

ANNOTATIONS

Program: **NAVAL ARCHITECTURE AND MARINE TECHNOLOGY**

Professional orientation: **TRANSPORT, NAVIGATION AND AVIATION**

Professional qualification: **MECHANICAL ENGINEER**

Academic degree: **BACHELOR**

Form of Study: **FULL-TIME**

Term of Study: **4 years / 8 semesters**

Discipline “Mathematics, part 1”, code (1)

The present program consists of basic elements of following parts: Linear Algebra, Analytic Geometry and differential computation of one or more variables. For material adaptation elementary knowledge of gymnasium practice are sufficient. The aim of the course is defining of main conceptions for the next course Mathematics, Part 2 as well as in engineering subjects. Also computer facilities are used during the exercises for algebra.

Main parts of content :

- Linear Algebra
- Analytic Geometry
- Differential computation.
- Structure of educational process: Lectures and Laboratory exercises.

Discipline “Computer Technologies”, code (2)

The subject aims to educate the students on modern computer systems and connected types of information technologies. It gives basic knowledge on informatics, hardware and system program provision for personal computers. Parts of disciplines are integration environment MS Windows, computer graphic, electronic tables and diagrams – Excel, PowerPoint and computer networks.

Main parts of content :

- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint
- Internet and Data base Systems.

Structure of educational process: Consists of laboratory exercises connected with MS Windows, Internet facilities, MS Office elements.

Discipline “Technical documentation Naval Architecture, part 1”, code (3)

The Technical documentation in Naval Architecture, part 1 covers common engineering and special disciplines for Bachelor’s degree students of Naval Architecture and Marine Technology. The subject is education on common theoretical principles and methods for project documentation, the rules and requirements for machine drafts, also the facilities for technical documentation of basic machine and ship elements in coordination with the norms and standards. The students are educated in basic terminology for construction documentation, standards in shipbuilding.

Main parts of content :

- Ship Technical Documentation
- Basic methods for drawing elements in space.
- Theoretic drawing of a ship hull.
- Construction drawings of a ship.

Discipline “Basics of Shipbuilding and Marine Techniques, part 1”, code (4)

The discipline is a part of education Plan of students Naval Architecture and Marine Technology, Bachelor degree in 1-st semester. The main target of the subject to make students familiar with basic definitions and characteristics of complex technical systems, classification of ships, vessels capabilities on sea, exploitation parameters of ship constructions and systems. The accent falls upon mathematical and physical principles. During laboratory exercises some practical problems are solved using also multimedia equipment and software.

Main parts of content :

- Basic mathematical principles, physical quantities
- Classification and features of ships and marine facilities
- Main dimensions of the ship
- Ship theory
- Ship parameters
- Stages in ship project realization
- Technology of shipbuilding.

Discipline “Specialized Sport Activities, part 1”, code (5a)

The discipline is connected with swimming training by specific swimming exercises for maintain the health status of the students. The given theoretic and training potential gives students skills on swimming styles and especially freestyle stroke. There is an entrance level provided for physical capabilities of the students educated. The teaching program consists of 30 hours exercises in a swimming pool.

Main parts of content :

- Theoretic and methodic knowledge
- Special physical training
- Technical and tactic training
- Psychological and will training.

Discipline “Sport and Social Adaptation, part 1”, code (5b)

The education program on Sport and Social Adaptation Part 2 lays in education plan for Bachelor degree of all subjects. The program is intended for students who are obliged to select in 1-st year of education due to physical deceases and health problems. The lectures material is in two semesters and covers topics of basics of sport as a factor of good psychical and physical health and its influence to effective social adaptation.

Main parts of content :

- Sport
- Social adaptation
- The place of sport for an effective social adaptation.

Discipline “Introduction to Marine English”, code (5c)

This discipline may be chosen and it is targeting to introduce the basic terminology of the subject as well to accents on skills development for reading with understanding, special details of a technical text, connected with lexis and syntax models. The knowledge on discussion, thematic connected with defined methods units points to creation of special knowledge and skills for extracting and systemizing of information from the specialized texts and development of communication abilities of the students.

Main parts of content :

- Introduction to Naval Architecture
- Safety at Sea
- Classification and Certification of Ships

Discipline “ Mathematics, part 2”, code (6)

The content of Mathematics, part 2 uses knowledge achieved during Mathematics, part 1. Program consists following parts: Integral Computation, Uniform Differential Equations, Function of a Complex Variable, Possibility Theory and others. The target of the course is to define of terms treated and their implementation in the following parts of the course. Provided is also computer algebra training which gives opportunities for making easy the home training of the students.

Main parts of content :

- Integral Computation
- Differential Equations
- Complex numbers and function with a complex variable
- Possibility Theory.

Discipline “ Chemistry”, code (7)

Chemistry is compulsory discipline for the students of Naval Architecture and Marine Technology and is fundamental for the others subjects concerning engineers and specialized training. During the course some basic learning must be obtained on the structure and properties of the matter, chemical and thermodynamic processes, electrochemical systems, corrosion, physical and chemical parameters of the fuels and mineral oils also polymers.

Main parts of content :

- Structure and properties of the matter
- Chemical Thermodynamic
- Electrochemistry
- Corrosion of metals
- Corrosion protection
- Fuels
- Lubricants and Cooling materials
- Water as cooling agent and for power needs

Chemistry of the polymers.

Discipline “ Material Knowledge and Materials Technology”, code (8)

The discipline is of a common technical kind intended to give basic knowledge on machine building, methods of material treatment when obtaining, shape changing and characteristics improvement by thermal and complex methods. The structure and parameters of metals materials are of interest. During the course the main engineering materials are discussed like iron alloys and other metals: Al, Cu, Mg, Ti. A main part is dedicated for the nonmetals – polymers, ceramics, composites and other specific materials. One of the main targets of this course is the students to obtain knowledge on metallurgical problems, material treatment as casting, plastic deformation, welding, thermal treatment for different materials.

Main parts of content :

- Structure and properties of materials
- Fundamentals of engineering materials
- Basics and theory of thermal treatment
- Nonmetals – polymers, ceramics, composites

Production and main technological operations of material shape changes.

Discipline “ Technical Documentation in Naval Architecture, part 2”, code (9)

Technical documentation in shipbuilding, part 2 continues with education on the rules and requirements of draft documentation for basic covering the student’s education. The purpose of this subject is learning the Rules and requirements for machine and shipbuilding drafts preparation in accordance with the standards in shipbuilding.

Main parts of content :

- Construction documentation of coupled unit

- Common draft and specification
 - Theoretical draft of a ship hull
 - Defining the relative and real coordinates of ship surface
- Theoretical draft of a small vessel.

Discipline “ Physics”, code (10)

The course aims to introduce the students to fundamentals of physics – theoretically and experimentally, starting and basic knowledge on physics on level, corresponding to the needs of higher education in Bulgaria. The connection of the theory with practical implementations is pointed.

Main parts of content :

- Elements of classical mechanics
- Dynamics of a material point
- Work and Energy
- Elements of molecular physics and thermodynamics
- Irreversibility of processes
- Electricity and magnetic processes
- Vibration and waves
- Optics
- Structure of the atom

Elements of nuclear physics

Discipline “Computer Graphics”, code (11)

The discipline aims to teach students in order details of computer graphic, especially ACAD system and its implementation when making a project of a ship and naval facilities. The discipline includes: common structure of AutoCAD, details of graphic primitives, 2D and 3D objects.

Discipline “ English, part 1”, code (12)

In the first part of the English language course students’ training is based on their foreign language competence acquired in secondary school. The course focuses on the consolidation of the basic grammatical units and revision of General English vocabulary.

Developed are all four communicative skills – reading comprehension, listening, speaking and writing. The purpose of the training at this stage is to facilitate the transition from General English to English for Specific Purposes.

Main issues of the syllabus content:

- Consolidation of the basic grammar tenses in the English language
- Discussions on various topics using the basic grammatical constructions in General English
- Introduction of new lexical units to provide the transition from General English to English for Specific Purposes
- Developing students’ communicative skills.

Discipline “Specialized Sport Activities, part 2”, code (13a)

The education program on Sport swimming suggests for specific swimming skills and the theoretical knowledge for health status gives also skills for better swimming capabilities. Special attention is pointed to basis tendentious in different styles when starting and finishing. Training backstroke freestyle.

Main issues of the syllabus content:

- Theoretical and methodical knowledge
- Common physical training
- Special Physical training
- Technical and tactical training
- Psychological and will training.

Discipline “Sport and Social Adaptation, part 2”, code (13b)

The education program on Sport and Social Adaptation Part 2 lays in education plan for Bachelor degree of all subjects. The program is intended for students who are obliged to select in 1-st year of education due to physical deceases and health problems. The lectures material is in two semesters and covers topics of basics of sport as a factor of good psychical and physical health and its influence to effective social adaptation.

Main issues of the syllabus content:

- Sport
- Social Adaptation
- The place of sport for an effective social adaptation.

Discipline “ Introduction to Marine English, part 2”, code (13c)

This discipline may be chosen and it is targeting to introduce the basic terminology of the subject as well to accents on skills development for reading with understanding, special details of a technical text, connected with lexis and syntax models. The knowledge on discussion, thematic connected with defined methods units points to creation of special knowledge and skills for extracting and systemizing of information from the specialized texts and development of communication abilities of the students.

Main issues of the syllabus content:

- The Ship as a Complex Structure
- Basic Classification of Ships
- Introduction to Ship Construction and Shipbuilding Materials

Discipline “ Practical Training, part 1”, code (14)

The aim of this discipline is collecting knowledge on structure and working skills with universal lathe, cutting machines and boring machines die to requirements of IMO. The students must be able to choose equipment, instruments, to tune the equipment for different regimes of work, to control to the machine work. The result has to be reached by every single education and practical work and exercise.

Main parts of content :

- Universal Lathe
- Universal Cutting Machines
- Boring Machines.

Discipline “Practice, part 1”, code (15)

Through the discipline "Practice" the students of the Naval Architecture and Marine Technology who have completed the first course acquaint themselves with the ship as a complex engineering and architectural system and some specific activities in shipbuilding and ship repair.

The aim of the practice is to consolidate the students' knowledge acquired in the "Fundamentals of Naval Architecture and Marine Technology" discipline for the individual ship structures, elements, arrangements, ship devices and systems, to help them acquire the specific terminology, and to support the future training of students with sufficient information on technical training and technology of production processes. The practice is carried out in companies and companies performing shipbuilding, ship repair and other activities related to marine engineering, activities.

Main issues of the syllabus content:

- General business information
- Getting to know a particular ship
- Understanding the technology of manufacturing processes in the company
- Develop a project report.

Discipline “Thermal Technologies”, code (16)

The aim of the course is to acquaint students with the fundamentals, principles and application of technical thermodynamics and heat transfer. The curriculum includes examining issues related to the transformation of the different forms of energy, the technical means of this transformation, the distribution of heat in the bodies, and examples of modern technical means for transforming energy and utilizing new energy sources. In addition, the course focuses on issues related to the application of technical thermodynamics and heat transfer in the field of shipbuilding.

Main issues of the syllabus content:

- Thermodynamics

Theme 1. Introductory concepts, definitions and laws of thermodynamics.

Theme 2. Evaluating properties using ideal gas model. Internally Reversible Steady - State Flow Processes. Internal Combustion Engine.

Theme 3. Evaluating of thermodynamic processes of real gases and vapors. Vapor Power System.

Theme 4. Refrigeration and Heat Pump Systems.

- Heat transfer.

Theme 1. Heat Conduction;

Theme 2. Convection;

Theme 3. Radiation Heat Transfer;

- Heat Exchangers.

Discipline “ Mechanics”, code (17)

The discipline "Mechanics" comprises three main parts: Statics, Kinematics and Dynamics. In Statics methods for reduction and conditions of equilibrium of force systems are studied, their application for solving of specific engineering problems as well. Mainly, the problems concerning determination of support reactions are solved here. In Kinematics the motion of a particle and the basic motions of a rigid body, such as translation, rotation and planar motion, are studied. Kinematics of some common planar mechanisms is considered here. The Dynamics part is devoted to the classical mechanical methods for derivation of the differential equations of motion of a particle, a rigid body and a mechanical system under the forces application.

Every student receives individual task for laboratory work that must be fulfilled and be defended at the appointed time.

To assimilate the discipline the knowledge of mainly the following mathematical sections are required: vector calculus, analytical geometry, differential and integral calculus, analysis of differential equations.

Main issues of the syllabus content :

- STATICS

- KINEMATICS

- DYNAMICS

Discipline “ Hydrodynamics of ships”, code (18)

This discipline is fundamental for the students in Naval Architecture and Marine Technology. It covers the basics of fluid mechanics and sea dynamics, giving basic knowledge for other disciplines as stability and motions of ships, strength, piping systems, etc.

Main issues of the syllabus content:

- Fluid properties and fluid motion equations

- Hydrostatics

- Kinematics of fluids

- Dynamics of ideal fluids

- Dynamics of viscous fluids

- Boundary layers

- Wing theory

- Wave theory.

Discipline “ Technical Documentation in Naval Architecture, part 3”, code (19)

The subject continues the study of the Rules and Requirements for Technical Documentation in providing the special disciplines of the shipbuilding and marine engineering specialty for the Bachelor degree.

The discipline aims:

- to continue familiarization of students with the principles and methods of design theory and study of ship and ship design methods on the ship's main planes and planes and give them the knowledge and skills necessary to develop shipbuilding drawings and drafting documentation;
- to provide students with comprehensive knowledge about the types of shipbuilding drawings and design documentation, their content and format, the shipbuilding drawing rules and the current standards and norms;
- to acquaint students with the basic rules and requirements for the development of main drawings for technical design;
- to acquaint students with the basic rules and requirements for the development of shipbuilding drawings and working documentation of assembled units in shipbuilding, assemblies and hull structures;
- to acquaint students with the basic terminology and elaboration of design documentation of shipbuilding devices, conditional indications and rules for the preparation of shipbuilding drawings;

Main issues of the syllabus content:

- Drawings of general arrangement
- Non-dismountable joints in shipbuilding
- Typical structural units
- Conditional representation of structural elements
- Work documentation in shipbuilding
- Ship Schemes.

Discipline “English, part 2”, code (20)

The consolidation of students’ competences in General English commenced in the first part continues in this semester as well. Students’ attention is drawn to grammatical units widely used in the language of science and technology. Learners are also introduced to basic maritime terminology. Developed are the four communicative skills – reading comprehension, listening and speaking. Each unit is followed by a mini-project for broadening their knowledge which terminates with a mini-presentation.

Main issues of the syllabus content:

- Revision of Tenses
- Focus on the Passive Voice
- Introduction of New Maritime Vocabulary
- Developing Students’ Communicative Skills.

Discipline “Economics”, code (21a)

The subject “Economics is an elective discipline, studying the basic principles, rules, requirements and mechanisms for an efficient operation of the enterprise. It examines the patterns of development, the main economic processes and their impact on the economic condition and efficiency of the enterprise, as well as the influence of government policy and the state of the national economy on its activities.

The main objective is to form a system of knowledge about the basic laws and principles of the effective functioning of the enterprise. Specifically, students should acquire knowledge and skills to:

- determine the factors that have the greatest impact on the operation of an enterprise
- determine the structure of the assets and capital of the enterprise

- identify the most important financial and economic indicators of its activity
- determine the operating costs of the enterprise and calculate the cost
- set prices
- determine the revenue and profits of the enterprise.

Discipline “Management of Industrial Enterprises”, code (21b)

This subject discusses the main, general and theoretical issues related to engineering processes. The aim is to acquaint students with the characteristic theoretical and methodological problems of the research in the area of engineering of production systems, design of industrial enterprises, organization of auxiliary and servicing processes in one industrial enterprise, management of engineering projects. The possibilities of applying the system approach in production systems design are analyzed, as well as the choice of preferred option in the course of the given engineering process. This provides a foundation on which students can build on their knowledge in organization and management of production in one business unit.

Main issues of the syllabus content:

- Object and Subject of Industrial Engineering and Management
- Engineering of Production Systems
- Plant Location and Layout
- Location Theories
- Strategic Decisions for Location of the Enterprise
- Production System
- Organization of The Production Process in Time
- Design of industrial enterprises
- Organization and General Methodology of Industrial Enterprise Design
- Content and General Methods of Technological Design
- Design of Separate Enterprise Production Units (Workshops)
- Pre-determining the Production Type and the Basis for Spatial Construction of the Production Units
- Design of the Separate Enterprise Production Units.

Discipline “Specialized Sport Activities, part 3”, code (22a)

Discipline “Sport Management, part 1”, code (22b)

Discipline “Introduction to Marine English, part 3”, code (22c)

Discipline “ Practical Training, part 2”, code (23)

Subject of the "Practice, part 2" discipline for students of the second course, Naval Architecture and Marine Technology is the acquisition of a basic minimum of theoretical knowledge and practical skills regarding the elaboration of details, assemblies and sections of the ship's hull using electric welding methods as well as on issues related to the safety of the labour safety technique.

Main issues of the syllabus content:

- Welding machines and equipment
- Welding technology of sheet material
- Occupational safety and safety techniques in the implementation of welding technologies
- Practical implementation of welded joints of sheet material.

Discipline “ Strength of Materials”, code (24)

The discipline of Strength of Materials is fundamental for all mechanical engineers. The main objective of the course is to acquire the students the skills for strength and deformation calculation of structures under static load. In order to acquire the learning materials, the knowledge acquired by the subjects Mathematics, Mechanics (Statics) and Material Science should be used as a basis.

During the course the students acquaint themselves with the main types of resistance - tension /compression, twist of round sections especially bending as well as with the most common in the mechanical practice combined load - torsional bending, the question of stability of the balance of pressed bars is discussed briefly and the knowledge obtained is the basis for the successful understanding the subsequent disciplines.

Main issues of the syllabus content:

- Introduction to material strength
- Rod structures
- Deformations at center tension/compression
- Pure torsion
- Special bending
- Combined load.
- Buckling of pressed rods.

Discipline “ Machine Elements”, code (25)

Students receive the first basic knowledge of engineering design and construction of mechanisms and machines.

Modern methods of study, calculation and construction of basic types of general purpose machine elements and some of their most common structures are studied

The reference data, which are necessary for the design according to the European and international norms, are accepted and are accepted as official Bulgarian standards, so the students receive the training corresponding to the training at the Technical University of the European Union.

Main issues of the syllabus content:

- Design stages. Types of loads.
- Efficiency criteria. Safety factor.
- Detachable joints.
- Non-detachable joints.
- Quasi-dismountable joints.
- Non-steered connectors.
- Managed connectors.
- Self-adaptive connectors.

Discipline “ Marine Power Plants”, code (26)

The subject “Marine power plants” exists in the education plan for Bachelor’s degree of specialty Shipbuilding and Naval Techniques. During the course the education is focused on structure, work principles and main rules for exploitation of main ship and buster engines, machinery and equipment of marine power plants. Subject of training are ship diesel engines, steam and gas turbines, ships boilers, pumps, compressors, fans, separators, filters and heat exchangers. In detail the principles of common work of these elements as parts of a machine compartment are treated. The main power and economic principles of work of the systems are of interest. During laboratory exercises the students are involved in basic principles of ship propulsion complex functioning. The problems connected with modern requirements concerning systems covering safety, environment and IMO requirements are of special interest.

Main issues of the syllabus content:

- Ship diesel engines
- Ship steam and gas turbines
- Ship heat exchangers and separators
- Buster systems
- Systems, parts and Marine Power Complex
- Marine Power Complex.

Discipline “Electrical Science and Electronics”, code (27)

The discipline aims education in the field of basic physical processes in electrical equipment, analysis of electrical and electronic systems, education on methods of comparison of electrical quantities, forming practical skills and their implementation by the help of special programs and models. Also to introduce the students to principles and characteristics of electromechanical and electronic facilities by estimation of different parts.

Main issues of the syllabus content:

- Electromagnetic field
- Electrical chains
- Magnetic circuits and Transformers
- Electric Machines
- Measurement in Electrotechniques
- Electronics.

Discipline “Statics and Dynamics of Ships and Marine Facilities, part 1”, code (28)

The discipline is intended to familiarize the students with the basic seagoing qualities of floating structures: buoyancy, stability and unsinkability.

Main issues of the syllabus content:

- Buoyancy of ships;
- Stability;
- Unsinkability.

Discipline “ English, part 3”, code (29)

During this semester students have the opportunity to widen and improve their language competence as well as combine it with the development of a range of subject specific skills. At this stage the focus of study is on the specialized vocabulary as well as the word formation models and syntactic constructions typical of the scientific style of writing. Students are trained to work with specialized dictionaries. By the end of the English course students are expected to recognize and successfully apply the terminology used in their professional discourse.

Main issues of the syllabus content:

- Detailed Classification of Ship Types
- Cargo Types
- Ship General Arrangements
- Ship Structural Arrangements – Keel, Framework, Floors, Beams, etc.
- Ship Dimensions – LOA, LBP
- Hull Forms
- Communication Skills Development.

Discipline “Specialized Sport Activities, part 4”, code (30a)**Discipline “Sport Management, part 2”, code (30b)****Discipline “ Introduction to Marine English, part 4”, code (30c)****Discipline “Marine Facilities Systems”, code (31)**

The topic of this discipline is the study of the principle arrangement, constructions and features of different types of piping systems of ships and off-shore structures.

The teaching is intended to:

- Develop students’ technical understanding of the piping systems
- Familiarize them with the methods of providing the operational features of marine structures through the piping systems
- Familiarize them with the design features of marine piping systems

- Create skills in determining the optimum parameters of operation of marine piping systems
- Introduce the students to the requirements of the international conventions and agreements, as well as national standards on the pollution prevention of seas and oceans. Main issues of the syllabus content:
 - Classification of the marine piping systems
 - Structural elements of pipelines
 - Structural elements of piping systems
 - Hydraulic calculations for determining the parameters of piping systems
 - Determining the parameters of marine HVAC systems
 - Functional and structural features of different types of piping systems and specifics of their design.

Discipline “Statics and Dynamics of Ships and Marine Facilities, part 2”, code (32)

The subject is intended to introduce the students to the modern methods of investigation of the dynamics of marine structures. It provides basic knowledge on motions of ships and marine structures at sea and on launching of ships.

Main issues of the syllabus content:

- Launching of ships
- Practical problems in ship theory
- Basics of the hydrodynamic theory of ship motions
- Linear theory of transverse oscillations
- Linear theory of longitudinal oscillations
- Non-linear theory of ship motions
- Motion stabilizers.

Discipline “ Resistance, Propulsion and Maneuvering of Ships and Marine Structures, part 1”, code (33)

This is the first part of the course dealing with resistance of ships and part of propellers related to geometry, hydrodynamic characteristics of propellers and their interaction with the hull’ Main issues of the syllabus content:

- Nature, causes of resistance. Components of resistance.
- Viscous resistance
- Wave resistance
- Influence of environmental factors on resistance.
- Relation between hull form and resistance
- Experimental methods of determining ship resistance.
- Geometrical characteristics of marine propellers.

Discipline “Electrical equipment of ships and marine facilities”, code (34)

The subject Electrical Equipment of Ships and Marine Structures is a generalization of the subjects Electrical Engineering and Electronics etc.

The objective of the course is familiarize the students with the specific conditions of operation of electrical equipment onboard the ship, the units of the ship electrical and power system, specific electrical protection devices, the main electrical drives onboard, as well as with the assembling the electric system and ship electric safety.

The mastering of the theoretical issues is assisted by the corresponding laboratory exercises.

Main issues of the syllabus content:

- Introduction. Specific operational conditions of marine electrical equipment;
- Elements of ship automatics;
- Marine electric power systems;
- Ship electric drives;
- Processes of electrical assembly;
- Electrical protection of marine electrical systems.

Discipline “Technical Safety”, code (35)

The subject presents to the students the requirements and regulations on labor protection and technical safety, as well as the rules for safe and accident-free work. The technical means for fulfillment of the rules for safe and accident-free work is also considered.

Main issues of the syllabus content:

- Conditions of labor in the shipbuilding production,
- Work in an environment of industrial and welding dust;
- Work under noise and vibrations;
- Work with pressurized equipment;
- Electrical safety;
- Fire protection;
- Working at high locations.

Discipline “English, part 4”, code (36)

During this semester students have the opportunity to widen and improve their language competence as well as to combine it with the development of a range of subject specific skills. At this stage the focus of study is on the specialized vocabulary concerning the properties of the materials used in shipbuilding and the methods of their processing, as well as the word formation models and syntactic constructions typical of the scientific style of writing. Also developed are the communicative skills of reading comprehension, listening, speaking and writing.

Students are trained to work with specialized dictionaries. By the end of the English course students are expected to recognize and successfully apply the terminology used in their professional discourse.

Main issues of the syllabus content:

- Materials in Engineering
- Material Properties
- Methods of Processing
- Shipbuilding Materials
- Communicative Skills Development.

Discipline “Philosophy”, code (37a)

Objective: The syllabus includes the eternal problems of philosophy – both traditional and modern, as well as issues of the practical philosophy.

Tasks: To provide the students with the possibility to acquire intellectual experience and to perceive easier their position in society. The study of philosophy is joining to the values of the humanitarian culture and forming a modern style of thinking in human relations.

Main issues of the syllabus content:

- History of philosophy
- Practical philosophy

Discipline “History of Technics”, code (37b)

Objective: To present to the students a general picture of the development of technology, particularly shipbuilding, and to reveal the interrelation Man-Science-Technology-Production, that will expand the intellectual outlook of the future engineer. Tasks: By studying and analyzing of history of technology to outline the factors influencing the development of technology and the effect on society; to create in the students the understanding that the history of technology is a part of the general history of mankind; by familiarization with the profiles of eminent inventors to provoke students to heuristic thinking.

Main issues of the syllabus content:

- Technology of the tribal societies and of the Ancient world.
- Evolution of the technology during V-XV Century.

- Technology of the first industrial revolution.
- Technology of the second industrial revolution
- Third technological/scientific-technological revolution.

Discipline “Structural Mechanics of Ships and Marine Facilities”, code (38)

The course presents the mechanics of the solid and deformable body. The main equations of the theory of elasticity and the methods for solving them are studied in order to determine the stresses and deformations of the solid deformable bodies (structural elements of ships and marine structures)

Main issues of the syllabus content:

- stress theory;
- theory of deformations;
- equation of physics;
- mathematical model of the problem;
- twisting of prismatic rods;
- planar task;
- beam bending;
- ship frames;
- bending of grid beams;
- plate bending;
- buckling of rods and rod systems;
- buckling of rectangular plates.

Discipline “Resistance, Propulsion and Maneuvering of Ships and Marine Structures, part 2”, code (39)

The objective of the course project is to apply practically the knowledge acquired for in the discipline and making decisions on specific issues of a propeller design. A complete design of a propeller is to be made including development of a theoretical drawing of the propeller.

Main issues of the syllabus content:

- Resistance prediction
- Preliminary design for engine selection
- Final propeller design
- Cavitation and strength checks
- Theoretical drawing.

Discipline “ Resistance, Propulsion and Maneuvering of Ships and Marine Structures, project”, code (40)

The objective of the course project is to apply practically the knowledge acquired in the discipline and making decisions on specific issues of a propeller design. A complete design of a propeller is to be made including development of a theoretical drawing of the propeller.

Main issues of the syllabus content:

- Resistance prediction
- Preliminary design for engine selection
- Final propeller design
- Cavitation and strength checks
- Theoretical drawing.

Discipline “Vibration of Ships and Marine Structures”, code (41)

The course teaches the basis of vibration theory and the basic methods of calculating parameters of vibrational processes in systems with one, „n“ and countless degrees of freedom. The course includes also the forces causing the vibrations of ships and marine structures, the norms and methods and approaches to reduce them.

Main issues of the syllabus content:

- Vibration of systems with one degree of freedom;
- Vibration of systems with "n" degrees of freedom;
- Vibration of beams;
- Vibration of plates;
- Forces that cause vibrations;
- Vibration norms;
- Some anti-vibration measures.

Discipline “ Welding of Marine Structures”, code (42)

The aim of the course is to acquaint students with the basic principles and activities in the field of welding with applicability in the building and repair of ships and marine structures

Main issues of the syllabus content:

- Theoretical bases of heat distribution;
- Heat sources;
- Welding methods;
- Welding of steel grades;
- Non-ferrous metal welding;
- Welding stresses and deformations;
- Welding control.

Discipline “Strength and Structures of Ships and Marine Facilities - part 1”, code (43)

The discipline teaches the main issues related to the determination of the external forces acting on the ship and marine structures. The course includes issues of the working ability of structural elements, the external loading norms and the materials used

Main issues of the syllabus content:

- Introduction. Classification of ships and marine structures;
- External forces;
- External loads norms;
- Physical strength models of the ship and marine structures
- Capacity of the structural elements ;
- Concentration of stresses in the structural elements ;
- Materials used ship and marine structures.

Discipline “ English, part 5”, code (44)

During this semester students have the opportunity to widen and improve their language competence as well as combine it with the development of a range of subject specific skills. At this stage the focus of study is on the specialized vocabulary concerning the design process and the process of ship building. At this stage the development of the four communicative skills continues. Created are students’ oral presentation skills. Students are trained to work with specialized dictionaries. By the end of the English course students are expected to recognize and successfully apply the terminology used in their professional discourse.

Main issues of the syllabus content:

- Stages of ship design – the design spiral
- Design of Cargo Handling Facilities
- Design of Port Constructions
- The Shipbuilding Process
- Oral Presentation Skills Development
- Translation of Non-abridged Technical Texts
- Discussion about Design Optimization.

Discipline “ Specialized Practice”, code (45)

The course aims at acquainting the students of with the specifics of the technical and technological preparation and organization of the production of ships and marine structures.

The aim of the practice is to develop practical skills in solving specific production tasks and creating skills for team working. A special practice is conducted in the shipbuilding or/and ship design companies.

Main issues of the syllabus content:

- Familiarization company activities
- Familiarization the production process
- Familiarization the organization and technical preparation of production
- Study and implementation of specific activities related to the knowledge gained
- Develop a practice report.

Discipline “Strength and Structures of Ships and Marine Facilities, part 2”, code (46)

The aims of the subject is the study the functions and elements of the hull structures.

The course is based on the knowledge from part 1 of the same subject and study characteristics of strength dimensioning.

The course will provide the students with a sufficient theoretical knowledge about the ship structures and the implementation of scantling rules.

Main issues of the syllabus content:

- bending the ship on still water;
- bending the ship on wave;
- overall ship strength;
- structure systems;
- hull structures;
- workability of the hull structures;
- ship shell;
- bottom structures;
- side structures;
- deck structures;
- bulkheads
- superstructures and trunks;
- foundations, bulwarks, pillars;
- structures of oil and gas platforms.

Discipline “ Strength and Structure of Ships, project”, code (47)

The preparation of course project requires from the student to apply the gained knowledge during the lectures and laboratory exercises on the subject

There are several design task connected with ship structure for a given ship type, theoretical lines, ship speed, type of cargo etc.

Main issues of the syllabus content:

- Estimation of the Rule based bending moment
- General arrangement of the ship
- Design of the geometry of midship section – spacing, height of DB, double side etc.
- Scantling elements of the midship section
- Strength evaluation of transversal section subjected to longitudinal bending.

Discipline “Devices for Ships and Marine Facilities”, code (48)

The subject of "Devices for Ships and Marine Facilities" as a special discipline for students teaches the structures and design features of the various types of hull and safety equipment for transport vessels and some special types of equipment and launching gear for floating structures. The discipline aims: – to develop in students a technical understanding of the hull equipment as an

integral part of the ship; – to familiarize them with the ways of providing seaworthiness, operation etc. ship qualities through hull equipment, as well as the provision of marine structures through some special devices; – to familiarize them with the constructional features of the equipment as a whole, as well as with the structural features of their components; – to create practical skills for the design of ship equipment; – to familiarize students with the requirements of international conventions and standards for the protection of human life at sea and ways to fulfil them.

Main issues of the syllabus content:

- Rescue and safety equipment
- Steering equipment
- Cargo loading equipment
- Anchoring equipment
- Mooring equipment
- Towing equipment.

Discipline “ Design of Ships and Marine Facilities”, code (49)

The subject "Design of ships and marine equipment" summarizes the knowledge of the students gained during their study in the specialty. The lectures on the first and second part chronologically follow the ship design process by providing the theoretical foundations that are modelled in the laboratory exercises with modern and accessible software products (MS Excel and AutoCAD).

The first part clarifies the main methodological features of the theory of ship design and the links with the other disciplines studied. The main focus is on the initial stages of design, which are characterized by their highly creative character and which decide for the efficiency of the designed vessel. There are "recipes" given for ship design, rather a special attention is paid to the study of the basic laws linking the general characteristics of the ship with her operation qualities

In the first part of the course, the main stages of design are studied, starting with the assignment.

The design-specific methods for calculating the ship's load and for determining the load capacity are considered. From the basic equations of the ship design theory the equation of masses and buoyancy are studied in details. The requirements of International Convention on Load Lines are demonstrated by example calculation of minimum free board during the laboratory exercises.

Main issues of the syllabus content:

- Subject and tasks of the discipline
- Theory and methods for design of floating structures
- Organization of ship design activities
- Weight calculation of the ship
- Equation of masses and buoyancy
- Ship capacity and Rules for draft marks.

Discipline Technological Equipment in Shipbuilding and ship Repair”, code (50b)

The Programme is the study of:

- principles of design and construction of the main production facilities in modern enterprises for shipbuilding and repair;
- the workshop structure and master plans of the shipbuilding and ship repair enterprises;
- the characteristics of the technological equipment used in the construction and repair of ships and marine equipment;

The discipline aims:

- to give students knowledge of the purpose, the structural components and the methods of application of the technological equipment used in the construction and repair of the ships;
- to acquaint students with the main technological stages in the construction and repair of the ship structures and with the plasma technological and resource provision of these productions;

- provide students with systematic knowledge of the structure and master plans of the construction and repair plants of the ship and marine structures

Main issues of the syllabus content:

- Basic technological processes and production stages in the construction and repair of the ships and marine structures (SMS)
- Accuracy, standardization and quality at ships and ship subsystems;
- Plaster works in shipbuilding and ship repair;
- metal stock and technologies for zero processing of steel materials;
- typing of the details of the steel structure of the SMS and technologies for their cutting;
- Bending technology and equipment.
- Types and production structure of modern construction enterprises and repair of the SMS.

Discipline “ Architecture of Ships and Marine Facilities”, code (51a)

The course aims to acquaint the students of the specialty with the basic concepts in the architectural design, with the methods used in the artistic construction of elements of complex systems, related to ships and marine structures. The questions about the formation of the architectural-structure view of the ships and the marine structures are discussed. The basic concepts of the interior of the premises, of the types of structural, insulation and decorative finishes are given.

Main issues of the syllabus content:

- Methodological basis of the discipline;
- Introduction to "Industrial Design";
- Architectural- structure view of the ship;
- Graphics model. Exterior.
- Graphics model. Interior.

Discipline “ Technology and Organization of Maritime Transport”, code (51b)

Students learn about the environment in which the maritime transport sector is developing. It presents the structure of international shipping with its basic elements and market infrastructure. In this regard, the basic commodity markets are presented as the basis of demand and types of ships and port technologies as a consequence of market requirements. The physical structure of the markets with its elements such as ports and waterways, the organizational structure of the markets with the market participants and intermediary companies are considered. Together with commodity markets, all market operations affecting water transport will also be considered.

Main issues of the syllabus content:

- Basic concepts of the structure of international shipping;
- Main concepts of supply and demand on the international freight market
- Main concepts of market infrastructure
- Basic concepts for key market participants
- Basic concepts of basic forms of tonnage exploitation.

Discipline “ Technology and Organization of Port Activities”, code (51c)

Students are acquainted with the structure of the port and the organization of the transfer activity. The exploitation and financial results of port activity are considered. The methods for creating port tariffs and their application are analyzed.

Main issues of the syllabus content:

- Port and port facility warehouse designation;
- Activity planning over time;
- Planning resources
- Controlling and managing the implementation of operational schedules
- Indicators and indicators of port activity
- Using the results for long-term planning and revenue generation of the portal.

Discipline “ Fleet and Ports Operation”, code (51d)

Students learn about the environment in which the maritime transport sector develops. The main commercial operations for servicing the foreign trade commodity exchange, the contracts and other basic documents for carrying out the exploitation activity are considered. It presents the pricing practice in tramp and line navigation, the decision-making mechanism of commercial and operational character in operational and long term. The relations of ship operators with clients, intermediaries and service companies are considered.

Main issues of the syllabus content:

- Basic concepts of the structure of the freight market;
- Basic concepts of documents and documentary practice in the commercial exploitation of shipping and ports;
- Basic concepts of commercial practice in the day-to-day commercial operation of the ship and the operator;
- Basic concepts of costs and prices in maritime transport
- Main concepts of broker activity and agents in maritime transport.

Discipline “ English, part 6”, code (52)

The subject aims to introduce students to the key factors in cargo operations, ensuring the safety of the ship and crew. The issues of packaging, marking, handling, stowage and securing of cargo are discussed. Information is introduced about the most important cargo documents which are used in relation to loading and discharging the cargo. An emphasis is put on the use by students of the IMO Standard Marine Communication Phrases related to cargo and cargo handling. The subject aims to introduce specific terminology and to develop skills for reading comprehension of texts in cargo work and develop skills in oral communication using IMO SMCP. Dialogues are made simulating communication between ship and shore personnel in relation to ship loading / unloading operations. The subject introduces the work on making up a sea protest with the task to develop students' practical writing skills. The syllabus complies with the recommendations of the IMO Model Course 3.17 Maritime English.

Basic sections of the contents:

- Cargo Work
- Explaining the reasons and circumstances for writing a Sea Protest. Presenting the structure of a sea protest. Making up a sea protest.

Discipline “ Design of Ships and Marine Facilities, part 2”, code (53)

The subject "Design of ships and marine facilities" summarizes the knowledge of the students gained during the education in this specialty. The lectures on the first and second part chronologically follow the ship's design process, giving the theoretical bases that are modelled in the laboratory exercises by modern and accessible software products (MS Excel and AutoCAD).

The obtained knowledge is used to develop individually the course project.

The second part analyses the basic equations of the theory of floating structures, allowing the initial stages of designing to justify effective solutions best suited to the project assignment. These basic equations are based on the hull form. Both traditional methods and approaches to computer design of the ship hull (theoretical lines of the ship) are set out. It is a part of the modern mathematical apparatus used in 3D modelling of the form in CAD systems.

The course includes analyses the properties of the designed ship related to the intact stability at small and large angles of inclination and damage stability. Particular attention is paid to the modern Rules and Requirements resulting from the main international conventions: the Load Lines Convention (ICLL 66), the protection of marine waters from pollution (MARPOL), the protection of marine life at sea (SOLAS), and of International Stability Code (18 February 2008).

Main issues of the syllabus content:

- Parameters affecting ship stability

- Ship hull form design
- Stability calculation
- Special features of bulk carriers
- Special features of ship for unified cargoes
- Assessment of ship floating position
- Requirements for damage stability of ships.