***Dunarea de Jos* University of Galati**
Faculty of Naval Architecture
2019-2020

Study domain	Level (BA/MA)	Study programme	Study year	Semester	Course title and brief description	Credit units
Naval Architecture	BA	Naval Architecture	I	1	**Mathematical analysis** The discipline is focused on the fundaments of strings and series of real numbers, differential calculus, integral calculus and first order differential equations.	5
Naval Architecture	BA	Naval Architecture	I	2	**Linear algebra, analytic and differential geometry** The following topics are studied: vector spaces, linear applications, Euclidean vector spaces, plane and spatial geometry ruled and rotated surfaces, quadric and differential geometry.	5
Naval Architecture	BA	Naval Architecture	I	1,2	**Computer programming and programming language** Object oriented programming using the Java programming language	8
Naval Architecture	BA	Naval Architecture	I	1	**Descriptive geometry** Making the representation of the point, line and plane in triple orthogonal projection, representation of polyhedral surfaces, representation of cylindrical-conical surfaces and intersections of surfaces.	4
Naval Architecture	BA	Naval Architecture	I	2	**Technical drawing and computer aided design**	4

					Making the sketch and drawing at scale, drawings dimension, detailed drawings and assembly drawings using AutoCAD's 2-D drawing workspace.	
Naval Architecture	BA	Naval Architecture	I	1	**Physics** The study of the oscillations, elastic waves and acoustics.	3
Naval Architecture	BA	Naval Architecture	I	1	**Chemistry** The study of the periodic table, notions of general chemistry, metals and alloys - physical and mechanical properties, metal corrosion.	3
Naval Architecture	BA	Naval Architecture	I	2	**Naval architecture** Type of ships, basic ship terminologies, the introduction in the concept of ship's hydrostatics and stability, discuss about hydrostatic parameter of a surface ship.	5
Naval Architecture	BA	Naval Architecture	I	1,2	**Mechanics** Classical mechanics: Statics, Kinematics and dynamics of rigid bodies and rigid body systems.	7
Naval Architecture	BA	Naval Architecture	I	2	**Fluid mechanics** The hydrostatic and kinematics of fluids, dynamics of ideal and real fluids, boundary layer theory.	4
Naval Architecture	BA	Naval Architecture	I	1	**Science and engineering of materials** There are presented about materials used in naval industry, metals and alloys - production processes and technological processes, materials properties and testing, material processing and material welding.	4
Naval Architecture	BA	Naval Architecture	I	1,2	**English** There are presented about the fundamental grammar notions needed	4

					for documentation in naval architecture field, the specialized terminology and practice communication on texts specific to the naval architecture field.	
Naval Architecture	BA	Naval Architecture	I	1,2	**Physical education** Making physical activities - individual and team games, sports tests aiming to maintain general health, harmonious physical development and maintenance of normal functional indicators.	2
Naval Architecture	BA	Naval Architecture	I	2	**Communication** Forming and practicing oral communication skills, interpersonal communication skills for engineers and writing skills.	2
						(60)
Naval Architecture	BA	Naval Architecture	II	3	**Special mathematics** Study of complex variable functions, complex numbers and solving differential equations.	5
Naval Architecture	BA	Naval Architecture	II	4	**Numerical methods** Study of numerical integration methods, solving algebraic and differential equations systems.	3
Naval Architecture	BA	Naval Architecture	II	3	**Technical drawing and computer aided design** Programs used in the naval technical drawing are learned	4
Naval Architecture	BA	Naval Architecture	II	3	**Hydrodynamics and wave theory** There are presented the notions of regular and irregular waves, with the influences that they have on the ship's body.	3
Naval Architecture	BA	Naval Architecture	II	4	**Preliminary ship design** There are presented the initial design of	4

					the vessel's ship's ship type, as well as the navigation routes.	
Naval Architecture	BA	Naval Architecture	II	3	**Theory of ship** There are presented the main notions about straight diagrams, unsurpassability, stability for different types of ships.	4
Naval Architecture	BA	Naval Architecture	II	3,4	**Ship construction** Shows the ship's body building systems with the main design ways	9
Naval Architecture	BA	Naval Architecture	II	3,4	**Strength of materials** In this discipline are presented the main requirements to which the ship's constructive elements are subjected and the methods for solving the problems of sizing, checking and determining the load capable.	9
Naval Architecture	BA	Naval Architecture	II	4	**Machine parts** The machines parts have elements that are in roto-translation. The connection between these elements is achieved through couplings and transmissions of various types. The discipline presents the calculation of these coupling and transmission elements.	4
Naval Architecture	BA	Naval Architecture	II	3	**Materials technology** In order to build a metal structure, knowledge about materials is required. These by their mechanical characteristics help to ensure strength and stiffness during the applications. The discipline presents various types of materials used in shipbuilding.	3
Naval Architecture	BA	Naval Architecture	II	3,4	**Physical education** To have a healthy body we need	2

					movement. This movement must be carried out in an organized field on a sports ground under the guidance of a specialized teacher.	
Naval Architecture	BA	Naval Architecture	II	4	**Internship** Internship programs are preferred by the economic naval environment as they prepare future engineers for production. These programs take place during the summer according to a program agreed with the faculty.	4
Naval Architecture	BA	Naval Architecture	II	4	**Electrical Engineering** The various shipboard systems are linked to command and control panels. The commissioning and testing of shipyards requires the knowledge and functioning of the components of these panels.	3
Naval Architecture	BA	Naval Architecture	II	4	**Thermal Engineering** There are installations on board ships such as propulsion engines, diesel generators, HVACs where thermal processes occur. Knowing the thermal processes that take place in these installations make the operation simpler.	3
						(60)
Naval Architecture	BA	Naval Architecture	III	5	**Ship resistance** For the determination of propulsion power it must be known to resist the water's care when the ship is moving. Depending on the forms, this ship's strength is higher or lower. The knowledge gained in the discipline of this tuning teaches students to determine ship resistance.	5

Naval Architecture	BA	Naval Architecture	III	5,6	**Board and deck systems and equipments** In order to accomplish the functions for which the ship is built on board, a whole series of systems are required to ensure: safe navigation and survival of sailors. The discipline provides the necessary knowledge for the design and construction of these systems.	9
Naval Architecture	BA	Naval Architecture	III	5	**Ship structures statics** The structure of the ship's body is composed, regardless of the construction system of bars and plates. Plates are a category of elements that require a close study because there are various assumptions for calculating the structures that have plaques. The discipline provides the necessary knowledge to approach the structure of bars and plates.	4
Naval Architecture	BA	Naval Architecture	III	5,6	**Finite element method in shipbuilding** In order to analyse complex ship structure, the classical strength materials methods have to be enhanced by numerical methods as the Finite Element Method. At the bachelor level, the fundaments of the finite element method are studied, elements formulations and types, boundary conditions and loads formulations. In the frame of numerical laboratories, the students are learning the main modelling items for ship’s local strength analysis, linear elastic material, static local loads and free local dynamic formulation, base on sequential	8

					applications from simple to more complex local ship panels.	
Naval Architecture	BA	Naval Architecture	III	6	**Generation of ship shapes** Shapes of the ship are those that determine the power needed to achieve cruising speed. For high speeds, fine shapes, which determine resistance to minimal advancement, are required. Within this discipline, the necessary knowledge for the optimal approach of the ship's forms is provided.	3
Naval Architecture	BA	Naval Architecture	III	5	**Seakeeping** One of the ships operation safety criteria, at any design stages, is the ships' motions assessment in regular in irregular sea state. At the bachelor level only the oscillations, rigid ship motions formulation are studied, with linear hydrodynamic approach, deterministic and statistic formulation In the frame of the project, the analysis the oscillations response for a merchant ship and by seakeeping criteria, heave, pitch and roll, the navigation limits are obtained.	4
Naval Architecture	BA	Naval Architecture	III	5	**Ship manoeuvrability** In order to ensure the safety of the cargo transport of the passengers as well as the sailing personnel, the ship must meet manoeuvrability requirements. At mooring or canal navigation this is very important. Within the framework of this discipline the necessary knowledge to solve the problems of manoeuvrability of ships is provided.	4

Naval Architecture	BA	Naval Architecture	III	6	**Experimental techniques in naval architecture** When analytical and numerical methods of calculus cannot solve problems related to the behaviour of naval structures in navigation, then experimental checks are required. Within these methods, which are often electrical, specialized equipment is used. Students learn in this discipline how different equipment and measuring techniques work.	4
Naval Architecture	BA	Naval Architecture	III	5,6	**Technology of ship hull manufacture** The body of the ship is generally composed of flat and curved panels. These panels consist of sections, the sections consist of blocks, and finally their fitting to obtain the final shape of the ship's body. The ways of making, assembling and fitting are different depending on the type, size and destination of the ship. Within this discipline are presented the various ship building technologies.	8
Naval Architecture	BA	Naval Architecture	III	6	**Internship** Internship programs are preferred by the economic naval environment as they prepare future engineers for production. These programs take place during the summer according to a program agreed with the faculty.	4
Naval Architecture	BA	Naval Architecture	III	6	**General and local vibration of ship** The discipline is focused on the fundaments of analytical methods for the evaluation of ship structures free and	3

					forced vibrations. In the first part there are studied the local vibrations for ship structures that are idealized as one and several degree of freedom, local continuous beam and plate panels. The local loads formulation are not included, being considered generic harmonic formulations. At the second part the analytical methods for free vibration modes of the ship girder are studied, by 1D-equivalent beam formulation of the ship's hull structure, used for preliminary design.	
Naval Architecture	BA	Naval Architecture	III	6	**Propeller theory** Propulsion of vessels can be accomplished by several methods. The most used one is with one or more propellers mounted in the aft of the ship. These propellers, depending on the ship type and cruise speed, must have different shapes and number of blades. Within the discipline, the main knowledge to help the engineer design a propeller. The study in the cavitation tunnel of the propellers complements the accumulated theoretical knowledge.	4
						(60)
Naval Architecture	BA	Naval Architecture	IV	7,8	**Management in shipbuilding** The discipline ensures the accumulation of knowledge using the management tools and techniques used in shipyards. The following topics are studied: shipbuilding industry in the national economy, methods of study and analysis of the production process, production	6

					capacity of the shipyard, production costs, modern methods of management, management of R&D.	
Naval Architecture	BA	Naval Architecture	IV	7	**Marketing** Discipline offers a range of information related to the consumer needs, which to be met and the business processes conduct, to be appropriate to the needs of buyers. Discipline seeks learning concepts, ways and methods by which to obtain assurance that any product produced or service performed will be sold on the market, where the consumer's requirements are well adapted.	3
Naval Architecture	BA	Naval Architecture	IV	8	**Naval architecture** The content of the discipline leads to the skills needed to design of the ship These skills are required by the employers on the labor market involved in the naval activities. The following topics are studied: choice of the equipment, arrange of the propulsion system, fitting in the cargo area on the main types of ships, build in the residential areas, specific elements in arranging of the various types of ships, specific documents.	4
Naval Architecture	BA	Naval Architecture	IV	7	**Technology of ship hull manufacture** Discipline content leads to the obtaining the needed skills for design and optimize the manufacturing technological flow of the ship hull. The following topics are studied: assembly and welding technologies of block sections and of	7

					ship hull, processing of laminates fashioning and bending of laminates, processing of the profiles.	
Naval Architecture	BA	Naval Architecture	IV	7	**Integrated ship hull design systems** Discipline content is in according with the shipping industry (ICE -Galati , Damen Galati, Vard Braila, Tulcea, Nasdis Galati). It ensures the accumulation of knowledge on using of CAD tools and techniques used in specific domain.	4
Naval Architecture	BA	Naval Architecture	IV	7,8	**Unconventional offshore structures** The following topics are studied: models of wave with finite slope, waves deformation, applications of environmental factors on marine structures, unconventional marine structures, the calculation of the dynamic response of fixed offshore to the environmental factors.	9
Naval Architecture	BA	Naval Architecture	IV	8	**Ship testing** Discipline content leads to the technological skills needed to coordinate the activities of the ship testing. The following topics are studied: preparing, planning and coordinating the ship testing, tehnology for starting up the ships systems, materials used for ship testing, harbour and sea trails.	3
Naval Architecture	BA	Naval Architecture	IV	8	**Research and design activity** The preparation includes the basics elements to integrate the work of the graduate in the activity of the design of ships and shipyards. Topics examples: principles of documentation, sources of	6

					documentation, description of the vessel, special theme.	
Naval Architecture	BA	Naval Architecture	IV	8	**Diploma project** Discipline contributes to the achievement by the student of the training in the Naval Architecture. By its content, the project aims the achievement by the students of the following knowledge and skills required by the employers: preliminary design of the ship, preliminary sizing of structural elements and overall hull strength assessment, numerical modeling of the behavior of the hull structure, the development of the required documentation for manufacture and installation of hull sections.	4
Naval Architecture	BA	Naval Architecture	IV	7	**Technical ships** The content of the discipline leads to the skills needed to design, construction and operation of the technical ships. The following topics are studied: technical ship classification, market of the technical ships, tugs, pushers, support and assistance ship, dredgers, technology platforms.	4
Naval Architecture	BA	Naval Architecture	IV	7	**Marine propulsion engines** This technical discipline includes four parts: main characteristics technical and thermal economics of marine propulsion engines, propulsion systems that use marine engines, shafts used in propulsion systems and steam boilers generating.	4
Naval Architecture	BA	Naval Architecture	IV	8	**Small ships**	3

					In the process of small ships design special attention should be paid to the design and optimisation of all hydrodynamics performances such as: resistance, powering, seakeeping and manoeuvrability. The naval architect has the analysis capability of the hydrodynamics performance of the small ships, which can be utilised in the ship design and research companies.	
Naval Architecture	BA	Naval Architecture	IV	8	**Rules and conventions in naval architecture** Discipline is fundamental in preparing naval engineer in field of naval architecture and specifically the introduction of international shipbuilding requirements of IMO (International Maritime Organization). This subject provides for students skills required by employers in the international shipbuilding, involved in the design, manufacture and ship management.	3
						(60)
Naval Architecture	BA	Ship Systems and Equipments	I	1	**Mathematical analysis**	5
Naval Architecture	BA	Ship Systems and Equipments	I	2	**Linear algebra, analytic and differential geometry**	5
Naval Architecture	BA	Ship Systems and Equipments	I	1,2	**Computer programming and programming languages**	8
Naval Architecture	BA	Ship Systems and Equipments	I	1	**Descriptive geometry**	4

Naval Architecture	BA	Ship Systems and Equipments	I	2	**Technical drawing and computer aided design**	4
Naval Architecture	BA	Ship Systems and Equipments	I	1	**Physics**	3
Naval Architecture	BA	Ship Systems and Equipments	I	1	**Chemistry**	3
Naval Architecture	BA	Ship Systems and Equipments	I	2	**Naval architecture**	5
Naval Architecture	BA	Ship Systems and Equipments	I	1,2	**Mechanics**	7
Naval Architecture	BA	Ship Systems and Equipments	I	2	**Fluid mechanics**	4
Naval Architecture	BA	Ship Systems and Equipments	I	1	**Science and engineering of materials**	4
Naval Architecture	BA	Ship Systems and Equipments	I	1,2	**English**	4
Naval Architecture	BA	Ship Systems and Equipments	I	1,2	**Physical education**	2
Naval Architecture	BA	Ship Systems and Equipments	I	2	**Communication**	2
						(60)
Naval Architecture	BA	Ship Systems and Equipments	II	3	**Special mathematics** Study of complex variable functions, complex numbers and solving differential equations.	5
Naval Architecture	BA	Ship Systems and Equipments	II	4	**Numerical methods** Study of numerical integration methods, solving algebraic and differential equations systems.	3
Naval Architecture	BA	Ship Systems and Equipments	II	3	**Technical drawing and computer aided design** Programs used in the naval technical drawing are learned	4
Naval Architecture	BA	Ship Systems and Equipments	II	3	**Hydrodynamics and wave theory**	3

					There are presented the notions of regular and irregular waves, with the influences that they have on the ship's body.	
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Naval Architecture	BA	Ship Systems and Equipments	II	3,4	**Ship construction** Shows the ship's body building systems with the main design ways	9
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Naval Architecture	BA	Ship Systems and Equipments	II	4	**Machine parts** The machines parts have elements that are in roto-translation. The connection between these elements is achieved through couplings and transmissions of various types. The discipline presents the calculation of these coupling and transmission elements.	4
Naval Architecture	BA	Ship Systems and Equipments	II	3	**Materials technology** In order to build a metal structure, knowledge about materials is required. These by their mechanical characteristics	3

					help to ensure strength and stiffness during the applications. The discipline presents various types of materials used in shipbuilding.	
Naval Architecture	BA	Ship Systems and Equipments	II	3,4	**Physical education** To have a healthy body we need movement. This movement must be carried out in an organized field on a sports ground under the guidance of a specialized teacher.	2
Naval Architecture	BA	Ship Systems and Equipments	II	4	**Internship** Internship programs are preferred by the economic naval environment as they prepare future engineers for production. These programs take place during the summer according to a program agreed with the faculty.	4
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					water's care when the ship is moving. Depending on the forms, this ship's strength is higher or lower. The knowledge gained in the discipline of this tuning teaches students to determine ship resistance.	
Naval Architecture	BA	Ship Systems and Equipments	III	5,6	**Board and deck systems and equipments** In order to accomplish the functions for which the ship is built on board, a whole series of systems are required to ensure: safe navigation and survival of sailors. The discipline provides the necessary knowledge for the design and construction of these systems.	9
Naval Architecture	BA	Ship Systems and Equipments	III	5	**Hydraulic machines and drives**	5
Naval Architecture	BA	Ship Systems and Equipments	III	5	**Ship thermoenergetics systems and equipments**	5
Naval Architecture	BA	Ship Systems and Equipments	III	6	**Integrated design of ship systems**	4
Naval Architecture	BA	Ship Systems and Equipments	III	6	**Navigation systems and equipments**	3
Naval Architecture	BA	Ship Systems and Equipments	III	5	**Electrical and electronic naval equipments**	5
Naval Architecture	BA	Ship Systems and Equipments	III	6	**Generation and distribution of electricity on board the ship**	4
Naval Architecture	BA	Ship Systems and Equipments	III	5	**Systems for environmental energy recovery**	5
Naval Architecture	BA	Ship Systems and Equipments	III	6	**Systems for ocean engineering**	4

Naval Architecture	BA	Ship Systems and Equipments	III	6	**Internship**	4
				6	**General and local vibration of ship** The discipline is focused on the fundaments of analytical methods for the evaluation of ship structures free and forced vibrations. In the first part there are studied the local vibrations for ship structures that are idealized as one and several degree of freedom, local continuous beam and plate panels. The local loads formulation are not included, being considered generic harmonic formulations. At the second part the analytical methods for free vibration modes of the ship girder are studied, by 1D-equivalent beam formulation of the ship's hull structure, used for preliminary design.	3
Naval Architecture	BA	Ship Systems and Equipments	III	6	**Propeller theory** Propulsion of vessels can be accomplished by several methods. The most used one is with one or more propellers mounted in the aft of the ship. These propellers, depending on the ship type and cruise speed, must have different shapes and number of blades. Within the discipline, the main knowledge to help the engineer design a propeller. The study in the cavitation tunnel of the propellers complements the accumulated theoretical knowledge.	4
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Naval Architecture	BA	Ship Systems and Equipments	IV	7,8	**Management in shipbuilding** The discipline ensures the accumulation	6

					of knowledge using the management tools and techniques used in shipyards. The following topics are studied: shipbuilding industry in the national economy, methods of study and analysis of the production process, production capacity of the shipyard, production costs, modern methods of management, management of R&D.	
Naval Architecture	BA	Ship Systems and Equipments	IV	7	**Marketing** Discipline offers a range of information related to the consumer needs, which to be met and the business processes conduct, to be appropriate to the needs of buyers. Discipline seeks learning concepts, ways and methods by which to obtain assurance that any product produced or service performed will be sold on the market, where the consumer's requirements are well adapted.	3
Naval Architecture	BA	Ship Systems and Equipments	IV	7	**Marketing** Discipline offers a range of information related to the consumer needs, which to be met and the business processes conduct, to be appropriate to the needs of buyers. Discipline seeks learning concepts, ways and methods by which to obtain assurance that any product produced or service performed will be sold on the market, where the consumer's requirements are well adapted.	4
Naval Architecture	BA	Ship Systems and Equipments	IV	7,8	**Naval architecture** The content of the discipline leads to the	9

					skills needed to design of the ship These skills are required by the employers on the labor market involved in the naval activities. The following topics are studied: choice of the equipment, arrange of the propulsion system, fitting in the cargo area on the main types of ships, build in the residential areas, specific elements in arranging of the various types of ships, specific documents.	
Naval Architecture	BA	Ship Systems and Equipments	IV	7	**Technology of installation and repairing of ship systems** Discipline content leads to technological skills needed to coordinate the activities of installation and repairing of ship systems and equipments. The following topics are studied: ship propulsion system installation, board and deck systems and equipments installation and repairing.	5
Naval Architecture	BA	Ship Systems and Equipments	IV	7	**Integrated design of ship systems** The discipline prepares students to use CAD tools and techniques for specific domain, to model pipeline naval systems, leading to shorter time when graduates integrate into Naval Design and Shipbuilding**.**	3
Naval Architecture	BA	Ship Systems and Equipments	IV	8	**Arrangement of engines' compartment** The discipline leads to the skills needed for the design of a safe engines' compartment by understanding and using the principles and rules for the location of machinery and equipments in	3

					the compartment and volumes tanks calculation.	
Naval Architecture	BA	Ship Systems and Equipments	IV	7	**Machine systems** The discipline is focused on the study of auxiliary systems for propulsion engines and diesel generators, such as: fuel supply system, lubrication plant, cooling installation, starting and reverse systems.	3
Naval Architecture	BA	Ship Systems and Equipments	IV	8	**Ship systems and equipments testing** Discipline content leads to the technological skills needed to coordinate the activities of the ship systems and equipments testing. The following topics are studied: preparing, planning and coordinating the ship syatems and equipments testing, tehnology for starting up the ships systems, harbour and sea trails.	6
Naval Architecture	BA	Ship Systems and Equipments	IV	8	**Research and design activity** The preparation includes the basics elements to integrate the work of the graduate in the activity of the design of ships and shipyards. Topics examples: principles of documentation, sources of documentation, description of the vessel, design of a ship system, special theme.	4
Naval Architecture	BA	Ship Systems and Equipments	IV	7	**Diploma project** Discipline contributes to the achievement by the student of the training in the Ship Systems and Equipments. By its content, the project aims the achievement by the students of the following knowledge and skills required by the employers: preliminary design of the ship, preliminary design of	4

					a ship system, sizing of systems elements, the development of the required documentation for installation of ship systems and equipments.	
Naval Architecture	BA	Ship Systems and Equipments	IV	7	**Technical ships** The content of the discipline leads to the skills needed to design, construction and operation of the technical ships. The following topics are studied: technical ship classification, market of the technical ships, tugs, pushers, ssupport and assistance ship, dredgers, ttechnology platforms.	4
Naval Architecture	BA	Ship Systems and Equipments	IV	8	**Marine propulsion engines** This technical discipline includes four parts: main characteristics technical and thermal economics of marine propulsion engines, propulsion systems that use marine engines, shafts used in propulsion systems and steam boilers generating.	3
Naval Architecture	BA	Ship Systems and Equipments	IV	8	**Small ships** In the process of small ships design special attention should be paid to the design and optimisation of all hydrodynamics performances such as: resistance, powering, sea keeping and manoeuvrability. The naval architect has the analysis capability of the hydrodynamics performance of the small ships, which can be utilised in the ship design and research companies.	3
						(60)

Naval Architecture	MA	Naval Architecture	I	1	**Project Management** The following topics are studied: project management processes, implementation of project integration management, project time management, project risk management, project cost management, project human resource management. The discipline contributes to the managerial training of the future shipbuilding specialist. It assures the accumulation of knowledge on the use of the managerial techniques and tools used in the shipyards.	4
Naval Architecture	MA	Naval Architecture	I	1	**Complements in Propulsion Dynamics** The following topics are studied: actual trends in ship propulsion, marine propeller geometry, manufacturing technology, propeller experimental approach, propeller theoretical approach, propeller design, hydrodynamic performances of marine propeller in unsteady flow, unconventional propulsors and devices. The content of the discipline leads to the acquirement of the necessary competences for the study and design of ship propulsion systems, in order to improve the propulsion performance of the ships. These competences are required for research and design activities in naval architecture.	6
Naval Architecture	MA	Naval Architecture	I	1	**Unconventional Materials** The following topics are studied: the use of composite materials in the shipbuilding industry, a new approach in replacing shipbuilding conventional materials with composite materials, methodologies to build naval structures from composite	6

					materials, calculation methods regarding the use of composite materials. The training offered by this discipline is to familiarize students with the use of unconventional materials (composite materials) in the construction of boats. Students will also assimilate the design and analysis knowledge of shipbuilding structures made of composite materials.	
Naval Architecture	MA	Naval Architecture	I	1	**Advanced Shipbuilding Technology 1** The following topics are studied: general elements and terms în technology of shipbuilding , technical and day living accommodation, technology of fabrication, mounting of the board systems, technology of fabrication and mounting of the deck systems, launching of the ship, test on shore and sea, technological problems and estimations. The content of the course is in accordance with the degree and standard of shipyards and ships installations.	4
Naval Architecture	MA	Naval Architecture	I	1	**Research & Design Internship 1** The following items are included: choosing the research theme, bibliographic documentation, the state of the art of knowledge, establishing the directions of scientific research. The training includes the basic elements for integrating the graduate in the activities of the shipbuilding research and design companies.	10
Naval Architecture	MA	Naval Architecture	I	2	**Computational Fluid Dynamics 1** The following topics are included: the theory of partial differential equations, grid generation of meshing of differential equations that describe the flow model,	4

					fundamentals of the finite differences method, applications of numerical methods for solving linear and nonlinear differential equations, numerical modelling of bi and three-dimensional potential fluid flow. The discipline provides skills regarding: worth motivation of the numerical solutions through the post-processing data techniques, technical solutions choices for reducing the ship resistance, hydrodynamic hull forms optimization.	
Naval Architecture	MA	Naval Architecture	I	2	**Structural Analysis and Hydro elasticity** The following topics are included: user procedures and functions implemented in the CAD/FEM programs, the analysis of the global ship strengths with 3D-FEM hull models, the global ship hull vibrations analyses based on 3D-FEM models, the buckling structural analysis for global models based on the finite element method, non-linear, elasto-plastic, static and dynamic analyses based on the finite element, Special phenomena induced by the waves at the forced general ship hull vibration (springing, whipping), the linear dynamic response at coupled oscillations and vibrations in the vertical plane and horizontal-torsional, the non-linear analysis of the ship dynamic response at coupled oscillations-vibrations, the analysis of fatigue resistance and the estimation of the exploitation period of the ship hull structure. The master student accumulates the practical knowledge of the advanced techniques of calculating the ship structures,	6

					as well as of the hydro elasticity of the ship.	
Naval Architecture	MA	Naval Architecture	I	2	**Experimental Analysis of Noise and Vibration** The following topics are included: noise, experimental noise analysis, format for noise survey report, guidance on the inclusion of noise issues in safety management systems, simplified procedure for determining noise exposure, underwater noise measurements and testing, noise prediction, noise by safety reason, shafting vibration, format for vibrations survey report. The purpose is that the student to accumulate the practical knowledgment regarding the modern acquisition technics, data processing, storing and reporting of vibro-acoustic data.	6
Naval Architecture	MA	Naval Architecture	I	2	**Advanced Shipbuilding Technology 2** The following topics are included: welding processes of metals, DC electric arc, AC electric arc, stability of the electric arc and welding process, power sources for welding, selecting welding power sources, automatic and semiautomatic welding, equipment for gas welding, welded joints, welding consumable used in shipbuilding, calculation of general deformations of welding hull units. Through its content, the discipline aims to provide the master student explanation and interpretation of the theoretical models of calculation of technological processes of welding.	4
Naval Architecture	MA	Naval Architecture	I	2	**Research & Design Internship 2** The following items are included: analysis and selection of the theoretical methods,	10

					technological research methods, experimental modelling methods, of study applicable in the field of the research theme, analysis of numerical, experimental and technological, investigation capabilities at "Dunărea de Jos" University of Galati, in the field of research. The training includes the basic elements for integrating the graduate in the activities of the shipbuilding research and design companies.	
						(60)
Naval Architecture	MA	Naval Architecture	II	3	**Computational Fluid Dynamics 2** The following topics are included: numerical simulation of the boundary layer flow, numerical solutions of the Navier-Stokes and continuity equations, formulation of boundary conditions, modelling of free surface, particular flow boundary conditions with free surface, modelling of turbulent flow. The discipline provides skills regarding: worth motivation of the numerical solutions through the post-processing data techniques, technical solutions choices for reducing the ship resistance, hydro-dynamic hull forms optimization.	6
Naval Architecture	MA	Naval Architecture	II	3	**Integrated CAD-CAM Tools in Naval Architecture 1** The following topics are included: theoretical fundamentals, curves and surfaces, Bezier curves and B-spline, Bezier and B-spline surfaces, geometrical modelling tools, non-relational geometric modellers, complex surface modelling in AVEVA Marine. This specialty discipline	4

					consists of two parts: study of general methods of 3D modelling of ship shapes and knowledge of dedicated programs of integrated naval design.	
Naval Architecture	MA	Naval Architecture	II	3	**Optimal Shipbuilding Technologies** The following topics are included: the shipbuilding process, shipbuilding management theory, product-oriented work breakdown structure, metal manufacturing and construction processes, welding, fracture control, assembly of ship structure, shipyard layout, planning, scheduling, and production control, accuracy control, ship conversion, overhaul, and repair. This discipline provides: knowledge of modern methods of naval technological design, development of skills necessary to solve such problems, training of competencies in the coordination and control of ship manufacturing and assembly activities.	4
Naval Architecture	MA	Naval Architecture	II	3	**Offshore Units and Systems** The following topics are included: influence of wave theory on hydrodynamic forces of excitation, hydrodynamic transparency and synthesis: types of offshore structures and methods for assessing their dynamics under environmental factors, elements regarding the stability of floating offshore structures in calm water and waves, specific elements for the transport and location of offshore structures. Through its content, the discipline aims to provide the naval engineer with in-depth knowledge on understanding the specific issues that arise	6

					in the design, construction and operation of offshore structures.	
Naval Architecture	MA	Naval Architecture	II	3	**Research & Design Internship 3** The following items are included: theoretical modelling of the research topic, development of the theoretical model. theoretical results, numerical modelling of the research topic theme, development the numerical model. numerical results, technological modelling of the research topic theme, development the technological model. technological results, translating results from model to nature, experimental modelling of the research topic theme, development of the experimental model. results by experimental model, translating experimental results from model to nature. The training includes the basic elements for integrating the graduate in the activities of the shipbuilding research and design companies.	10
Naval Architecture	MA	Naval Architecture	II	4	**Integrated CAD-CAM Tools in Naval Architecture 2** The following topics are included: complex blocks modelling, locate blocks sections and panels, seams modelling. plates modelling, stiffeners modelling, cuttings modelling. notch modelling, complex brackets modelling, assembly drawings generation, construction drawings generation. The main objective is learning the methods for working in/with a CAD-CAM system data base.	4
Naval Architecture	MA	Naval Architecture	II	4	**Commissioning** The following topics are included:	5

					Preparing the commissioning program, Planning and coordination of the commissioning program, Starting-up technology of the ship sytems, Organizing the commissioning program, Specific materials requetsed by the commissioning program, Harbour tests and sea trials requested by the commissioning program. The content of the discipline leads to acquiring the necessary competencies for coordinating the commissioning program of the ship.	
Naval Architecture	MA	Naval Architecture	II	4	**Ethics and Academic Integrity** The following topics are included: the distinction between ethics, morality, applied ethics, models of moral man, the utilitarian or consequentialist theories, basic ethical rules of scientific research, deontological meanings, the ethical challenges caused by the rapid development of electronic communication. The correctness and accuracy of using the concepts and theories perceived in the discipline of ethics and academic integrity ensures a proper conduct of the students according to the ethics of the university.	3
Naval Architecture	MA	Naval Architecture	II	4	**The Marine Environmental Protection Technology** The following topics are studied: green ship concept, energy efficiency design index, ship energy efficiency management plan, green passport. The main objective is that the master student to accumulate the practical knowledgeable regarding the environment pollution (EEDI index and	5

					environmental parameters) by lectures and project activities.	
Naval Architecture	MA	Naval Architecture	II	4	**Research & Design Internship 4** The following items are included: comparison of theoretical, numerical, technological and / or experimental results, highlighting innovative solutions applied in theoretical, numerical, technological and / or experimental modelling, highlighting the optimal solutions applied in solving the research topic, conclusions of theoretical, numerical, technological and / or experimental research, future directions applicable to solving the research topic. The training includes the basic elements for integrating the graduate in the activities of the shipbuilding research and design companies.	8
Naval Architecture	MA	Naval Architecture	II	4	**Research for Master Thesis** Research and design themes in the field of naval architecture, specific to master program, individualized for each masterand, which addresses the following main directions: ship hydrodynamics (CFD), ship dynamics (resistance, maneuverability, seakeeping and hydroelasticity), dynamics of ship propulsion systems, ship structures analysis (FEM), offshore systems and units, ship integrated CAD / CAM / CAE systems, experimental noise and vibration analysis, advanced shipbuilding technologies, marine environmental protection, project management technologies.	5

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