APPROVED BY
Order No V-247 of the Minister of Education, Science and Sport of the Republic of Lithuania of 3 March 2023

DESCRIPTOR OF THE GROUP OF STUDY FIELDS OF TECHNOLOGICAL SCIENCES

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the group of study fields of Technological Sciences (hereinafter referred to as the "Descriptor") regulates the special requirements for the study programmes in the group of study fields of Technological Sciences (F). The Descriptor regulates the studies in the group of study fields of Technological Sciences (hereinafter referred to as the "studies of Technological Sciences") in the scope not covered by the General Requirements for the Provision of Studies approved by Order No V-1168 of the Minister of Education, Science and Sport of the Republic of Lithuania of 30 December 2016 "On Approval of Description of General Requirements for the Provision of Studies".

2. The Descriptor has been drawn up taking into account the following international documents: European Standards for Accreditation of Engineering Programmes *EUR-ACE® Framework Standards and Guidelines* (http://www.enaee.eu/) and Annex III to the European Higher Education Area Paris Communiqué (2018) (EHEAPARIS2018_Communique_AppendixiII_952778).

3. Learning outcomes are grouped according to the grouping used in the European Standards for Accreditation of Engineering Programmes *EUR-ACE® Framework Standards and Guidelines*.

4. The Descriptor is intended for first and second cycle college and university study programmes that are carried out as either full-time or part-time studies.

5. Upon completion of studies in Technological Sciences, a Professional Bachelor's/Bachelor's/Master's qualification degree corresponding to the sixth/seventh level of the Lithuanian Qualifications Framework and the European Qualifications Framework for Lifelong Learning, and the first/second level of the European Qualifications Framework in the European Higher Education Area is awarded, as attested by the Professional Bachelor's/Bachelor's/Master's diploma and the diploma supplement issued by the higher education institution.

6. The requirements for obtaining qualification certificate for the study programmes in the study field of Marine Technology and study programmes, upon completion of which theoretical and practical knowledge and skills necessary for obtaining Certificate of Competency of the Officer in Charge of a Navigational Watch or confirmation thereof are estab3lished by Order No 3-355 of the Minister of Transport of the Republic of Lithuania of 8 August 2005 "On the Approval of the Description of the Procedure for the Conferment of the Marine Competence and the Issuance of Documents Certifying the Seafarer's Qualification", Directive 2008/106/EC of the European Parliament and of the Council on the Minimum Level of Training of Seafarers, Directive 2012/35/EU of the European Parliament and of the Council amending Directive 2008/106/EC on the minimum level of training of seafarers, 1978 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1995 International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel, 2006 Convention on the Implementation of the Relevant Provisions of Maritime Labour in the Republic of Lithuania.

7. Study programmes in the study field of Marine Technology, which lead to the award of a professional qualification of a navigator and a certificate of competency issued by the Lithuanian Transport Safety Administration (hereinafter referred to as the Administration) consisting of a Certificate of Competency of the Officer in Charge of Navigational Watch and General Operator Certificate of a Global Maritime Distress and Safety System and their Endorsement Certificates, shall be subject to further evaluation and approval by the Administration and may only be carried out at higher education institutions accredited by the Administration.

8. Upon completion of a study programme in the study field of Marine Technology approved by the Administration, a Professional Bachelor of Technology degree or a Bachelor of Technology degree and a qualification of a Navigator shall be obtained in conjunction with a Certificate of Competence of the Officer of the Navigational Watch and an STCW Endorsement issued by the Administration.

9. The Descriptor does not impose any specific requirements for admission to first cycle study programmes.

10. It is recommended that candidates for second cycle studies awarding Master's qualification degree in Technological sciences be the graduates of:

10.1. first cycle university studies in Technological Sciences, Engineering Sciences, Physical Sciences, Mathematical Sciences and Computer Sciences;

10.2. first cycle university studies in other fields of study and university bridging courses of the chosen study field of Technological Sciences, the results and scope of study of which are determined by the higher education institution in credits;

10.3. college studies in Technological Sciences, Engineering Sciences, Physical Sciences, Mathematics and Computer Sciences, and university bridging courses of a chosen study field of Technological Sciences, the results and scope of study of which are determined by the higher education institution in credits;

11. Studies of Technological Sciences can be organised as two-field or interdisciplinary study programmes:

11.1. the study field of Marine Technology may be carried out as two-field or interdisciplinary first cycle study programmes, except for study programmes leading to a marine qualification of a navigator and a Certificate of Competency of the Officer in Charge of Navigational Watch issued by the Administration, possibility for which shall be coordinated with the Administration. A maximum of 30 study credits may be granted for studies of Marine Technology as interdisciplinary study programmes, and at least 90 credits must be granted as studies in another field (including internship and preparation of final work), through which the learning outcomes set out in the Descriptor of the study field are to be achieved;

11.2. study field of Biotechnology can be organised as two-field study programmes, combining the studies with study fields in groups such as Computer Science, Physical Sciences, Life Sciences, Engineering Sciences, Health Sciences, Social Sciences, Legal Sciences, educational sciences, agricultural sciences. Studies in the study field of Biotechnology Studies may include specialisations related to Ecological and Environmental sciences, Medical and Health Sciences, Life Sciences and Social Sciences.

12. Interdisciplinarity should also be promoted when studying in single-field study programmes and it should be understood as the need to develop the ability to solve the problems addressed in the study process of any study subject in the multidisciplinary context of social, environmental and resource conservation, and the application of advances achieved in other study fields.

13. The main purpose of the studies of Technological Sciences is to provide students with knowledge and develop skills according to the learning outcomes of the chosen study field described in the third chapter of the following Descriptor and prepare them for further academic and professional careers.

CHAPTER II
CONCEPT AND SCOPE OF THE STUDY FIELD

14. Technologies are ways and means to create a virtual or material object or process using natural, intellectual, financial, human and other resources. Technology is also a set of man-made products and processes related to any purposeful activities, including production ones.

15. Technological sciences have direct links with Engineering Sciences and with information technologies that enable the production of technological and technical information and

documentation in digital form, and the management of processes and data flows, as well as with mathematics, physics and chemistry, biology, ecology and business management.

16. Those who have completed studies in Technological Sciences may base their studies on study programmes that belong to a higher study cycle, start or pursue professional careers in scientific and study institutions, engage in engineering activities, work in processing industry and other areas of professional activity that require knowledge and ability to develop engineering products and their production technologies.

17. Concept and coverage of individual study fields in Technological Sciences:

17.1.1. Natural Resource Technologies (F01):

17.1.2. natural resources are natural components of the human environment that we use to meet our needs. Natural resources can be divided into two groups: renewable (water, land, biomass, etc.) and non-renewable (mineral). The diversity of natural resources, their different prevalence and importance to the global economy encourage the analysis and study of widely different technologies for their extraction, transportation, processing and utilization;

17.1.3. graduates may engage in research and practical work, technological and managerial work in industrial companies engaged in the extraction and processing of raw materials and other areas of professional activity requiring knowledge and ability to extract and utilize natural resources, develop resource-efficient processing technologies, as well as knowledge of the principles of sustainable development and the circular economy and the impact on climate change, human health and the economy;

17.2. Polymer and Textile Technologies (F02):

17.2.1. it is the science of polymeric materials, processes and methods/technologies and equipment for the production of polymeric and textile materials, as well as the development, manufacture, infrastructure and organization of products from polymeric and textile materials, methods and means of delivering, recycling and/or reuses of products. The study field of Polymer and Textile Technology also includes technologies for leather and its products and clothing technologies;

17.2.2. they are intended for the entire life cycle of household and functional and smart textiles, clothing, accessories, haberdashery, footwear and other technical products, processes or services, from conception, modelling, design and production to end-of-life, recycling and disposal, taking into account economic, legal, social, cultural and environmental factors. The life cycle of polymers and textiles is closely linked to design, marketing, brand and quality management, innovation development and digitalisation;

17.2.3. graduates may carry out research, as well as engage in technological and engineering and managerial work in polymer and textile materials and clothing development, manufacturing, recycling, marketing and other services companies and research institutions;

17.3. Materials Technologies (F03):

17.3.1. it is a study field that touches upon engineering, physics and chemical sciences and includes research on mechanical, optical, chemical, electronic properties of materials, synthesis of new materials, research on the possibilities of application of materials and processes that occur when consuming the material, and technology of manufacturing specific technical products. Materials Technologies are also the

17.3.2. totality of ways, means and organization of materials development and production processes. Materials Technologies include Materials Science — science on the structure and properties of functional materials, methods of studying the properties of materials and ways to improve their properties, and the application of high technologies (micro- and nanotechnology);

17.3.3. due to the very wide scope of application, individual materials technologies, such as furniture and woodwork production, graphic technologies, electronic and material graphic advertising technologies, light technology, laser technology, and optoelectronic materials and technologies, have a certain level of autonomy. Study programmes based on independent learning can be organised for the studying of these technologies. With the increasing diversity of man-made materials and the rapid

growth of the scale of use of new materials, especially those with manageable properties, many other topics of materials science and technology can be discovered in the future.

17.3.4. the manufacture of furniture and wood products is the science of wood and other materials used in the manufacture of furniture and wood products, as well as processes, techniques and equipment for the manufacture of furniture and woodwork, the development of furniture and woodwork, the carrying out of manufacturing and processing processes, as well as ways and means of delivering products to the consumer and the public;

17.3.5. graphic technology is the science of materials, processes, techniques and equipment for creating and producing graphic output, creating graphic products, preparing for printing and thus evaluating the method of printing, technical capabilities of equipment and technological features of materials, methods and means of production;

17.3.6. advertising technology is the science of the processes of creating and producing electronic and material graphic advertising, software and materials used, production techniques and equipment, the development of electronic and material graphic advertising products and the organisation and performance of production processes;

17.3.7. light engineering is the science of lasers, luminaires, smart lighting systems, solar cells, renewable energy devices, technologies related to visible and invisible light and applications of physics, chemistry, electronics and mathematics, the development of products classified as light engineering and the organisation and execution of production processes;

17.3.8. laser technology is the science of the processes and equipment required for the construction of laser and optical components and optical coatings necessary for the construction of laser systems, of advanced ultra-pulse laser systems and laser microprocessing techniques used in the manufacture of high-tech products, methods and tools for organizing and carrying out processes for the development and production of laser systems;

17.3.9. optoelectronic materials and technologies is the science of optoelectronic materials and processes, ways and equipment to produce them, ways and means of organizing and carrying out processes for the development and production of materials and systems attributable to optoelectronics;

17.3.10. graduates may engage in research, engineering and management work in companies in the development, production, development and processing of materials and products thereof, development and processing of various uses of natural and man-made materials, engineering and processing industries;

17.4. Marine Technology (F04):

17.4.1. includes inland, coastal, short sea and high seas shipping processes, management of ships of different purpose and operation of ship systems for the transport of cargo and passenger transport by water, the operation of sea and inland ports, the safe use of maritime and inland waterways environments and resources, ocean exploration, water transport logistics technologies and economics. Marine technology is closely linked to international law of the sea, the main provisions of which are defined by the United Nations Convention on the Law of the Sea;

17.4.2. the Descriptor shall apply to both wide-ranging and specialised study programmes related to the work of a boat master and seaport, fleet, fishing and other technologies;

17.4.3. graduates may undertake research and practical work related to the development and implementation of marine technology, ensuring the conservation and sustainable use of marine and inland waters and their resources, safety and control of navigation in sea and inland ports, maintenance of hydrographic, surface and underwater structures, or after obtaining a marine qualification of a navigator and a Certificate of Competency of the Officer in Charge of Navigational Watch in the Administration, work on board ~~for~~ various purposes vessels (merchant, fishing, naval, special purpose, passenger, recreational, etc.) and other floating structures;

17.5. Biotechnology (F05):

17.5.1. it is any technology involving the utilization of natural biological systems, living organisms or their derivatives based on the manipulation of DNA outside a living cell and inside a living cell with a view to obtaining a new product or processing it, using it for a specific purpose, as

well as the use of biological processes in science and technology to create and improve products or processes intended for a specific purpose. Biotechnology integrates knowledge of biology, biochemistry, microbiology, chemical engineering and other fields in order to better understand and technologically utilize the capabilities of living organisms;

17.5.2. graduates may engage in research, technological and managerial work in biological process research and bio-product development and production companies;

17.6. Food technology (F06):

17.6.1. refers to the use of natural, financial, legal, human resources and food science and engineering knowledge to develop food or food chain processes (including processes of selection, processing of raw materials, production, distribution, delivery to the consumer);

17.6.2. food technology is closely linked to food science and is based on the knowledge of engineering, chemistry, microbiology and nutritional sciences about the nature, composition, processing principles and methods of improvement of food, the importance of healthful nutrition ensuring food safety and suplying to consumers. Food technologies have direct links with business management, enabling the planning and organization of food production;

17.6.3. graduates can carry out research work in research institutions, engage in engineering and managerial work in food development, production, processing enterprises, food handling companies (e.g. supermarkets with production units);

17.7. Public Catering (F07):

17.7.1. it is the use of intellectual, financial, human resources and knowledge of food science, information technology and engineering to develop processes in the food chain (including processes of selection of raw materials, processing, product production, delivery to the consumer). Public catering is closely linked to food science and guided by knowledge of engineering, chemistry, microbiology and nutritional sciences about the nature of food, composition, production principles and methods of improvement, traditions and the influence of various cultures on eating habits and food tastes, healthful nutrition, ensuring food safety and presentation to consumers. Public catering has direct links with business management, enabling the planning and organization of food production;

17.7.2. graduates can carry out research work in research institutions, work in engineering, technological and managerial work in food development, production, processing and catering companies.

CHAPTER III
LEARNING OUTCOMES

18. This chapter presents the fundamental learning outcomes of studies in Technology Sciences applicable to all the study fields within the group of Technological Sciences, but they do not constitute a specification of the detailed curriculum of the study programme or study subjects. Additional specific learning outcomes and study organisation requirements for each study field are given in paragraphs 20 to 23, 25 to 28, 30 to 33.

19. A person who has completed college studies must have achieved the following learning outcomes:

19.1. knowledge and understanding. A person must:

19.1.1. know and understand the basics of Mathematical Sciences, Physical Sciences, Life Sciences and Computer Sciences and the properties of raw materials and materials, and relate this knowledge to the chosen study field of Technological Sciences;

19.1.2. know the essential concepts of the chosen study field and understand their content;

19.1.3. have general and up-to-date knowledge of the chosen study field;

19.1.4. understand the multidirectionality of Technological Sciences and the possibilities for technologies to apply knowledge of other sciences;

19.2. technological analysis. A person must:

19.2.1. be able to apply their knowledge and understanding to evaluate technological processes and production systems in their chosen study field in ways they are familiar with, as well as apply conventional modelling techniques;

19.2.2. be able to recognize and formulate technological problems of the chosen study field, determine the compatibility of technological processes and technological equipment;

19.2.3. understand and be able to take into account safety requirements and the impact of technology on human health and nature, as well as the economic and social consequences;

19.3. technology design. A person must:

19.3.1. be able to apply technological knowledge and understanding of the chosen study field in the development and implementation of tasks in accordance with the established requirements, as well as use advanced scientific achievements;

19.3.2. understand and be able to apply methodologies for technology design, process digitaliation and data management;

19.4. research. A person must:

19.4.1. be able to find relevant professional information in databases and other sources of information;

19.4.2. be able to use basic software to model or simulate technologies;

19.4.3. have the skills of working with equipment for measuring the study field, be able to conduct the necessary experiments, process their data and make conclusions and recommendations;

19.5. practical activities. A person must:

19.5.1. have the knowledge at the user level of industrial technologies and technological equipment of the chosen study field;

19.5.2. be able to use theoretical and applied knowledge to solve technological problems, as well as know the properties of raw materials and materials and their recycling capabilities;

19.5.3. understand the ethical, legal, environmental and commercial circumstances of technological activities, know technological and environmental norms;

19.5.4. understand the principles of organization of technological activities, know the basic safety of work requirements;

19.6. personal skills (teamwork, cooperation and lifelong learning). A person must:

19.6.1. be able to work effectively both independently and in a team;

19.6.2. be able to communicate with the professional community and the general public in a national language and at least one foreign language;

19.6.3. understand the impact of technological and engineering decisions on society and the environment, adhere to the norms of professional ethics and technological engineering activities, realize responsibility for the consequences of the decisions made and technological activities;

19.6.4. have the knowledge of key aspects of technological project management and business;

19.6.5. understand the importance of individual lifelong learning and prepare for it.

20. A person who has completed college studies in Natural Resource Technologies must be versed in the principles of sustainable development and circular economy.

21. A person who chooses a Marine Technology college studies, upon completion of which the person acquires the theoretical and practical knowledge and skills necessary to obtain a diploma, certificate of proficiency or Certificate of Competency of the Officer in Charge of Navigational Watch shall be able to operate in practice the technological equipment used in Marine Technology.

22. A person who has completed college studies in the field of Biotechnology must have a thorough knowledge of molecular biology, genetic engineering and bioinformatics.

23. A person who has completed college studies in Food Technology and Catering must know methods and tools for determining the quality of food and the nutritional value of food components, be able to carry out microbiological analysis of food raw materials and products, and know the norms of food safety and healthy nutrition.

24. A person who has completed first cycle university studies must have achieved the following learning outcomes:

24.1. knowledge and understanding. A person must:

24.1.1. know and understand the basics of Mathematical Sciences, Physical Sciences, Life Sciences and Computer Sciences and the properties of raw materials and materials, and relate this knowledge to the chosen study field of Technological Sciences;

24.1.2. know the essential concepts of the chosen study field and their content, and be familiar with the physical basis of technological processes;

24.1.3. have a coherent understanding of the core knowledge of the chosen study field, sufficient to develop and manage technological processes and improve them according to the latest scientific developments;

24.1.4. understand the multidirectionality of Technological Sciences and the possibilities of using knowledge of other sciences to develop technologies;

24.2. technological analysis. A person must:

24.2.1. be able to analyse and evaluate technological processes and production systems of the chosen study field, apply appropriate experimental, analytical, statistical and numerical methods, correct interpretation of analytical results;

24.2.2. be able to identify, formulate and solve technological problems of the chosen study field, assess the suitability of materials, technological equipment and the possibilities for its adaptation and improvement;

24.2.3. understand and be able to take into account safety requirements and the impact of technology on human health and nature, as well as the economic and social consequences;

24.3. technology design. A person must:

24.3.1. be able to apply technological knowledge and understanding of the chosen study field in the design and implementation of projects that meet specified technical, economic and environmental requirements;

24.3.2. understand and be able to apply methodologies for technology design, process digitalisation and data management;

24.4. research. A person must:

24.4.1. be able to find relevant professional and scientific information in databases and other sources of information;

24.4.2. have the knowledge of and use numerical modelling techniques to develop technology development assumptions;

24.4.3. be able to work independently with laboratory research equipment, plan and carry out the necessary experiments, process and interpret their data, and draw up conclusions and recommendations;

24.5. practical activities. A person must:

24.5.1. be able to select, compose technological equipment, tools and methods of the chosen study field, as we as be able to operate technological equipment in practice;

24.5.2. be able to use theoretical and applied knowledge to solve technological problems, as well as know the properties of raw materials and materials and their recycling capabilities;

24.5.3. have the knowledge of ethical, legal and environmental and commercial circumstances of technological activities, as well as be aware of technological and environmental norms;

24.5.4. have the knowledge of the principles of organisation of technological activities, the importance and basic requirements of occupational safety, as well as the interaction between the links of the technological process and the business environment;

24.6. personal skills (teamwork, cooperation and lifelong learning). A person must:

24.6.1. be able to work effectively both independently and in a team;

24.6.2. be able to communicate with the national and international professional community and the general public in a national and at least one foreign language;

24.6.3. understand the impact of technological and engineering decisions on society and the environment, adhere to the norms of professional ethics and technological engineering activities, realize responsibility for the consequences of the decisions made and technological activities;

24.6.4. understand various project management and business aspects (risk and change management, production scale effect, etc.), as well as the links between technological solutions and their economic and social implications;

24.6.5. understand the importance of individual lifelong learning and prepare for it, as well as be able to grow and develop together with technological progress taking place.

25. A person who has completed first cycle university studies in Natural Resource Technologies must be versed in the principles of sustainable development and circular economy.

26. A person who has opted for first cycle university studies in Marine Technology, which allows to acquire the theoretical and practical knowledge and skills necessary for obtaining a diploma, certificate of proficiency or attestation of a marine competence, must be able to operate in practice the technological equipment used in marine technology.

27. A person who has completed first cycle university studies in Biotechnology must have a thorough knowledge of molecular biology, genetic engineering and bioinformatics, as well as be able to select biotechnological equipment and carry out analysis of bioprocesses.

28. A person who has completed first cycle university studies in Food Technology and Catering must know methods and tools for determining the quality of food and the nutritional value of food substances, be able to carry out microbiological analysis of food raw materials and products, and know and apply food safety and healthy nutrition norms.

29. A person who has completed a second cycle studies must have achieved the following learning outcomes:

29.1. knowledge and understanding. A person must:

29.1.1. know and understand the basics of mathematical sciences, physical sciences, life sciences and computer sciences and the properties of raw materials and materials, and relate this knowledge to the chosen study field of Technological Sciences;

29.1.2. know and apply advanced scientific achievements of the chosen study field;

29.1.3. know the context of technology and scientific knowledge beyond the chosen study field and be aware of the possibilities of using knowledge from other sciences to develop technologies and create new ones;

29.2. technological analysis. A person must:

29.2.1. be able to deal with problems that are atypical, not strictly defined and incomprehensively specified;

29.2.2. be able to formulate and address new and emerging challenges in the thematic areas of the chosen study field;

29.2.3. be able to use their knowledge and understanding to conceptualize models, systems and processes, as well as apply a variety of techniques, including mathematical analysis, computational modelling and experimentation;

29.2.4. have the knowledge of social, health and safety, environmental and commercial requirements;

29.2.5. be able to apply and develop new approaches to solve problems and implement solutions;

29.3. technology design. A person must:

29.3.1. be able to apply acquired technological knowledge and understanding to solve typical and new problems, using knowledge from other sciences;

29.3.2. be able to innovatively develop new and original ideas and techniques, as well as apply the latest scientific developments and digital methods;

29.3.3. be able to adopt socially responsible, natural resource-efficient and energy-efficient technological solutions when faced with multiple, technically undefined and uncharacterised problems;

29.4. research. A person must:

29.4.1. be able to identify, locate and obtain the necessary primary and derivative data;

29.4.2. be able to plan and carry out analytical, numerical modelling and experimental studies;

29.4.3. be able to critically assess data and develop conclusions and project proposals;

29.4.4. be able to analyse the applicability of new and emerging technologies of the chosen study field;

29.5. practical activities. A person must:

29.5.1. be able to combine knowledge of different directions and solve multifaceted technological problems, have an excellent knowledge of technological processes and their development trends in international markets, and know the principles of coupled production;

29.5.2. be able to select and apply research methods and methodologies, as well as understand their limitations and opportunities for development;

29.5.3. be able to apply new materials, understand the principles of the management of the properties of different materials, as well as adapt technologies and technological equipment for the production of products with new properties of the materials;

29.5.4. know the ethical, environmental and commercial requirements of technological and engineering activities;

29.6. personal skills (teamwork, cooperation and lifelong learning). A person must:

29.6.1. professionally understand the impact of technological and engineering decisions on society and the environment, adhere to the norms of professional ethics and technological engineering activities, realize responsibility for the decisions taken and creative and technological activities;

29.6.2. have the knowledge at the leadership level of project management and business aspects (risk and change management, production scale effect, etc.), as well as understand the links between technological solutions and their economic and social implications;

29.6.3. understand the importance of individual lifelong learning and prepare for it, as well as be able to engage in personal development alongside technological and scientific progress;

29.6.4. be able to work effectively independently and in a team, be the leader of a team that may consist of representatives of different study fields and study cycles, as well as help team members improve;

29.6.5. work effectively and communicate on a national and international levels in a national and at least one foreign language.

30. A person who has completed second cycle university studies in Natural Resource Technologies must have a deeper knowledge of and apply the principles of sustainable development and circular economy.

31. A person who has completed second cycle university studies in Polymer and Textile Technologies must have a deeper knowledge of the principles of new product development and brand development.

32. A person who has completed second cycle university studies in Biotechnology must have extensive knowledge of molecular biology, genetic engineering and bioinformatics, be able to select biotechnological equipment and carry out bioprocess analysis, and be able to manage biotechnological equipment.

33. A person who has completed second cycle university studies in Food Technology and Catering must know the methods and means of determining the quality of food and the nutritional value of food components, be able to carry out microbiological analysis of food raw materials and products, know and apply food safety and healthy nutrition norms.

CHAPTER IV
TEACHING, LEARNING AND ASSESSMENT

34. Study methods must be efficient and varied, the tasks intended for independent work must be linked to the study results of the study programme and motivate students, the time and material resources (libraries, laboratories, equipment and other) of students and teachers must be used rationally, and digital communication, information retrieval and distance education technologies must be effectively applied.

35. The idea of lifelong learning must be promoted in the study process, and students must be prepared and encouraged to be responsible for their own learning. The study programme, its

curriculum and didactic system must motivate students to also use other possible resources and sources for their studies, and teachers to introduce innovations into the study process.

36. Teachers must know and understand the didactic concept of the study programme, meet the requirements of the study programme as it pertains to their competence, be able to construct a study subject (module) in accordance with the study programme to which the subject (module) belongs, build on the results of recent research, know the links of the subject (module) to other fields of study and science, have a multidisciplinary approach to problem solving, be able to improve teaching and study content, choose effective student-centred study methods and ways for assessing student achievements, develop more effective study methods, provide recommendations that would allow the developers of the study programme to further improve it, to know the requirements for accreditation of the study fields.

37. The following methods and forms of study are recommended: traditional and interactive lectures, laboratory work, tasks for finding and summarizing information, case studies, problem analysis and solving exercises, individual and group projects, report presentation kits; as well as consultations and lecture videos and process animations if part of the studies is carried out remotely. The same methods may be applied to studies of different cycles, but in the second cycle of study their application must be based on a more in-depth understanding of the content, more complex tasks, research work, expression of student autonomy and the like.

38. Studies, especially second cycle studies, must include research work, focus on industrial application and the development of transversal skills, and an emphasize on personal skills. The didactic framework of the study programme must both encourage and create the prerequisites for the application of analytical, practical and transversal skills. It is recommended that this be implemented through final work defended in public. Protection of intellectual property must be ensured in all cases, and trade secrets must not be disclosed.

39. The studies, upon completion of which the theoretical and practical knowledge and skills necessary to obtain the marine competence of a boat master and a certificate of competence issued by the Administration shall be completed by an examination for the assessment of professional competence.

40. The student’s activity at an industrial company or other place of internship must be organized according to an individual plan. Student training, cooperation between teachers and internship supervisors when preparing individual student assignments, clarifying the processes of internship company, hearing and evaluating student work reports are necessary constituent parts of internship.

41. In the field of Marine Technology studies, upon completion of which the theoretical and practical knowledge and skills necessary to obtain the Certificate of Competency of the Officer in Charge of Navigational Watch issued by the Administration, practical skills are formed and evaluated in practice when working with simulators, simulating tasks performed on board and onboard training and other internships.

42. The activities of a higher education institution carrying out study programmes in the study field of Marine Technologies, where students acquire the theoretical and practical knowledge and skills necessary to obtain the Certificate of Competency of the Officer in Charge of Navigational Watch issued by the Administration, shall comply with the requirements of the International Standards Organisation quality systems standards (ISO 9000 series), the quality system must be formalised in writing, established and maintained.

43. Teachers must use different forms of assessment and different evaluation methods, such as examinations, computer testing, problem solving analysis, reports, presentations, laboratory reports, internship reports, project reports, public defence of works, learning records/work folder, self-assessment, peer evaluation and other, as well as know the methodological aspects of their application. In addition, the search for new integrated methods of assessment must be encouraged. All skills described in the learning outcomes must be evaluated in a way that demonstrates that students possess these skills.

44. Teachers, supervisors and examiners for programmes in the study field of Marine Technology, throughout which acquire the theoretical and practical knowledge and skills necessary for the acquisition of a certificate of competence issued by the Administration shall correspond to the types and levels of competence assessment for certain seafarer training and activities carried out on board or ashore, according to the requirements of the 1978 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (as amended). When simulators are used to assess readiness and competence, teachers must have properly mastered the methods of training and evaluation as it pertains to using specific types of simulators.

45. The assessment of the knowledge and abilities of the student must be reliable and supported by clearly formulated and pre-determined criteria, the conditions for the performance of the task and existing resources must be taken into account, and the assessment must be accompanied by constructive comments of the teacher, either orally or in writing. Students must be given opportunities to participate in decisions regarding the ways and criteria for assessing the learning outcomes achieved, the quantity and volume of assignments. Students must receive timely feedback on the work they have done or projects they have prepared.

CHAPTER V
REQUIREMENTS FOR THE IMPLEMENTATION OF STUDIES

46. The study programme must meet the requirements of the study programmes set out in the Descriptor and other legal acts, be relevant, correspond to the level of science and study direction, be constantly improved and updated, reflect the achievements of the scientific directions associated with the direction of study. Study programme developers must ensure that newly emerging topics are included in the programme's learning outcomes, so that students are familiar with innovations during their studies, and are encouraged to see perspectives on the development of the study field.

47. The purpose of the study programme must be clear and the results of the studies must be achievable, reflecting the distinctiveness, specificity and scope of the programme, but at the same time it must also include the learning outcomes set out in the Descriptor. The structure of the study programme must correspond to the specifics of the study fields of Technological Studies, include concepts of design, drawing up of the specification, implementation of technological activities, development and maintenance, industrial digitalisation, as well as sustainable development.

48. The study programme must be designed to meet students' individual needs in terms of duration and intensity of study, schedule diversity, geographical features, mobility, possibility of drawing up an individual study plan, and a choice of combinations of qualifications. It is recommended that additional assistance be provided for disadvantaged social groups.

49. The basis of study programmes shall be competent and qualified teachers. They must be selected and evaluated according to the following criteria: practical teaching experience, interest and activity in developing effective and advanced methods of study, level of scientific activity, ability to communicate freely in at least one of the foreign languages used for international cooperation, ability to use modern distance learning technologies, recognition by professional, scientific and other communities, participation in professional development programmes and traineeships, professional discernment, personal interest in student study affairs, ability to advise students on their study plans and their academic and professional careers, knowledge and understanding of the criteria on which study programmes are evaluated.

50. The assessment board for the evaluation of the final works (projects) that are publicly defended must be composed of competent researchers of the study field, practitioner professionals, representatives of stakeholders from various institutions.

51. The material and methodological base must meet the following minimum requirements:

51.1. the number, arrangement and layout of classrooms, laboratories, other study and independent work spaces, and the number of workstations in them must be appropriate to the needs of the studies and to the requirements of occupational safety and hygiene. In order to assess the cost of technological systems and the rapid change of technology, it is recommended for higher education

institutions to conclude cooperation or utilisation agreements with companies that can provide students with access to technological processes and equipment and allow them to acquire skills in working with such equipment;

51.2. the work of technical and administrative services must create favourable conditions for the development of students' practical skills and the individualization of the study programme;

51.3. teaching materials and literature sources must be available in a library and/or electronic environment. Students must be given access to the software necessary to acquire practical skills during contact classes and when carrying out tasks independently.

52. Higher education institutions carrying out programmes in the study field of Marine Technology, upon completion of which students acquire the theoretical and practical knowledge and skills necessary to obtain the Certificate of Competency of the Officer in Charge of Navigational Watch issued by the Administration, must possess the technological equipment necessary for the study programme, such as simulators and other educational equipment and tools that allow modelling and creating environments simulating real physical conditions, emergency, hazardous and other unusual conditions of work on board, performance of the ship's equipment, including equipment failures, etc., so that they are familiar as best as possible with the tasks carried out on board and the established procedures.

53. In order for students to be able to carry out the internship, the higher education institution must conclude contracts with domestic or foreign industrial companies and research institutes which have modern technological bases and properly developed places of internship. If a higher education institution has acquired technological equipment of the necessary study field and has highly qualified specialists capable of working with it, part or all of the internship can be carried out in a higher education institution.

54. For the purpose of meeting the general standard of the required competence, study programmes in the field of Marine Technology, upon completion of which students acquire the theoretical and practical knowledge and skills necessary to obtain the Certificate of Competency of the Officer in Charge of Navigational Watch issued by the Administration, shall include mandatory seagoing service time, the acquisition of which is part of the study programme approved by the Administration.