# BSc – Bachelor of Science – Electrical Engineering Sciences (240ECTS)

### Name of Study

BSc - Bachelor of Science - Electrical Engineering Sciences (240 ECTS)

## Introduction

**The mission** of the "Electrical Engineering Sciences" Bachelor of Science Program, developed by the Merchant Maritime Faculty of the "MirceacelBatran" Naval Academy is to continue the Romanian Naval Engineering traditions, by developing general, specific and attitude competences, in order to facilitate our graduates to properly develop their own professional careers:

- in merchant worldwide fleet, capable to fulfill the needs of the operational level (Electrical Officer) onboard every merchant vessel;

- in commercial societies of ship construction and repair (shipyards), capable to perform the requirements for technological and electrical equipment and installation design engineer;

- in research and design institutes, capable to perform the needs for electrical and electromechanical equipment and installation design engineer;

- in education as a technical subject teacher for electrical profile;

- in higher education, capable to fulfill the needs of junior university assistant;

- in commercial insurance societies, capable to perform the requirements for technical expert, inspector;

- in commercial societies of applied engineering soft development, capable to perform the requirements for technical consultant;

- in administrative institutions, capable to perform the requirements for technical consultant in electrical and mechanical engineering.

This mission will be accomplished by applying all procedures and activities requested by the Academy's Quality Management System and also fully compatible to the academic community aquis.

The values we want to implement for our success are:

- the professionalism, sustainable activity respect, honesty and correctitude in front of other people and his profession;

- the respect to other people, respect of the law, respect of the school's traditions and virtues;

# **Full-time**

**Duration** 8 semesters full time

### Credits

### 240+10 ECTS

### Level

Higher education

## Degree

Bachelor of Science – Electrical Engineering Sciences

## **General Learning outcome**

- To develop the capability to understand and use the basic of electrical engineering in Romanian and English;

- To develop the operational capabilities by mastering the specific methods, techniques and instruments;

- To form capabilities, that will allow the graduate to perform in due time in the field of electric and mechanic engineering, planning, organizing, training, coordination and control for helping the activities of design, production and operation of electrical and electromechanical systems;

- To develop the capability to understand the industrial and managerial logistics;

- To develop the competence of computer operation;

- To develop skills to select, process and analyze necessary information for reasoning and taking decisions;

- To develop the capability of understanding and active taking part in optimizing the processes from organizations and institutions;

- To develop the capability of working in complex and multicultural teams;

- To develop the capability of practicing the logistics of insurance and processing resources;

- To develop the skills of effective communication in English both face to face and using modern technical devices, specific for the training field;

- To form capabilities of communication and negotiation in different cultural areas;

- To enhance the capacity of integrate effectively and quickly as engineer in a variety of types of organizations and institutions;

- To develop the capacity of research to facilitate the interdepartmental joint activities.

# Specific Learning outcome

- To transfer advanced theoretical knowledge regarding electric circuits and electromagnetic field;

- To transfer advanced knowledge regarding designing and operating the marine electrical installations;

- To transfer advanced knowledge regarding electric motors, hydro-pneumatic mechanisms and electric, hydraulic and pneumatic automation;

- To transfer advanced knowledge regarding the design and operation of electrical and electronic navigating equipment;

- To transfer advanced knowledge regarding the design and operation of electrical and electronic equipment in the engine room;

- To develop the capacity of calculating the performance of the electrical and electronic

equipment;

- To develop the capacity of designing naval electrical installations by using the modern techniques, methods and instruments based on computer;

- To develop the skills in welding, chiseling and assembling work in electrical workshops and production and maintenance surveillance;

- To transfer thorough knowledge regarding the fabrication methods and processes in the electrical engineering;

- To transfer thorough knowledge regarding testing and trials technologies of electrical installations on board ships;

- To transfer modern knowledge regarding the operation of mechanical, electrical, hydraulic and pneumatic systems on board ships;

- To transfer advanced knowledge regardingperiodical operation, repair and management documents and papers of electro-mechanic and electro-energetic installations on board ships; and using these as the producers indicated;

- To transfer advanced knowledge regarding the fundamental principles of leading and organizing the crew in the electro-energetic compartment of the ship;

- To transfer advanced knowledge and understanding regarding the specific processes and phenomena of then marine energetic systems and installations;

- To develop the capacity of calculating and maintaining, using the documents and specific means on board, the correct operation of the marine energetic system;

- To develop the capacity of operating, maintaining and repairing the components of the marine installation;

- To develop the capacity of organizing and leading the activity from the electro-energetic compartment of the ship;

- To transfer advanced knowledge regarding the structure of the automatic systems, basic and complex functions automation processes and naval electrical and electro-mechanical systems;

- To transfer advanced knowledge regarding naval installations of signaling and installation control on board; electrical devices, navigational integrated systems, naval control and electrical propulsion systems;

- To develop the capacity to repair the marine devices and equipment and their supervision and also to organize the technological flux according to the maintenance schedule.

### Prerequisites

High School (Baccalaureate) Diploma.

### Structure and organization

The first year is made up of 10 mandatory subjects and 3 optional subjects.

The second year is made up of 12 mandatory subjects and 3 optional subjects out of whom 3 are specialty subjects.

The third year includes 13 mandatory subjects and 1 optional subject more specialized studies in a number of 8 and 3 projects.

The fourth year includes11 mandatory subjects, 4 optional subjects, out of whom 13 specialty and 3 projects, and the diploma project is designed.

For each year of study there is a great number of non-compulsory subjects.

## **Aims and Goals**

During the study semesters, we try to develop an advanced engineering point of view, in direct relation with the specific maritime economic issues and with all these ideas, to develop a high professional ethics and management competences specific to the maritime business. After graduating the Bachelor of Science program, the students will be able to:

- Carry fundamental and applied researches on nautical sciences;

- Achieve process and analyze experimental data;

- To properly action and work in complex and multicultural teams;

- Efficiently communicate in English language, either face to face or using modern technique;

- To be able to plan, initiate and execute complex systems engineering projects;

- To be able to manage a product family in a company (from customer relations to product portfolio management);

- Thoroughoutgoing of the maritime concepts and its usage in order to ensure a better management and administration of electro-energetic department of the ship;

- The courses will develop a series of competences, which will allow them to go further to the Master of Science Degree courses.

## **Teaching and working methods**

Lectures, individual and group exercises, project work and laboratory assignments.

### Internationalization

The BSc program is internationally oriented. All subjects from the first to the fourth year of study are taught in Romanian.

Code	Course title	Credits	0/V *)	S1	S2				
First Year of Study									
EC-01	Mathematical Analysis I, II	10	0	5	5				
EC-02	Linear Algebra, Analytic and Differential Geometry	5	0	5					
EC-03	Computer Programming and Programming Language	10	0	5	5				
EC-04	Physics	8	0	4	4				
EC-05	<u>Chemistry</u>	3	0		3				
EC-06	Electric Circuit Theory	6	0		6				
EC-07	Technological Methods and Procedures in Electrical Engineering	4	0		4				
EC-10	Maritime English and Communication Strategies	2	0		2				
EC-12	Technical Drawing and Information Graphics	3	0	3					
EC-11	Elements of Mechanical Engineering	3	0	3					
	Optional courses Module A								
EC-13	Introduction to Naval Electrical Engineering	2	V	2					
EC-14	Seamanship	3	V	3					
EC-08	Naval History	1	V		1				

Optional courses Module B							
EC-15 General Elements of Navigation	2	V	2				
EC-16 Seamanship Training	3	V	3				
EC-09 Psychology-Sociology	1	V		1			
Total:	60		30	30			
Second Year of Study							
EC-17 Electrical Engineering Materials	4	0	4				
EC-18 Special Mathematics	6	0	6				
EC-19 Theory of Electromagnetic Field	6	0	6				
EC-20 Electrical and Electronic Measurements	5	0		5			
EC-21 Analogue Electronics	6	0	6				
EC-22 Numerical Methods for Electrical Engineering	5	0		5			
EC-23 Digital Electronics	5	0		5			
EC-24 Microprocessor Systems	5	0		5			
EC-25 Computer Networks and Data	2	0	2				
EC-27 Maritime English and Communication Strategies II	2	0	2				
EC-28 English Language	2	0		2			
EC-PD Training in the field of study	2	0		2			
Optional courses Module A		•					
EC-29 Mechanics and Strength of Materials	6	V	3	3			
EC-30 Naval Architecture	3	V		3			
EC- 26A General Economics	1	V	1				
Optional courses Module B							
EC-31 Naval Mechanical Equipment	6	V	3	3			
EC-32 Shipbuilding and Damage Control	3	V		3			
EC- 26B	1	v	1				
Total:	60		30	30			
Third Year of Study							
EC-33 Electromechanical Convertors	12	0	6	6			
EC-34 Electrical Equipment	6	0	6				
EC-35 Quality and Reability	2	0		2			
EC-36 Interface Transducers and Data Acquisition	5	0		5			
EC-37 Systems Theory and Automatic Adjustment	8	0	5	3			
EC-38 Static Converters	5	0	5				
EC-39 Thermal Engineering	3	0	3				
EC-40 Hydro and Pneumatic Drives	2	0		2			
EC-41 Microcontrollers and Programmable Automata	3	0		3			
EC-42 Naval Law	3	0		3			
EC-43 Naval Communication Systems	4	0		4			
EC-44 Maritime English and Communication Strategies III	2	0	2				
EC-PS Training in the field of study	2	0		2			
Optional courses Module A	1						
EC-45 Microwave Equipment	3	V	3				
Optional courses Module B							
EC-46 Radiolocation Equipment	3	V	3				
Total:	60		30	30			

Fourth Year of Study									
EC-47 Marine Electric Drive Systems	11	0	5	6					
EC-48 Marine Refrigeration Equipment	3	0	3						
EC-49 Marine e Electrical Systems Maintenance	3	0		3					
EC-50 Deck Electrical Equipment	5	0		5					
EC-51 Electric Navigation Equipment	5	0		5					
EC-52 Electric Power Production and Distribution	4	0	4						
EC-53 Maritime Management and Marketing	3	0		3					
EC-54 Naval Machines and Equipment	3	0	3						
EC-55 Marine Diesel Engines	2	0	2						
EC-56 Steam and Gas Power Plants	2	0	2						
EC-57 Maritime English and Communication Strategies	2	0	2						
Optional courses Module A									
EC-59 Navigation Integrated Systems	4	V	4						
EC-60 Complex Naval Automation	3	V		3					
EC-61 Deck Electromagnetic Compatibility	3	V		3					
EC-62 Servomechanisms	5	V	5						
Optional courses Module B									
EC-63 Electronic Navigation Systems	4	V	4						
EC-64 Management and Surveillance of Naval Power Plants	3	V		3					
EC-65 Naval Electric Propulsion Systems	3	V		3					
EC-66 Sources of energy	5	V	5						
	~~			20					
Total:	60		30	30					
Total: ELECTIVE SUBJECTS	60		30	30					
Total: ELECTIVE SUBJECTS First Year of Study	60		30	30					
Total: ELECTIVE SUBJECTS First Year of Study EC-67 First Aid	<b>60</b> 2		<b>30</b> 2	30					
Total: ELECTIVE SUBJECTS First Year of Study EC-67 First Aid EC-68 Fire Fighting Prevention	60 2 2		<b>30</b> 2	2					
Total:     ELECTIVE SUBJECTS     First Year of Study     EC-67   First Aid     EC-68   Fire Fighting Prevention     EC-69   Personal Survival Techniques	2 2 2 2		2	30 2 2					
Total:     ELECTIVE SUBJECTS     First Year of Study     EC-67   First Aid     EC-68   Fire Fighting Prevention     EC-69   Personal Survival Techniques     EC-70   Personal Safety and Social Responsibility	2 2 2 2		2 2 2	<b>30</b>					
Total:     ELECTIVE SUBJECTS     First Year of Study     EC-67   First Aid     EC-68   Fire Fighting Prevention     EC-69   Personal Survival Techniques     EC-70   Personal Safety and Social Responsibility     EC-71   English Language	2 2 2 2 2 2		<b>30</b>	2 2 2					
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Total:     ELECTIVE SUBJECTS     First Year of Study     EC-67   First Aid     EC-68   Fire Fighting Prevention     EC-69   Personal Survival Techniques     EC-70   Personal Safety and Social Responsibility     EC-71   English Language     EC-72   2nd Foreign Language     EC-73   Carriage and Handling of Dangerous Goods     EC-74   MARPOL     FC -75   Competences in using survival techniques, except for fast	60 2 2 2 2 2 1 1 3 3 3		30 2 2 1	30 2 2 1 3 3					
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\*) O - Mandatory course, V - Optional course