.0

Assesment methods and criteria:

Subject passing criteria	Passing threshold	Percentage of the final grade
Project completion	50.0	75.0
Written test	50.0	25.0

Example issues / example questions / tasks completed

Topology optimization of ship hull bracket.

Parametric optimization of ship hull dimensions, based od predefined model.

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	**Reliability, Safety and Risk Analysis II**		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	2	3	2	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	15	-	-	15	-	30

Name of lecturer(s)	Roman Liberacki

Learning outcomes of the course unit	The student defines the terms of reliability, safety and risk. The student identifies and explains the reasons for the application of basic mathematical models in reliability studies. The students calculate the reliability indexes of simple and complex structures. Student discusses the criteria for acceptable risk level. The student uses the method of assessing the probabilities of human errors. The student uses the methods prescribed in the FSA and QRA. Student discusses the procedures and technical means taken to ensure safety during the ships and their systems operation. Student presents ways to reduce the negative effects of the accidents at sea.
Prerequisites and co-requisites	No requirements
Course contents	The main terms of reliability and safety. Reliability of simple and complex objects. Physical aspects of reliability. Empirical indexes of reliability. Basic mathematical models for testing the reliability and safety of complex systems.. Risk and reliability analysis of technical systems. The terms of safety and risk. Risk as a measure of safety. The criteria for acceptable risk. The human factor and the risk. Methods of assessing human error probabilities. Formal safety assessment (FSA). Quantitative safety analysis (QRA). Procedures and technical means taken to ensure security during the operation of ships and their systems. Ways to reduce the negative effects of the accidents at sea.
Recommended and requiered reading	**Basic literature** 1. Brandowski A.: Nauka o bezpieczeństwie. Polit. Warszawska 1993. 2. Melnick E.: Encyclopedia of Quantitative Risk Analysis and Assessment. Viley & Sons. 2008. 3. Modarres M.: What Every Engineer Should Know about Reliability and Risk Analysis. New York, 1993. 4. Swain A.D., Guttman H.E.: Handbook of Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications. Final Report, prepared for U.S. Nuclear Regulatory Commision. August, 1983. 5. IMO (MSC 66/INF.8): A methodology for formal safety assessment of shipping. 1996. **Supplementary literature** No reqiurements

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade
	Midterm colloquium	60%	50%
	Reports	100%	50%

Subject name	Ship Design and Construction		
Subject code	O:096170		
Faculty	Faculty of Ocean Engineering and Ship Technology		
Course name	Ocean Engineering		
Learning area	technical sciences		
Learning profile	general academic profile	Study year	2
Type of subject	Obligatory	Study semester	3
Study level	Full-time studies postgraduate studies	ECTS	6

ECTS details

Activity	gk	pw
Lecture	15	
Project	60	
Consulation	10	
Lecture studies		40
Sum	85	40
Parameter ECTS	25	25
ECTS components	3,4	1,6
ECTS sum	5	

Name of lecturer	dr inż. Bogusław Oleksiewicz dr inż. Bogusław Oleksiewicz
Subject objectives	The goal of the subject is to make a student familiar with the advanced, qualitative and quantitative, problems of ship design and the methods compatible with those used in the modern CAD/CAGD methodology and practice. A synthetic ('top-down') approach is proposed throughout the lectures aimed on preparation a student to better understanding the complexity of contemporary ship design & construction.

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_U13		
K_U14		
K_U15		
K_W04	Student: • distinguishes the main functional and design types of ships • recognizes the functional subsystems of a ship as a marine water vehicle, • mentions basic features and parameters of a ship, • mentions basic stages in the overall process of the design and construction of ships • mentions and explains the principal notions of static optimization and its applications in a contemporary ship technology; • mentions and classifies the typical measures of merit (objective functions) and constraints in ship design • formulates selected problems of ship design in terms of static optimization • mentions the principal analytical models used in a modern design of ship geometry by the CAGD methods, • distinguishes the principal objects of ship hull geometry: patches of surfaces and boundary curves ('master curves') • explains the geometric modeling process: the data, representation, parametrization, generation, definition, shape evaluation • distinguishes the main modes and techniques of form generation • names the types of curves (elementary vs. non elementary) used in geometric modeling of ship hulls and their representations. • names the basic surface patch types of ship hulls and their representations. • distinguishes parametric vs. geometric continuity of connections of curves and surfaces • names the basic measures and techniques of fairness visualisation of curves and surfaces.	[SW1] Assessment of factual knowledge
K_W14		
K_W15		

Mode of delivery	at the university
Prerequisites	None

Recommended components	The elements of ship theory, linear algebra, descriptive geometry and analytic geometry

Subject contents

A. Lecture

1. Fundamentals in preliminary ship design

Multi-criteria classification of ships. Systems approach based on an example of maritime transportation system. Environment of the system. Functional subsystems. Ship design as a decisive and iterative process. Design spiral. Owners data. Main design particulars. The decisive and verification phases in the design. Parametric (index-based) vs. geometric methods. Basic design balances. A concept of feasible and optimal solution.

2. Optimisation methods in ship design

Static optimisation as a method of ship design. Principal notions of static optimisation: dimensionality, decision variables, objective function, constraints, feasible solution region, The types of solutions: feasible, ideal, locally and globally-optimal. Existence and uniqueness of the solution. Static optimisation as a non-linear programming problem. A concept of optimal ship. Typical objective functions and constraints in ship design. Overview of the optimization algorithms: analytical vs. numerical. The problems without- and with constraints.

3. CAGD methods in ship design

Overview of geometric objects in ship design (hulls, bow bulbs, fins, marine screws, etc.. Multi-criteria classification of ship form modelling problems. Geometric modelling process of curves and surfaces. Basic theory of curves and surfaces in parametric representation. Curves on a surface (eg. geodesics). Elementary and non elementary curves. Polynomial and rational splines (NURBS). Qualitative and quantitative attributes of shape evaluation (fairness). Transformations 3D of geometric objects. Subdivision of a surface into patches, parametric (C^n) vs. geometric (G^n) continuity. Typical patches representation in matrix notation: bi-linear,. sweeping,. composite. Special cases: ruled and developable patches.

B. Practical examples of the design

(‘in-home’ programs by the author)

(i) Optimization methods in ship design

- Optimisation of the main parameters of a fleet of ships in a linear shipping on the three shipping lines (owner studies).
- · Optimisation of the main particulars of a merchant vessel in preliminary design.
- · Optimisation of the main parameters of a mechanical propulsion system of a ship
- · Optimisation of the main particulars of a port barge (different analytical methods)

(ii) CAGD methods in ship design

- · Topological layout of the hull surface patches
- · Modelling of the boundary patch ‘master curves’ in the spline PTTS representation.
- Modelling of the hull patches: PMB, FOS, FOB, COS, SMP, COD in different representations
- · Modelling of the fin patches: fin-keel of a yacht, rudder and skeg
- Modelling of the bulbs patches: a bow bulb and keel bulb of a yacht
- Analytical optimisation of fairness of the hull curves (CWL, SOD) in different representations
- Visualisations of the pre-defined curves and surface patches in the available programs.

(ii) CAGD methods in ship design

- Topological layout of the hull surface patches
- · Modelling of the boundary patch ‘master curves’ in the spline PTTS representation.
- Modelling of the hull patches: PMB, FOS, FOB, COS, SMP, COD in different representations
- Modelling of the fin patches: fin-keel of a yacht, rudder and skeg

	•Modelling of the bulbs patches: a bow bulb and keel bulb of a yacht •Analytical optimisation of fairness of the hull curves (CWL, SOD) in different representations • Visualisations of the pre-defined curves and surface patches in the available programs.
Recommended and required reading	**Required reading** 1. D'Arcangelo A: - Ship Design & Construction. SNAME, New York, 1969 2. Erichsen S. - Management of Marine Design. Buttrerworths 1989. 3. Masano Aoki: - Introduction to Optimization Techniques, The Macmillan Company, New York, 1971 4. Nowacki H., Bloor M.I.G., Oleksiewicz B. (Editors), Dekanski C.W., Michalski J., Wilson M.J.: Computational Geometry for Ships. World Scientific Publishing Co.Pte.Ltd., London, 1995. 5. Schneekluth H.: - Ship Design for Efficiency and Economy, Buttrerworths 1987. 6. Watson D.G.M.: Practical Ship Design, Elsevier, 1998 7. Oleksiewicz B: - Ship Design and Construction, Lecture Notes Gdańsk 2015 (e-form, unpublished) **Recommended reading** 1. Kupras K., Sokołowski K: - Metody Obliczeniowe Wstępnego Projektowania Statków, Wyd. Morskie, Gdańsk, 1968 (in Polish) 2. Michalski J.: - Podstawy Projektowania Okrętów, Gdańsk, 2012 (in Polish) 3. Pacześniak J., Staszewski J: - Projektowanie Morskich Statków Handlowych, Skrypt PG, Gdańsk, 1984 (in Polish)

Planned learning activities

Lecture	Exercise	Laboratory	Project	Seminar	Sum
15	0	0	60	0	75

W tym nauczanie na odległość: 0.0

Assesment methods and criteria	<table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Solving the control tasks at the end of semester in a form of a semester report and passing an oral examination.</td><td>30.0</td><td>100.0</td></tr></table> **Example issues / example questions / tasks completed** • · Name the basic elements of the marine transportation system environment • · Name the basic functional subsystems of a ship as a marine vehicle together with their short design characteristics. • · Name the main particulars of a ship in different categories: geometry, masses, volumes, etc. • · Point out a correspondence between the main design balances of a ship and the owner's data • · What are the necessary / sufficient conditions of existence / uniqueness of the static optimisation solution? • · What are the local / global optimal solutions? • · Mention the examples of technical / economical measures of merit (objective functions) in optimisation of ships and their functional subsystems. • · What is the interpretation (role) of equality and inequality constraints in an optimisation model of ship design. • · Mention a general classification of non linear programming algorithms in the static optimisation. • · Explain a notion of an explicit, implicit and parametric representation of curves and surfaces • · Explain a notion of a basis in an analytical representation of polynomial curves • · Explain the difference between an algebraic and geometric basis in the analytical representation of curves • · What are the elementary and non elementary curves?. Give some examples. • · Explain the essence of splines and thus their wide application in geometric modelling of shapes. · Mention the basic surface patch types used in geometric modelling of ship's hull •Explain a notion of an explicit, implicit and parametric representation of curves and surfaces •Explain a notion of a basis in an analytical representation of polynomial curves •Explain the difference between an algebraic and geometric basis in the analytical representation of curves •What are the elementary and non elementary curves?. Give some examples. •Explain the essence of splines and thus their wide application in geometric modelling of shapes. • Mention the basic surface patch types used in geometric modelling of ship's hull
Language of instructions	English None
Work placement	Not applicable

Subject name	Professional Communication		
Subject code	O:096210		
Faculty	Language Centre		
Course name	Ocean Engineering		
Learning area	technical sciences		
Learning profile	general academic profile	Study year	2
Type of subject	Obligatory	Study semester	4
Study level	Full-time studies postgraduate studies	ECTS	4

ECTS details

Activity	gk	pw
Project	60	
Project consultation	5	
Report creation		5
Project creation		30
Sum	65	35
Parameter ECTS	25	25
ECTS components	2,6	1,4
ECTS sum	4	

Name of lecturer	mgr Agnieszka Jachowicz mgr Agnieszka Jachowicz
Subject objectives	The seminar aims to provide the opportunity to gain confidence and competence in working in a professional environment where English is the language of communication. The aim of the seminar is to help students acquire the linquistic, communicative and socio-cultural skills needed to function comfortably in English in relation to their professional and social goals. The seminar is oriented towards communicative competence.

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
		[SK1] Assessment of group work skills [SU5] Assessment of presentation [SW2] Assessment of presentation [SU1] Assessment of task fulfilment [SK3] Assessment of ability to organize work

Mode of delivery	at the university
Prerequisites	Students must have already attained at least the B1 level of their General English course.
Recommended components	English Language Circle, Debates in English, English Language Olympiad for Students of Technical Universities
Subject contents	Preparing presentations, writing various kinds of business letters, including CV and covering letter. Preparing for a job interview. Various topics from the field of psychology, such as verbal and non-verbal communication, personality types and psychological tests, risk in business, ethics in business, conflicts, negotiations, persuasions and manipulations. Communication on the Internet and other electronic media: Netiquette. Types of discussions and debates. Dress code, social events, cultural differences, business trips.

Recommended and required reading

Required reading

P. Domański, English in Science and Technology. Wydawnictwo Naukowo-Techniczne, Warszawa, 1996

S. Taylor, Model Business Letters, E-mails & Other Business Documents. Pearson, 2004

R. Lewis, When Cultures Collide. Nicholas Brealey Publishing, 2006

R. A. Day, How to Write & Publish a Scientific Paper. Cambridge University Press, 1993

Recommended reading

J. Bralczyk: "Wiem, co mówię, czyli o dobrej komunikacji." Oficyna Wydawnicza Branta, Bydgoszcz-Warszawa, 2011

Academic publications, dictionaries, scientific and science magazine articles. Online resources.

Planned learning activities	Lecture: 0; Exercise: 0; Laboratory: 0; Project: 60; Seminar: 0; Sum: 60 W tym nauczanie na odległość: 0.0
Assesment methods and criteria	See below
Language of instructions	English
Work placement	Not applicable

Planned learning activities

Lecture	Exercise	Laboratory	Project	Seminar	Sum
0	0	0	60	0	60

W tym nauczanie na odległość: 0.0

Assesment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
speaking, cooperation within the group	60.0	20.0
presentations	60.0	20.0

Example issues / example questions / tasks completed

Preparing for the topic of a presentation, and participation in it; discussing the given topic in the group; debate; discussing particular linquistic problems; role-playing; report.

Language of instructions

English

Work placement

Not applicable

Field of study	Oceanotechnika	Specialisation	Ocean Engineering
Course unit title	Engineering Design - Group Project II		

Course unit code	Year of study	Semester	Number of ECTS credit allocated	Type of course
	2	4	6	MSc

Planned learning activities and teaching methods	Lecture	Tutorials	Laboratory	Project	Seminar	Sum
	-	-	-	75	-	75

Name of lecturer(s)	

Learning outcomes of the course unit

For a given ship requirements student can perform the following designing procedures:

- for the designed ship chooses a correct reference (parent) ship;
- calculates parameters of the designed ship: displacement, main dimensions, volumes, deadweight, ship body form coefficients;
- prepares theoretical lines using computer system TRIBON INITIAL DESIGN;
- creates design documentation of the lines using AutoCAD;
- calculates characteristics of the ship resistance, hydrodynamic characteristics of the propeller, chooses correct main engine, predicts the ship’s speed in the specified acceptance trials conditions ;
- sets and verifies the stability safety measures of the designed ship;
- creates stability documentation (metacentric height, cross curves, Reed’s curves) and confronts the results with requirements of international conventions, classification societies rules and administration law;
- sets and verifies the ship’s resistance, main engine power and ship’s velocity;
- creates stability documentation: Bonjean scale, hydrostatic curves, freeboard and confronts the results with the requirements of: international conventions, classification societies and administration;
- prepares documentation of the ship’s general plan and its technical description;
- prepares a compact report which contains professional documentation of the ship’s preliminary design.

Prerequisites and co-requisites

Subject: Ship Theory;
Subject: Ship and Yachts Design I;
Subject: Computer Aided Design Systems.

Course contents

Course in the computer laboratory equipped with TRIBON INITIAL DESIGN computer system;
The course features initial computer-aided ship design scope. Project is carried out by the project teams of three or four students – based on the synthesis of acquired knowledge concerning different aspects of shipbuilding. The project prepares students for master's thesis in the ship design. The characteristic feature of the group project is the type of designed vessel, other than a classic general cargo ship. Additionally, it also features an extended project documentation which includes the scope of preliminary project. The group project covers following topics:

- Discussion and analysis of the owner’s (functional) requirements of the design ship;
- Evaluation of design materials and tools available for use;
- Creation of necessary and complementary project assumptions;
- Selection of the reference (parent) vessel based on ships similarities metric;
- Application of advanced nonlinear models of algorithms for ship's main design parameters estimation: the main dimensions and ship body form coefficients;
- A preliminary calculation of the designed vessels initial, static and dynamic stability;
- A preliminary design of the ship's propulsion system: resistance, cavitations, propeller, main engine, ship speed verification, power and trust driven characteristics;
- Design of the ship body form using a professional TRIBON INITIAL DESIGN computer system;
- Documentation of the designed ship theoretical lines in the AutoCAD computer program;
- Verifications and creation of the ship's characteristics involving: buoyancy, volume, freeboard, tonnage, stability and ship propulsion using TRIBON INITIAL DESIGN computer program;
- Design of the ship's general plan using AutoCAD computer program;
- Critical analysis of the project's results and further improvement proposals;

Recommended and requiered reading

Basic literature

Watson D.G.M.: *Practical ship design*. Elsevier 1998.
Bertram V.: *Practical ship hydrodynamics.* Butterworth Heinemann 2000.
Podręcznik: *Tribon User Manual*. Kockums Computer Systems.

Supplementary literature

Michalski J.P.: *Podstawy teorii projektowania okrętów.* Wydawnictwo Politechniki Gdańskiej. Gdańsk 2013.
Dudziak J.: *Teoria Okrętu*. Wydawnictwo Morskie. Gdańsk 1988.

Assesment methods and criteria	Course passing criteria	Passing threshold	Percentage of the final grade
	Project documentation	100%	25%
	Exam	50%	75%

Subject name	MSc Thesis		
Subject code	O:096220		
Faculty			
Course name	Ocean Engineering		
Learning area			
Learning profile		Study year	2
Type of subject	true	Study semester	4
Study level	postgraduate studies	ECTS	20.0

Number of ECTS credits

Learning activity of student	gk	pw
Participation in didactic classes included in study plan	0	
Participation in consultation hours	30	
Self-study hours		470
Sum	30	470
Total number of study hours	500	
Number of ECTS credits	20.0	

Name of lecturer	
Subject objectives	

Learning outcomes

Course outcome	Subject outcome	Method of veryfication
K_K03		
K_K04		
K_K13		
K_U04		
K_U09		
K_U10		
K_U11		
K_U15		
K_U16		
K_W13		
K_W14		
K_W15		

Mode of delivery	at the university
Prerequisites	
Recommended components	
Subject contents	
Recommended and required reading	**Required reading** **Recommeded reading**

Lesson type and method of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar
Number of study hours	0.0	0.0	0.0	0.0	0.0
Total number of study hours per semester included in study plan	0.0				

e-learning hours included: 0.0

Assesment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	0.0	0.0

Example issues / example questions / tasks being completed

Language of instructions	Polish
Work placement	Not applicable