APPROVED BY

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DESCRIPTOR OF THE STUDY FIELDS OF TECHNOLOGY

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the study fields of Technology (hereinafter referred to as "the Descriptor") applies to the first and second cycle of university and college studies.

2. The Descriptor has been prepared in accordance with the Law on Higher Education and Research of the Republic of Lithuania, taking into account Resolution No 535 of the Government of the Republic of Lithuania of 4 May 2010 "On the Approval of the Descriptor of the Lithuanian Qualifications Framework", Order No V-2212 of the Minister of Education and Science of the Republic of Lithuania of 21 November 2011 "On the Approval of the Descriptor of Study Cycles", Order No V-501 of the Minister of Education and Science of the Republic of Lithuania of 9 April "On the Approval of the Descriptor of General Requirements for Degree-Awarding First Cycle and Integrated Study Programmes", Order No V-826 of the Minister of Education and Science of the Republic of Lithuania of 3 June 2010 "On the Approval of the Descriptor of General Requirements for Master's Study Programmes", Order No V-2463 of the Minister of Education and Science of the Republic of Lithuania of 15 December 15 "On the Approval of Recommendations for Developing the Descriptor of a Study Field or Study Fields" and the EUR-ACE standard for European Accreditation of Engineering Programmes (http://www.enaee.eu/).

3. The Descriptor aims:

3.1 to assist higher education institutions in preparing, implementing and evaluating study programmes;

3.2 to inform students, social partners and the public of knowledge and skills acquired;

3.3 to support an institution carrying out an external review in the evaluation of study programmes.

4. The completion of study programmes in any field of technology awards a higher education qualification:

4.1 The completion of college studies awards the professional bachelor degree in one of the fields of study certified by a professional bachelor diploma issued by a college;

4.2 The completion of first cycle university studies awards the bachelor degree in one of the field of study certified by a bachelor diploma issued by a university;

4.3 The completion of second cycle university studies awards the master degree in one of the fields of study certified by a master diploma issued by a university.

5. Any field of study in technology may be minor under fist cycle study programmes.

6. Studies in technology may be organised as full-time or part-time studies.

7. General admission requirements are as follows:

7.1 Individuals with at least secondary education are admitted, through a competitive process, to first cycle study programmes in technology taking into account their learning outcomes, entrance examinations or other criteria set by the higher education institution. The list of competitive subjects by field of study and the principles of determining the competitive score, the minimum entrance score and other criteria, subject to evaluation by the students' representation, are determined by higher education institutions and published no less than two years before the start of the relevant academic year;

7.2 Individuals who meet the requirements set by the university are admitted to the second cycle studies in technology.

8. The professional bachelor degree and the bachelor degree correspond to level 6 of the Lithuanian Qualifications Framework and European Qualifications Framework for lifelong learning, while the master degree is equivalent to level 7 of the Lithuanian Qualifications Framework and European Qualifications Framework for lifelong learning.

CHAPTER II
CONCEPT AND SCOPE OF THE STUDY FIELD

9. Technologies refer to a range of methods and measures for creating a virtual or physical object/process using natural, intellectual, financial, human and other resources. Technology also means the entirety of man-made products of any targeted activities and processes, including production.

10. The annexes to the Descriptor contain the Descriptors of the studies fields of minerals technology, polymers and textiles technology, materials technology, maritime technology, biotechnology, building technology and food technology.

CHAPTER III
SPECIAL AND GENERAL LEARNING OUTCOMES

11. This chapter focuses on the fundamental learning outcomes for technology that refer to any field of technology, but do not specify the detailed content of the study programme or study subjects.

12. College studies should enable graduates to demonstrate:

12.1 Knowledge and understanding:
12.1.1 knowledge and understanding of the basics of natural sciences and mathematics in the chosen field of technology;
12.1.2 understanding of the key concepts of the chosen field of technology and their content;
12.1.3 basic knowledge in the chosen field of technology;
12.1.4 awareness of the wider multidisciplinary context of technology.

12.2 Technological analysis:

12.2.1 ability to apply their knowledge and understanding in solving technological problems by using familiar methods;
12.2.2 ability to apply their knowledge and understanding in the analysis of technological processes and methods and the choice of technological equipment;
12.2.3 ability to apply analytical and modelling methods in the chosen field of technology.

12.3 Technology design:
12.3.1 ability to apply technological knowledge in the chosen field of study and understanding in the formulation and fulfilment of tasks in accordance with set requirements;
12.3.2 understanding of design methodologies and ability to apply them.

12.4 Investigations:
12.4.1 ability to find appropriate professional information in databases and other information sources;
12.4.2 ability to conduct necessary experiments, interpret data and draw conclusions;
12.4.3 skills in operating technological equipment in their field of study.

12.5 Practice:
12.5.1 ability to apply appropriate technological equipment, measures and techniques;
12.5.2 ability to combine theoretical and applied knowledge in solving technological problems;
12.5.3 understanding of ethical, environmental and commercial implications of technological activities;
12.5.4 understanding of the organisational principles of technological activities and awareness of the basic requirements for safety at work.

12.6 Personal abilities:
12.6.1 ability to function effectively as an individual and as a member of a team;
12.6.2 ability to communicate with the engineering and technology community and society at large;
12.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
12.6.4 knowledge of the principle project management and business aspects at technological level;
12.6.5 recognition of the importance of and preparedness for independent life-long learning.

13. First cycle university studies should enable graduates to demonstrate:

13.1 Knowledge and understanding:
13.1.1 knowledge and understanding of the basics of natural sciences and mathematics in the chosen field of technology;
13.1.2 awareness and systemic understanding of the key theoretical and applied basics and concepts of the chosen field of technology;
13.1.3 coherently linked basic knowledge in the chosen field of technology;
13.1.4 awareness of the wider multidisciplinary context of technology and ability to apply methods and processes of other technologies.

13.2 Technological analysis:
13.2.1 ability to apply their knowledge and understanding in formulating and solving technological problems by using appropriate methods;
13.2.2 ability to apply their knowledge and understanding in the analysis of technological processes and methods and the choice of technological equipment;

13.2.3 ability to select and apply appropriate analytical and modelling methods in the chosen field of technology.

13.3 Technology design:
13.3.1 ability to apply technological knowledge in the chosen field of study and understanding in project development and implementation in line with set requirements;
13.3.2 understanding of design methodologies and ability to apply them.

13.4 Investigations:
13.4.1 ability to find appropriate professional and scientific information in databases and other information sources;
13.4.2 ability to plan and conduct necessary experiments, interpret data and draw conclusions;
13.4.3 skills in operating technological equipment.

13.5 Practice:
13.5.1 ability to select and apply appropriate equipment, measures and techniques;
13.5.2 ability to combine theoretical and applied knowledge in solving technological problems;
13.5.3 understanding of ethical, environmental and commercial implications of technological activities;
13.5.4 understanding of the organisational principles of technological activities, the importance of safety at work and key requirements and the interaction between individual links of a technological process.

13.6 Personal abilities:
13.6.1 ability to function effectively as an individual and as a member of a team;
13.6.2 ability to communicate with the engineering and technology community and society at large;
13.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
13.6.4 knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the links between technological solutions and their economic outcomes;
13.6.5 recognition of the importance of and preparedness for independent life-long learning.

14. Second cycle studies should enable graduates to demonstrate:

14.1 Knowledge and understanding:
14.1.1 good understanding of the principles of the chosen field of technology;
14.1.2 awareness and appreciation of the forefront of their field of study.

14.2 Technological analysis:
14.2.1 ability to solve atypical, incompletely defined and specified problems;
14.2.2 ability to formulate and solve problems arising in new and emerging thematic areas in the chosen field of study;
14.2.3 ability to use their knowledge and understanding for the conceptualisation of models, systems and processes, apply different methods, including mathematical analysis, computational modelling or experiments;
14.2.4 understanding of the importance of social, health and safety, environmental and commercial requirements;
14.2.5 ability to use new approaches in problem solving and the implementation of solutions.

14.3 Technology design:
14.3.1 ability to apply technological knowledge acquired and understanding in solving of atypical problems, also including those related to other scientific and technological fields;
14.3.2 ability to use innovativeness in developing new and original ideas and approaches;
14.3.3 ability to make technological decisions in the case of multidimensional, technically undefined and precisely indescribable problems.

14.4 Investigations:
14.4.1 ability to identify, locate and obtain required data;
14.4.2 ability to plan and conduct analytical, simulation and experimental research;
14.4.3 ability to critically evaluate data and draw conclusions;
14.4.4 ability to explore the applicability of new and emerging technologies in the chosen field of study.

14.5 Practice:
14.5.1 ability to integrate knowledge in different fields and tackle multidimensional technological problems;
14.5.2 good understanding of the methods and methodologies to be applied and awareness of their limitations;
14.5.3 knowledge of ethical, environmental and commercial requirements for technological and engineering activities.

14.6 Personal abilities:
14.6.1 excellent understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and technological and engineering activities and awareness of responsibility for technological activities;
14.6.2 excellent knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the interrelation between technological solutions and their economic outcomes;
14.6.3 recognition of the importance of and preparedness for independent life-long learning;
14.6.4.
14.6.5 ability to function effectively as an individual and as a member of a team and the ability to lead the team, which may consist of representatives of different fields and levels of study;
14.6.6 ability to function and communicate effectively in national and international context.

CHAPTER IV
TEACHING, LEARNING AND ASSESSMENT

15. Teaching and learning methods should be effective and diverse, individual tasks focus on the learning outcomes of the study programme and motivate students, students' and teachers' time and facilities and learning resources, including libraries, laboratories, equipment, etc., need to be used in a rational way.

16. The study process should promote the idea of life-long learning, prepare and encourage students to assume responsibility for their learning. The programme, its curriculum and the didactic system should motivate students also to employ other possible resources and sources and urge teachers to include innovations in the learning process.

17. Teachers must be aware of and understand the didactic concept of the study programme, meet the requirements of the study programme for competence, be able to formulate the subject/module programme in line with the study programme under which that subject/module falls, rely on the latest research findings, be familiar with the links of the subject/module taught

with other fields of study and research, have a multidisciplinary approach to problem solving, be able to improve the content of teaching and learning, select appropriate student-centred teaching techniques and methods of assessment of student achievements and create more effective learning methods.

18. The following teaching techniques are possible: traditional and interactive lectures, laboratory courses, searches of information and summary tasks, case studies, problem analyses and problem solving classes, individual and group projects, sets of report presentations, also consultations and virtualisation of learning, where part of the studies take the form of distance learning. The same learning methods may apply to different cycles, however in the second cycle they should be based on a more in-depth understanding of the content, more complex tasks, demonstration of student's independence, etc.

19. The learning process, particularly in the second cycle, should cover research and development of industrial application and transferable skills. The didactic system of the study programme should also encourage and enable application of analytical, practical and transferable skills. This is recommended to be achieved by a final paper to be produced during the last semester, however each higher education institution and drafters of the study programme may decide how handle this considering the curriculum design of a given study programme.

20. There is a need for a proper organisation of students' activities in an industrial undertaking or any other job placement. Teaching students, cooperation between teachers and placement tutors at undertakings with regard to preparation of individual assignments for students, explanation of processes at the company of placement, hearing and assessment of student reports are essential to practical training.

21. Teachers should choose diverse methods of assessment, such as examinations, computer-aided testing, problem solving analysis, papers, presentations, reports of laboratory works, reports on placements, project reports, notes/file with papers, self-assessment, peer review, etc., and be aware of the methodological aspects of their application. Moreover, new integrated assessment methods should also be promoted. All student skills and competences covered by learning outcomes should be assessed so that their availability is confirmed. Students should get feedback on their works or projects completed in a timely manner. Their assessment should be based on clear criteria and supported by constructive comments.

22. The assessment of student knowledge and skills should be based on clearly-defined criteria known in advance and should take account of the conditions under which the assignment was completed and available resources. Students should be enabled to take part in making decisions on the assessment methods and criteria of learning outcomes and achievements and the number and scope of tasks.

23. The student achievement assessment system relevant to the study programme should be clearly documented and allow the higher education institution to satisfy itself that the graduates of the study programme have achieved the learning outcomes.

CHAPTER V
REQUIREMENTS FOR THE IMPLEMENTATION OF STUDY PROGRAMMES

24. The study programme should be in conformity with the study programme requirements set out in the Descriptor and other legislation, be relevant and adequate to the level of the field of research and study, regularly improved and revised so that it reflects changes in the field of research and study. The providers of the programme should ensure that the programme includes

emerging themes, students are introduced to innovations in the process of learning and are encouraged to recognise development prospects in the field of study.

25. The aim of the study programme should be explicit, and the learning outcomes should be possible to achieve and indicative of the distinctiveness, specificity and coverage of the programme. The curriculum design should reflect to the specificity of the fields of study in technology and include the concepts of design, drafting of specifications, implementation, development and supervision of technological activities and sustainable development.

26. The study programme should be built up so that it responds to the needs of different planned student groups related to the duration and intensity of learning, diversity in the schedule, geographical aspects, possibility of devising an individual plan of learning and combinations of qualifications.

27. Study programmes rely on competent and qualified teachers. They should be selected and evaluated by the following criteria: practical experience in teaching, interest and proactivity in creating effective and progressive teaching methods, level of scientific activity, ability to demonstrate fluency in at least one of the foreign languages of international cooperation, recognition within professional, scientific and other communities, involvement in professional development programmes and internships, professional insight, personal interest in academic affairs, ability to advise students on their learning plans and professional careers, awareness good knowledge of criteria used for the evaluation of study programmes.

28. At least 50% of the scope of each first cycle university study programme in credits and at least 80% of the scope of each second cycle university study programme in credits should be delivered by associate professors or professors, the majority of them should be working at the university implementing the relevant programme. Course units of a given field should be delivered by teachers with at least three years' scientific experience in that field related to the subject taught. Teaching of some of the subjects of the field by professionals with practical work experience in that field of technology and those with pedagogical experience is encouraged.

29. More than half of the teachers of the study programme implemented by the college should have at least three years' experience of practical work in the relevant subject area acquired within the last five years in other than a higher education institution, i.e. business or public institution.

30. The learning process ends with a thesis defended in public. The thesis assessment commission should be formed of competent specialists in the field of study, including researchers, professional practitioners and representatives of social stakeholders. The commission should be chaired by a person from a higher education institution other than that at which the study programme is completed. The commission should also consist of members from divisions other than the one implementing the study programme.

31. Facilities and learning resources should satisfy the following minimum requirements:

31.1 The number of classrooms, laboratories, other rooms used for teaching and individual learning purposes and the number of persons they accommodate, equipment and arrangement should meet the learning needs and occupational safety and hygiene requirements;

31.2 Operations of the technical and administrative units should allow for a satisfactory level of the development of students' practical skills and individualisation of the programme;

31.3 Teaching material and literature sources should be accessible in a library and/or the electronic environment. During contact hours and when carrying out individual work, students should have access to software required for the acquisition of practical skills.

32. As regards placement (which is not required under second cycle study programmes), the higher education institution should sign agreements with domestic or foreign industrial undertakings that have modern technological facilities and offer placement opportunities. Subject to the availability at the higher education institution of the technological equipment relevant to the field of study and highly qualified specialists who are able to operate it, practical training may be, either partially or fully, undertaken at the higher education institution.

CHAPTER VI
DESCRIPTION OF LEVELS OF ACHIEVED LEARNING OUTCOMES

33. The following levels of learning outcomes are distinguished: excellent, average and threshold.

34. The levels of learning outcomes of college studies are as follows:

34.1 Excellent level of achievements. In-depth understanding and relevant practical skills in technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the relevant technological activity. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain technological problems. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise manner. New technological knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates can continue their academic careers. A graduate with professional experience becomes a good practitioner. Career prospects are associated with technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

34.2 Average level of achievements. Understanding and relevant practical skills in technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Usual actions in the preparation and management of technology are performed with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to technology management, managerial responsibility and career development up to senior executive positions may be expected;

34.3 Threshold level of achievements. Basic understanding and practical skills in technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it, is able to pursue usual technological activities, but might need assistance and control and is in a position to identify mistakes. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in a specific area where knowledge and understanding of materials and typical technologies is important, however, does not require regular application of fundamental knowledge, e.g. in production control.

35. The levels of learning outcomes of the first cycle university studies are as follows:

35.1 Excellent level of achievements. In-depth understanding and relevant practical skills in technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the relevant technological activity. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain technological problems. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. It is desirable that at this level graduates continue their studies in the following study cycles. A graduate with professional experience becomes a good practitioner. Career prospects are associated with research, development of innovations, technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

35.2 Average level of achievements. Understanding and relevant practical skills in technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

35.3 Threshold level of achievements. Basic understanding and practical skills in technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. Ability to identify mistakes. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in a specific area where knowledge and understanding of materials is essential, but does not require the application of fundamental knowledge.

36. The levels of learning outcomes of the second cycle university studies are as follows:

36.1 Excellent level of achievements. In-depth fundamental understanding and relevant practical skills in technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking, a thorough knowledge of the literature and relevant technological activity, planning and conducting of research. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain problems. Calculations, explanations, interpretations and analyses requiring deeper knowledge are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates are recommended to seek a doctoral degree. A graduate with professional experience becomes a good practitioner able to demonstrate profound expert knowledge. Career prospects are associated with research, development of innovations, technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

36.2 Average level of achievements. Understanding and relevant practical skills in technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

36.3 Threshold level of achievements. Basic understanding and practical skills in technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for higher technical or general management positions. Upon gaining relevant professional experience, he may become a good practitioner in a specific area.

Annex 1
to the Descriptor of the study fields
of Technology

DESCRIPTOR OF THE STUDY FIELD OF MINERALS TECHNOLOGY

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the study field of Minerals Technology (hereinafter referred to as the "Descriptor") regulates special requirements for study programmes in the field of minerals technology.

2. The Descriptor applies to a range of branches in the field of minerals technology, including mining, quarrying, rock mechanics, mineral processing, mineral exploration, oil refining technology and biomass engineering.

CHAPTER II
CONCEPT OF THE STUDY FIELD

3. Natural resources may be classified into two groups: renewable (water, land, biomass, etc.) and non-renewable (minerals). The diversity of minerals necessitates exploration and study of very different technologies of their extraction, transportation, processing and use.

4. Studies of minerals technology require fundamentals of natural sciences, knowledge about minerals technology and its links with other types of technology. Graduates should be able to analyse and evaluate the accessibility of minerals, technological processes of extraction, transportation, processing and application, select technological equipment and develop and implement technological projects.

5. Graduates of minerals technology should understand the effects of technologies of extraction, processing and use on the living and non-living environment, climate change, human health and economy. They should be able to apply resource-efficient advanced technology that reduces production of waste, adverse impact on the environment and human safety and implement renewable technologies.

CHAPTER III
SPECIAL AND GENERAL LEARNING OUTCOMES

6. This chapter focuses on the fundamental learning outcomes for study programmes in the field of minerals technology, which, however, are not to be considered as the specification of the detailed content of the study programme or subjects. Developers and executors of study programmes may modify the learning outcomes to adapt them to a specific study programme.

7. College studies should enable graduates to demonstrate:
7.1 Knowledge and understanding:
7.1.1 knowledge and understanding of the basics of minerals technology, natural sciences and mathematics;
7.1.2 understanding of the key concepts of minerals technology and their content;
7.1.3 basic knowledge in minerals technology;

7.1.4 awareness of the wider multidisciplinary context of technology.

7.2 Technological analysis:
7.2.1 ability to apply their knowledge and understanding in solving problems of minerals technology by using familiar methods;
7.2.2 ability to apply their knowledge and understanding in the analysis of processes in minerals technology and the choice of techniques and technological equipment;
7.2.3 ability to apply analytical and modelling methods in the chosen branch of minerals technology.

7.3 Technology design:
7.3.1 ability to apply knowledge and understanding of minerals technology in the formulation and fulfilment of tasks in accordance with defined requirements;
7.3.2 understanding of design methodologies and ability to apply them.

7.4. Investigations:
7.4.1 ability to find appropriate professional information in databases and other information sources;
7.4.2 ability to conduct necessary experiments, interpret data and draw conclusions;
7.4.3 skills in operating technological equipment used in the field of minerals technology.

7.5 Practice:
7.5.1 ability to apply appropriate technological equipment, measures and techniques;
7.5.2 ability to combine theoretical and applied knowledge in solving technological problems;
7.5.3 understanding of ethical, environmental and commercial implications of technological activities;
7.5.4 understanding of the organisational principles of technological activities and awareness of the basic requirements for safety at work.

7.6 Personal abilities:
12.6.1 ability to function effectively as an individual and as a member of a team;
7.6.2 ability to communicate with the engineering and technology community and society at large;
7.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
7.6.4 knowledge of the principle project management and business aspects at technological level;
7.6.5 recognition of the importance of and preparedness for independent life-long learning.

8. First cycle university studies should enable graduates to demonstrate:

8.1 Knowledge and understanding:
8.1.1 knowledge and understanding of the basics of minerals technology, natural sciences and mathematics;
8.1.2 awareness and systemic understanding of the key theoretical and applied basics and concepts of minerals technology;
8.1.3 coherently linked basic knowledge of minerals technology;
8.1.4 awareness of the wider multidisciplinary context of technology and ability to apply methods and processes of other technologies.

8.2 Technological analysis:

8.2.1 ability to apply their knowledge and understanding in formulating and solving problems of minerals technology by using appropriate methods;
8.2.2 ability to apply their knowledge and understanding in the analysis of technological processes in a chosen branch of minerals technology and in the choice of techniques and technological equipment;
8.2.3 ability to select and apply appropriate analytical and modelling methods in the chosen branch of minerals technology.

8.3 Technology design:
8.3.1 ability to apply knowledge and understanding of minerals technology in project development and implementation in line with defined requirements;
8.3.2 understanding of design methodologies and ability to apply them.

8.4 Investigations:
8.4.1 ability to find appropriate professional and scientific information in databases and other information sources;
8.4.2 ability to plan and conduct necessary experiments, interpret data and draw conclusions;
8.4.3 skills in operating equipment used in minerals technology.

8.5 Practice:
8.5.1 ability to select and apply appropriate equipment, measures and techniques;
8.5.2 ability to combine theoretical and applied knowledge in solving technological problems;
8.5.3 understanding of ethical, environmental and commercial implications of technological activities;
8.5.4 understanding of the organisational principles of technological activities, the importance of safety at work and key requirements and the interaction between individual links of a technological process.

8.6 Personal abilities:
8.6.1 ability to function effectively as an individual and as a member of a team;
8.6.2 ability to communicate with the engineering and technology community and society at large;
8.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
8.6.4 knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the links between technological solutions and their economic outcomes;
8.6.5 recognition of the importance of and preparedness for independent life-long learning.

9. Second cycle studies should enable graduates to demonstrate:

9.1 Knowledge and understanding:
9.1.1 good understanding of the principles of the chosen minerals technology;
9.1.2 awareness and appreciation of the forefront of their field of study.

9.2 Technological analysis:
9.2.1 ability to solve atypical, incompletely defined and specified problems;
9.2.2 ability to formulate and solve problems arising in new branches of minerals technology;
9.2.3 ability to use their knowledge and understanding for the conceptualisation of models, systems and processes and to this end apply different methods, including mathematical analysis, computational modelling or experiments;

9.2.4 understanding of the importance of social, health and safety, environmental and commercial requirements;
9.2.5 ability to use innovative approaches in problem solving and the implementation of solutions.

9.3 Technology design:
9.3.1 ability to apply technological knowledge acquired and understanding in solving of unfamiliar problems, also including those related to other scientific and technological fields;
9.3.2 ability to use innovativeness in developing new and original ideas and approaches;
9.3.3 ability to make technological decisions in the case of multidimensional, technically undefined and precisely indescribable problems.

9.4 Investigations:
9.4.1 ability to identify, locate and obtain required data;
9.4.2 ability to plan and conduct analytical, simulation and experimental research;
9.4.3 ability to critically evaluate data and draw conclusions;
9.4.4 ability to explore the applicability of new and emerging technologies in the chosen branch of minerals technology.

9.5 Practice:
9.5.1 ability to integrate knowledge in different fields and tackle multidimensional technological problems;
9.5.2 good understanding of the methods and methodologies to be applied and awareness of their limitations;
9.5.3 knowledge of ethical, environmental and commercial requirements for technological and engineering activities.

9.6 Personal abilities:
9.6.1 excellent understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and technological and engineering activities and awareness of responsibility for technological activities;
9.6.2 excellent knowledge of the project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the interrelation between technological solutions and their economic outcomes;
9.6.3 recognition of the importance of and preparedness for independent life-long learning;
9.6.4 ability to function effectively as an individual and as a member of a team and the ability to lead the team, which may consist of representatives of different fields and levels of study;
9.6.5 ability to function and communicate effectively in national and international context.

CHAPTER IV
TEACHING, LEARNING AND ASSESSMENT, REQUIREMENTS FOR THE IMPLEMENTATION OF STUDY PROGRAMMES AND THE DESCRIPTION OF LEVELS OF ACHIEVED LEARNING OUTCOMES

10. Requirements for teaching, learning, assessment and study programme implementation are the same as set out in the Descriptor of the study fields of Technology.

11. The following levels of learning outcomes are distinguished: excellent, average and threshold.

12. The levels of learning outcomes of college studies are as follows:

12.1 Excellent level of achievements. In-depth understanding and relevant practical skills in minerals technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of activities in the field of minerals technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted technological problems of uncertain development prospects. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise manner. New technological knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates can continue their academic careers. A graduate with professional experience becomes a good practitioner. Career prospects are associated with minerals technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

12.2 Average level of achievements. Understanding and relevant practical skills in minerals technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Usual actions in the preparation and management of technology are performed with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to minerals technology management, managerial responsibility and career development up to senior executive positions may be expected;

12.3 Threshold level of achievements. Basic understanding and practical skills in minerals technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it, is able to pursue usual technological activities, but might need assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in minerals technology where knowledge and understanding of materials and typical technologies is important, however, does not require application of fundamental knowledge, e.g. in production control.

13. The levels of learning outcomes of the first cycle university studies are as follows:

13.1 Excellent level of achievements. In-depth understanding and relevant practical skills in minerals technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the literature and activities in minerals technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted problems of uncertain development prospects. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. It is desirable that at this level graduates continue their studies in the following study cycles. A graduate with professional experience becomes a good practitioner. Career prospects are associated with research, development of innovations, minerals technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

13.2 Average level of achievements. Understanding and relevant practical skills in minerals technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of

problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, minerals technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

13.3 Threshold level of achievements. Basic understanding and practical skills in minerals technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in minerals technology where knowledge and understanding of materials is essential, but does not require the application of new fundamental knowledge.

14. The levels of learning outcomes of the second cycle university studies are as follows:

14.1 Excellent level of achievements. In-depth fundamental understanding and relevant practical skills in minerals technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking, a thorough knowledge of the literature and activities in minerals technology, planning and conducting of research. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted problems of uncertain development prospects. Calculations, explanations, interpretations and analyses requiring deeper knowledge are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates are recommended to seek a doctoral degree. A graduate with professional experience becomes a good practitioner able to demonstrate profound expert knowledge. Career prospects are associated with research, development of innovations, minerals technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

14.2 Average level of achievements. Understanding and relevant practical skills in minerals technology are good, but are likely to be limited to information provided in the process of learning. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, minerals technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

14.3 Threshold level of achievements. Basic understanding and practical skills in minerals technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for higher technical or general management positions. Upon gaining relevant professional experience, he may become a good practitioner in minerals technology.

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Annex 2
to the Descriptor of the study fields
of Technology

DESCRIPTOR OF THE STUDY FIELD OF POLYMERS AND TEXTILES TECHNOLOGY

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the study field of Polymers and Textiles Technology (hereinafter referred to as the "Descriptor") regulates special requirements for study programmes in the field of polymers and textiles technology.

2. The Descriptor applies to a range of branches in the field of polymers and textiles technology, including polymers technology, textiles technology, leather technology and clothing manufacturing.

CHAPTER II
CONCEPT AND SCOPE OF THE STUDY FIELD

3. Polymers technology:

3.1 The science of polymeric materials, processes, methods and equipment for the production of polymeric materials;

3.2 The entirety of methods and means of the development, manufacturing and processing of products made of polymeric materials and their delivery to consumers and the public.

4. Textiles technology:

4.1 The science of materials, processes, methods and equipment for the production of textile products;

4.2 The entirety of methods and means of the development and manufacturing of textile products.

5. Textile:

5.1 The area of activity related to the manufacturing of textile products.

5.2 Textile materials mean raw textiles and textile products, including fibres, yarn, textile products and semiproducts of different purpose basically made of fibres.

6. Leather technology:

6.1 The science of leather and leather products, processes, methods and equipment for manufacturing of leather and leather products;

6.2 The entirety of methods, means and organisation of the development and manufacturing of leather products (haberdashery, footwear, harness, furniture, etc.).

7. Clothing technology:

7.1 The science of clothing materials and articles, also processes, methods and equipment used in manufacturing of clothing articles;

7.2 Individualised and serial development and manual, mechanical or automated production of clothing items, as consumer goods, at large and small industrial undertakings and individual workshops;

7.3 The entirety of methods and means of development, designing and production of clothing items, recycling and delivery of items to consumers and the public. Clothing technology encompasses serial and individualised development, designing, construction, modelling and industrial production or knitting and custom-made production of clothing.

8. Activities in the sectors of polymers and textiles technology include all elements in the chain of clothing, accessories, footwear, household and functional textile, functional polymeric products and other relevant technical products. The chain of supply covers activities ranging from the production of raw materials or materials, product design, construction, modelling and manufacturing to the provision of products to consumers and the public. Such additional elements as design, retail and wholesale, recycling or re-use and maintenance or after-sales support also play a major role in this chain.

CHAPTER III
SPECIAL AND GENERAL LEARNING OUTCOMES

9. This chapter focuses on the fundamental learning outcomes for polymers and textiles technology, which, however, are not to be considered as the specification of the detailed content of the study programme or subjects/modules. Developers and executors of study programmes may modify the learning outcomes to adapt them to a specific study programme.

10. College studies should enable graduates to demonstrate:

10.1 Knowledge and understanding:
10.1.1 knowledge and understanding of the artistic, social fundamentals and basics of natural sciences and mathematics in polymers and textiles technology;
10.1.2 understanding of the key aspects and concepts of polymer and textile materials selection, product design, designing, construction, production and maintenance technology and process organisation;
10.1.3 basic knowledge of polymers and textiles technology, including basic knowledge of technology;
10.1.4 awareness of the wider artistic, social (economic and financial), humanities and applied context of technology.

10.2 Technological analysis:
10.2.1 ability to apply their knowledge and understanding in defining, formulating and solving technological problems of polymer and textile product development and production by using familiar methods;
10.2.2 ability to apply their knowledge and understanding in the analysis of technological processes and methods and the choice of technological equipment;
10.2.3 ability to select and apply appropriate analytical and modelling methods.

10.3 Technology design:
10.3.1 ability to apply technological knowledge and understanding of polymers and textiles technology in the formulation and fulfilment of tasks in accordance with defined requirements;
10.3.2 understanding of designing, construction and modelling methodologies and ability to evaluate and apply them.

10.4 Investigations:
10.4.1 ability to find appropriate professional information in databases and other information sources;
10.4.2 ability to conduct necessary experiments/laboratory investigations, interpret data and draw conclusions;
10.4.3 skills in operating technological designing equipment.

10.5 Practice/technological activities:
10.5.1 ability to apply appropriate materials, technological equipment, means and techniques;
10.5.2 ability to combine theoretical and applied/practical knowledge in solving technological problems;
10.5.3 understanding of ethical, environmental and commercial implications of technological activities;
10.5.4 understanding of the organisational principles of technological activities and awareness of the basic requirements for safety at work.

10.6 Personal abilities:
10.6.1 ability to function effectively as individual and as a member of a team;
10.6.2 ability to communicate in writing and orally in the native and foreign language with the engineering and technology community and society at large;
10.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities, assumption and awareness of responsibility for technological activities and the quality of their own and their staff's performance;
10.6.4 knowledge of the principle project management and business aspects at technological level;
10.6.5 recognition of the importance of and preparedness for independent life-long learning;
10.6.6 ability to learn autonomously.

11. First cycle university studies should enable graduates to demonstrate:

11.1 Knowledge and understanding:
11.1.1 knowledge and understanding of the artistic, humanities, marketing, economic and financial principles, also basic engineering, scientific and mathematical principles of polymers and textiles technology;
11.1.2 understanding of the key aspects and concepts of polymer and textile materials and product design, formation of the range of products, material selection, designing, construction, modelling, production and maintenance technologies and process organisation and their interrelations;
11.1.3 coherently linked basic knowledge of polymers and textiles technology, including basic knowledge of technology;
11.1.4 awareness of the wider artistic, social, humanities, scientific and applied context of technology and relevant multidimensional requirements.

11.2 Technological analysis:

11.2.1 ability to apply their knowledge and understanding in independent identification, defining and solving of technological problems of the development and production of polymeric and textile materials and products by using appropriate and reliable methods;
11.2.2 ability to creatively and critically analyse equivalents of implemented projects and draw up essential guidelines for the implementation of new projects;
11.2.3 ability to apply their knowledge and understanding in the analysis of technological processes and techniques of the development and production of polymeric and textile materials and products and in the selection of technological equipment;
11.2.4 ability to select and apply appropriate analytical and modelling methods.

11.3 Technology design:
11.3.1 ability to apply knowledge and understanding of polymers and textiles technology in the development of materials and products and in project implementation in line with clearly defined integrated requirements;
11.3.2 understanding of design, designing, construction and modelling methodologies and ability to apply them in an adequate manner.

11.4 Investigations:
11.4.1 ability to search, systemise and analyse relevant patent-related and scientific literature in databases and other information sources and formulate the goals and objectives of the research and applied activities;
11.4.2 ability to select objects and methods of research and justify their relevance, also to plan and conduct necessary experiments;
11.4.3 ability to select reliable laboratory equipment and to work in workshops and laboratories;
11.4.4 ability to evaluate data, summarise and interpret findings by indicating causal relations, draw reasoned conclusions and give recommendations.

11.5 Practice/technological activities:
11.5.1 ability to select and apply appropriate materials and technological equipment, means and techniques;
11.5.2 ability to independently operate specialised computer-aided technologies and systems for materials and product visualisation, designing, construction, modelling, production and process organisation;
11.5.3 ability to integrate scientific innovations and possibilities of advanced technologies in the development, designing and production of new materials and products, their systems and new collections of industrial design;
11.5.4 understanding of ethical and environmental implications of commercial, creative and technological activities.

11.6 Personal abilities:
11.6.1 ability to function effectively as individual and as a member of a team while integrating into a changing product and technology development and social environment within a different cultural context;
11.6.2 ability to communicate in writing and orally in the native and foreign language with the engineering and technology community and society at large;
11.6.3 understanding of health, safety and legal problems and responsibility related to design, designing, construction and technological activities, compliance with the rules of professional ethics and of technological and engineering activities and assumption of responsibility for pursued activities;
11.6.4 knowledge of trademark, project implementation and business aspects, e.g. possible risks and changes, and understanding of their disadvantages;

11.6.5 understanding of the importance of life-long learning, both individual and in a team, and availability of fully developed learning skills required for further improvement of competences.

12. Second cycle studies should enable graduates to demonstrate:

12.1 Knowledge and understanding:
12.1.1 good understanding of the principles of polymers and textiles technology;
12.1.2 critical understanding of the substance and application of their field of study in similar areas of the global context taking into account the objectives of the artistic and technical creation and technological progress;
12.1.3 understanding of the methods of integrated quality assessment, management and forecasting of materials, products and processes and the process and importance of control and execution.

12.2 Technological analysis:
12.2.1 ability to solve atypical, incompletely defined and specified problems of materials and product development, designing, production and recycling technologies;
12.2.2 ability to formulate and solve scientific problems arising in new and emerging thematic areas in the field of study taking into account trends in sustainable development of technology;
12.2.3 ability to use their knowledge and understanding for the conceptualisation of models, complex systems and processes, apply different methods, including mathematical analysis, computational modelling or practical experiments;
12.2.4 understanding of the importance of social, health and safety, environmental and commercial requirements and their entirety;
12.2.5 ability to use new approaches in problem solving and the implementation of solutions.

12.3 Technology design:
12.3.1 ability to apply technological knowledge acquired and understanding in solving of atypical problems, also including those related to other scientific and technological fields;
12.3.2 ability to individually develop new and original ideas and approaches taking account of alternative solutions, demand, offer and trends in technology development;
12.3.3 ability to deal with complex, technically undefined and incomplete information using knowledge acquired in materials and product development, production and recycling technologies and their best judgment.

12.4 Investigations:
12.4.1 ability to independently identify, locate and obtain required data;
12.4.2 ability to plan and systematically conduct analytical, simulation and experimental research and make forecasts;
12.4.3 ability to critically evaluate and compare new data with those previously obtained and draw scientifically reasoned conclusions;
12.4.4 ability to explore and analyse the applicability of new and emerging technologies in the field of polymers and textiles technology.

12.5 Practice/technological activities:
12.5.1 ability to integrate knowledge in arts, humanities, social sciences, various fields of engineering and technology and apply their systems produced;
12.5.2 good understanding of the methods and methodologies to be applied and awareness of their disadvantages;
12.5.3 knowledge of ethical, environmental and commercial requirements for high quality design, technological and engineering activities.

12.6 Personal abilities:
12.6.1 excellent understanding of health, safety and legal problems and responsibility related to design, designing, construction and technological activities, compliance with the rules of professional ethics and of technological and engineering activities and assumption of responsibility for pursued activities;
12.6.2 excellent knowledge of trademark, project implementation and business aspects, e.g. possible risks and changes, and understanding of their disadvantages;
12.6.3 understanding of the importance of life-long learning, both individual and in a team, and availability of fully developed learning skills required for further improvement of competences;
12.6.4 ability to function effectively as individual and as a member of a team while successfully integrating into a changing product and technology development and social environment within a different cultural context and to lead the team, which may consist of representatives of different fields and levels of study;
12.6.5 ability to function effectively and communicate professionally in national and international context;
12.6.6 creative, critical, integral and logical thinking skills, developed intellectual principles and moral values acquired in the adequately selected field of improvement.

CHAPTER IV
TEACHING, LEARNING AND ASSESSMENT, REQUIREMENTS FOR THE IMPLEMENTATION OF STUDY PROGRAMMES AND THE DESCRIPTION OF LEVELS OF ACHIEVED LEARNING OUTCOMES

13. Requirements for teaching, learning, assessment and study programme implementation are the same as set out in the Descriptor of the study fields of Technology.

14. The following levels of learning outcomes are distinguished: excellent, average and threshold.

15. The levels of learning outcomes of college studies are as follows:

15.1 Excellent level of achievements. In-depth understanding and relevant practical skills in polymers and textiles technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of activities in the field of polymers and textiles technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain technological problems. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise manner. New technological knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates can continue their academic careers. A graduate with professional experience becomes a good practitioner. Career prospects are associated with polymers and textiles technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

15.2 Average level of achievements. Understanding and relevant practical skills in polymers and textiles technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Usual actions in the preparation and management of technology are performed with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good

practitioner. Career prospects relate to polymers and textiles technology management, managerial responsibility and career development up to senior executive positions may be expected;

15.3 Threshold level of achievements. Basic understanding and practical skills in polymers and textiles technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it, is able to pursue usual technological activities, but might need assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in polymers and textiles technology, where knowledge and understanding of materials and typical technologies is important, however, does not require regular application of fundamental knowledge, e.g. in production control.

16. The levels of learning outcomes of the first cycle university studies are as follows:

16.1 Excellent level of achievements. In-depth understanding and relevant practical skills in polymers and textiles technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the literature and activities in the field of polymers and textiles technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain technological problems. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. It is desirable that at this level graduates continue their studies in the following study cycles. A graduate with professional experience becomes a good practitioner. Career prospects are associated with research, development of innovations, polymers and textiles technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

16.2 Average level of achievements. Understanding and relevant practical skills in polymers and textiles technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, polymers and textiles technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

16.3 Threshold level of achievements. Basic understanding and practical skills in polymers and textiles technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in polymers and textiles technology where knowledge and understanding of materials is essential, but does not require the application of fundamental knowledge.

17. The levels of learning outcomes of the second cycle university studies are as follows:

17.1 Excellent level of achievements. In-depth fundamental understanding and relevant practical skills in polymers and textiles technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking, a thorough knowledge of the literature and activities in the field of polymers and textiles technology, planning and conducting of research. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain problems. Calculations, explanations, interpretations and analyses requiring deeper knowledge are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates are recommended to seek a doctoral degree. A graduate with professional experience becomes a good practitioner able to demonstrate profound expert knowledge. Career prospects are associated with research, development of innovations, polymers and textiles technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

17.2 Average level of achievements. Understanding and relevant practical skills in polymers and textiles technology are good, but are likely to be limited to information provided in the process of learning. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, polymers and textiles technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

17.3 Threshold level of achievements. Basic understanding and practical skills in polymers and textiles technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for higher technical or general management positions. Upon gaining relevant professional experience, he may become a good practitioner in polymers and textiles technology.

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Annex 3
to the Descriptor of the study fields
of Technology

DESCRIPTOR OF THE STUDY FIELD OF MATERIALS TECHNOLOGY

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the study field of Materials Technology (hereinafter referred to as "Descriptor") regulates special requirements for study programmes in the field of materials technology.

2. Materials technology falls under the broader group of technology in the area of technological sciences.

CHAPTER II
CONCEPT AND SCOPE OF THE STUDY FIELD

3. Materials technology encompasses the techniques and means for the development of material objects using one or more types of materials, recycling of materials or transformation of raw materials into materials with necessary properties.

4. Materials technology is closely related to science and engineering. Technology generally relies on the scientific understanding of physical and other phenomena, while the implementation of technology is directly linked to the use of engineering products and solutions. However, technology might often be based not only on science and engineering, but also on the requirements for benefit, consumer needs and safety and relevant objectives.

CHAPTER III
SPECIAL AND GENERAL LEARNING OUTCOMES

5. This chapter focuses on the fundamental learning outcomes for study programmes in the field of materials technology, which, however, are not to be considered as the specification of the detailed content of the study programme or subjects.

6. College studies should enable graduates to demonstrate:

6.1 Knowledge and understanding:
6.1.1 knowledge and understanding of the basics of natural sciences and mathematics in the field of materials technology;
6.1.2 understanding of the key concepts of materials technology and their content;
6.1.3 basic knowledge in materials technology;
6.1.4 awareness of the wider multidisciplinary context of materials technology.

6.2 Technological analysis:
6.2.1 ability to apply their knowledge and understanding in solving technological problems by using familiar methods;
6.2.2 ability to apply their knowledge and understanding in the analysis of technological processes and methods and the choice of technological equipment;
6.2.3 ability to apply analytical and modelling methods in the field of materials technology.

6.3 Technology design:
6.3.1 ability to apply technological knowledge and understanding in materials technology in the formulation and fulfilment of tasks in accordance with defined requirements;
6.3.2 understanding of design methodologies and ability to apply them.

6.4 Investigations:
6.4.1 ability to find appropriate professional information in databases and other information sources;
6.4.2 ability to conduct necessary experiments, interpret data and draw conclusions;
6.4.3 skills in operating technological equipment used in the field of materials technology.

6.5 Practice:
6.5.1 ability to apply appropriate technological equipment, means and techniques;
6.5.2 ability to combine theoretical and applied knowledge in solving technological problems;
6.5.3 understanding of ethical, environmental and commercial implications of technological activities;
6.5.4 understanding of the organisational principles of technological activities and awareness of the basic requirements for safety at work.

6.6 Personal abilities:
6.6.1 ability to function effectively as individual and as a member of a team;
6.6.2 ability to communicate with the engineering and technology community and society at large;
6.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
6.6.4 knowledge of the principle project management and business aspects at technological level;
6.6.5 recognition of the importance of and preparedness for independent life-long learning.

7. First cycle university studies should enable graduates to demonstrate:

7.1 Knowledge and understanding:
7.1.1 knowledge and understanding of the basics of natural sciences and mathematics in the field of materials technology;
7.1.2 awareness and systemic understanding of the key theoretical and applied basics and concepts of materials technology;
7.1.3 coherently linked basic knowledge in materials technology;
7.1.4 awareness of the wider multidisciplinary context of materials technology and ability to apply methods and processes of other technologies.

7.2 Technological analysis:
7.2.1 ability to apply their knowledge and understanding in formulating and solving technological problems by using appropriate methods;
7.2.2 ability to apply their knowledge and understanding in the analysis of technological processes and methods and the choice of technological equipment;
7.2.3 ability to select and apply appropriate analytical and modelling methods in the field of materials technology.

7.3 Technology design:
7.3.1 ability to apply technological knowledge in materials technology and understanding in project development and implementation in line with defined requirements;
7.3.2 understanding of design methodologies and ability to apply them.

7.4 Investigations:
7.4.1 ability to find appropriate professional and scientific information in databases and other information sources;
7.4.2 ability to plan and conduct necessary experiments, interpret data and draw conclusions;
7.4.3 skills in operating technological equipment used in the field of materials technology.

7.5 Practice:
7.5.1 ability to select and apply appropriate equipment, means and techniques;
7.5.2 ability to combine theoretical and applied knowledge in solving technological problems;
7.5.3 understanding of ethical, environmental and commercial implications of technological activities;
7.5.4 understanding of the organisational principles of technological activities, the importance of safety at work and key requirements and the interaction between individual links of a technological process.

7.6 Personal abilities:
7.6.1 ability to function effectively as an individual and as a member of a team;
7.6.2 ability to communicate with the engineering and technology community and society at large;
7.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
7.6.4 knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the links between technological solutions and their economic outcomes;
7.6.5 recognition of the importance of and preparedness for independent life-long learning.

8. Second cycle studies should enable graduates to demonstrate:

8.1 Knowledge and understanding:
8.1.1 good understanding of the principles of materials technology;
8.1.2 awareness and appreciation of the forefront of their field of study.

8.2 Technological analysis:
8.2.1 ability to solve atypical, incompletely defined and specified problems;
8.2.2 ability to formulate and solve problems arising in new and emerging thematic areas in the field of materials technology;
8.2.3 ability to use their knowledge and understanding for the conceptualisation of models, systems and processes, apply different methods, including mathematical analysis, computational modelling or experiments;
8.2.4 understanding of the importance of social, health and safety, environmental and commercial requirements;
8.2.5 ability to use innovative approaches in problem solving and the implementation of solutions.

8.3 Technology design:
8.3.1 ability to apply technological knowledge acquired and understanding in solving of unfamiliar problems, also including those related to other scientific and technological fields;
8.3.2 ability to use innovativeness in developing new and original ideas and approaches;
8.3.3 ability to make technological decisions in the case of multidimensional, technically undefined and precisely indescribable problems.

8.4 Investigations:
8.4.1 ability to identify, locate and obtain required data;
8.4.2 ability to plan and conduct analytical, simulation and experimental research;
8.4.3 ability to critically evaluate data and draw conclusions;
8.4.4 ability to explore the applicability of new and emerging technologies in the field of materials technology.

8.5 Practice:
8.5.1 ability to integrate knowledge in different fields and tackle multidimensional technological problems;
8.5.2 good understanding of the methods and methodologies to be applied and awareness of their limitations;
8.5.3 knowledge of ethical, environmental and commercial requirements for technological and engineering activities.

8.6 Personal abilities:
8.6.1 excellent understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and technological and engineering activities and awareness of responsibility for technological activities;
8.6.2 excellent knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the interrelation between technological solutions and their economic outcomes;
8.6.3 recognition of the importance of and preparedness for independent life-long learning;
8.6.4 ability to function effectively as an individual and as a member of a team and the ability to lead the team, which may consist of representatives of different fields and levels of study;
8.6.5 ability to function and communicate effectively in national and international context.

CHAPTER IV
TEACHING, LEARNING AND ASSESSMENT, REQUIREMENTS FOR THE IMPLEMENTATION OF STUDY PROGRAMMES AND THE DESCRIPTION OF LEVELS OF ACHIEVED LEARNING OUTCOMES

9. Requirements for teaching, learning, assessment and study programme implementation are the same as set out in the Descriptor of the study fields of Technology.

10. The following levels of learning outcomes are distinguished: excellent, average and threshold.

11. The levels of learning outcomes of college studies are as follows:

11.1 Excellent level of achievements. In-depth understanding and relevant practical skills in materials technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of activities in the field of materials technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain problems. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise manner. New technological knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates can continue their academic careers. A graduate with professional experience becomes a good practitioner. Career prospects are associated with materials technology management and

significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;
11.2 Average level of achievements. Understanding and relevant practical skills in materials technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Usual actions in the preparation and management of technology are performed with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to materials technology management, managerial responsibility and career development up to senior executive positions may be expected.

11.3 Threshold level of achievements. Basic understanding and practical skills in materials technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it, is able to pursue usual technological activities, but might need assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in materials technology, where knowledge and understanding of materials and typical technologies is important, however, does not require regular application of new fundamental knowledge, e.g. in production control.

12. The levels of learning outcomes of the first cycle university studies are as follows:

12.1 Excellent level of achievements. In-depth understanding and relevant practical skills in materials technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the literature and activities in the field of materials technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain problems. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. It is desirable that at this level graduates continue their studies in the following study cycles. A graduate with professional experience becomes a good practitioner. Career prospects are associated with research, development of innovations, materials technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

12.2 Average level of achievements. Understanding and relevant practical skills in materials technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, materials technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

12.3 Threshold level of achievements. Basic understanding and practical skills in materials technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require

assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in materials technology where knowledge and understanding of materials is essential, but does not require the application of new fundamental knowledge.

13. The levels of learning outcomes of the second cycle university studies are as follows:

13.1 Excellent level of achievements. In-depth fundamental understanding and relevant practical skills in materials technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking, a thorough knowledge of the literature and activities in the field of materials technology, planning and conducting of research. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain problems. Calculations, explanations, interpretations and analyses requiring deeper knowledge are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates are recommended to seek a doctoral degree. A graduate with professional experience becomes a good practitioner able to demonstrate profound expert knowledge. Career prospects are associated with research, development of innovations, materials technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

13.2 Average level of achievements. Understanding and relevant practical skills in materials technology are good, but are likely to be limited to information provided in the process of learning. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, materials technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

13.3 Threshold level of achievements. Basic understanding and practical skills in materials technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for higher technical or general management positions. Upon gaining relevant professional experience, he may become a good practitioner in materials technology.

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Annex 4
to the Descriptor of the study fields
of Technology

DESCRIPTOR OF THE STUDY FIELD OF MARITIME TECHNOLOGY

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the study field of Maritime Technology (hereinafter referred to as the "Descriptor") regulates special requirements for study programmes in the field of maritime technology.

2. The Descriptor applies to a range of branches in the field of maritime technology, including fleet technology, maritime pilotage, seaport technology and fishing technology.

3. Since maritime technology also covers some specialisations falling under the group of state regulated professions, the requirements and learning outcomes of the study programmes in this field of study should be in conformity with international legislation regulating relevant professions or qualifications, namely the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended, which is partially transposed into Directive 2008/106/EC of the European Parliament and of the Council of 19 November 2008 on the minimum level of training of seafarers (OJ 2008 L 323, p. 33), which, following its last amendment of 21 November 2012, is transposed Directive 2012/35/EU of the European Parliament and of the Council (*OJ 2012 L 343, p. 78-105).*

CHAPTER II
SPECIAL AND GENERAL LEARNING OUTCOMES

4. This chapter focuses on the fundamental learning outcomes for study programmes in the field of maritime technology, which, however, are not to be considered as the specification of the detailed content of the study programme or subjects. Developers and executors of study programmes may modify the learning outcomes to adapt them to a specific study programme.

5. College studies should enable graduates to demonstrate:

5.1 Knowledge and understanding:
5.1.1 knowledge and understanding of the basics of natural sciences and mathematics;
5.1.2 understanding of the key concepts of maritime technology and their content;
5.1.3 basic knowledge of maritime technology;
5.1.4 awareness of the wider multidisciplinary context of technology.

5.2 Technological analysis:
5.2.1 ability to apply their knowledge and understanding in solving technological problems of maritime technology by using familiar methods;
5.2.2 ability to apply their knowledge and understanding in the analysis of technological processes and methods and the choice of technological equipment.
5.2.3 ability to apply analytical and modelling methods.

5.3 Technology design:

5.3.1 ability to apply technological knowledge in the field of maritime technology and understanding in the formulation and fulfilment of tasks in accordance with defined requirements;
5.3.2 understanding of design methodologies and ability to apply them.

5.4 Investigations:
5.4.1 ability to find appropriate professional information in databases and other information sources;
5.4.2 ability to conduct necessary experiments, interpret data and draw conclusions;
5.4.3 skills in operating technological equipment used in the field of maritime technology.

5.5 Practice:
5.5.1 ability to apply appropriate technological equipment, means and techniques;
5.5.2 ability to combine theoretical and applied knowledge in solving technological problems;
5.5.3 understanding of ethical, environmental and commercial implications of activities in the field of maritime technology;
5.5.4 understanding of the organisational principles of activities in the field of maritime technology and awareness of the basic requirements for safety at work.

5.6 Personal abilities:
5.6.1 ability to function effectively as individual and as a member of a team;
5.6.2 ability to communicate with the engineering and technology community and society at large;
5.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
5.6.4 knowledge of the principle project management and business aspects at technological level;
5.6.5 recognition of the importance of and preparedness for independent life-long learning.

6. First cycle university studies should enable graduates to demonstrate:

6.1 Knowledge and understanding:
6.1.1 knowledge and understanding of the basics of natural sciences and mathematics in the field of maritime technology;
6.1.2 awareness and systemic understanding of the key theoretical and applied basics and concepts of maritime technology;
6.1.3 coherently linked basic knowledge of maritime technology;
6.1.4 awareness of the wider multidisciplinary context of technology and ability to apply methods and processes of other technologies.

6.2 Technological analysis:
6.2.1 ability to apply their knowledge and understanding in formulating and solving technological problems of maritime technology by using appropriate methods;
6.2.2 ability to apply their knowledge and understanding in the analysis of technological processes and methods in the field of maritime technology and the choice of technological equipment;
6.2.3 ability to select and apply appropriate analytical and modelling methods.

6.3 Technology design:
6.3.1 ability to apply technological knowledge and understanding of maritime technology in project development and implementation in line with defined requirements;
6.3.2 understanding of design methodologies and ability to apply them.

6.4 Investigations:
6.4.1 ability to find appropriate professional and scientific information in databases and other information sources;
6.4.2 ability to plan and conduct necessary experiments, interpret data and draw conclusions;
6.4.3 skills in operating technological equipment used in the field of maritime technology.

6.5 Practice:
6.5.1 ability to select and apply appropriate equipment, means and techniques;
6.5.2 ability to combine theoretical and applied knowledge in solving technological problems;
6.5.3 understanding of ethical, environmental and commercial implications of activities in the field of maritime technology;
6.5.4 understanding of the organisational principles of activities in the field of maritime technology, the importance of safety at work and key requirements and the interaction between individual links of a technological process.

6.6 Personal abilities:
6.6.1 ability to function effectively as an individual and as a member of a team;
6.6.2 ability to communicate with the engineering and technology community and society at large;
6.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
6.6.4 knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the links between technological solutions and their economic outcomes;
6.6.5 recognition of the importance of and preparedness for independent life-long learning.

7. Second cycle studies should enable graduates to demonstrate:

7.1 Knowledge and understanding:
7.1.1 good understanding of the principles of maritime technology;
7.1.2 awareness and appreciation of the forefront of their field of study.

7.2 Technological analysis:
7.2.1 ability to solve atypical, incompletely defined and specified problems;
7.2.2 ability to formulate and solve problems arising in new and emerging thematic areas in the field of maritime technology;
7.2.3 ability to use their knowledge and understanding for the conceptualisation of models, systems and processes, apply different methods, including mathematical analysis, computational modelling or experiments;
7.2.4 understanding of the importance of social, health and safety, environmental and commercial requirements;
7.2.5 ability to use innovative approaches in problem solving and the implementation of solutions.

7.3 Technology design:
7.3.1 ability to apply technological knowledge acquired and understanding in solving of unfamiliar problems, also including those related to other scientific and technological fields;
7.3.2 ability to use innovativeness in developing new and original ideas and approaches;
7.3.3 ability to make technological decisions in the case of multidimensional, technically undefined and precisely indescribable problems.

7.4 Investigations:
7.4.1 ability to identify, locate and obtain required data;
7.4.2 ability to plan and conduct analytical, simulation and experimental research;
7.4.3 ability to critically evaluate data and draw conclusions;
7.4.4 ability to explore the applicability of new and emerging technologies in the field of maritime technology.

7.5 Practice:
7.5.1 ability to integrate knowledge in different fields and tackle multidimensional technological problems;
7.5.2 good understanding of the methods and methodologies to be applied and awareness of their limitations;
7.5.3 knowledge of ethical, environmental and commercial requirements for technological and engineering activities.

7.6 Personal abilities:
7.6.1 excellent understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and technological and engineering activities and awareness of responsibility for technological activities;
7.6.2 excellent knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the interrelation between technological solutions and their economic outcomes;
7.6.3 recognition of the importance of and preparedness for independent life-long learning.
7.6.4 ability to function effectively as an individual and as a member of a team and the ability to lead the team, which may consist of representatives of different fields and levels of study;
7.6.5 ability to function and communicate effectively in national and international context.

CHAPTER III
TEACHING, LEARNING AND ASSESSMENT AND REQUIREMENTS FOR THE IMPLEMENTATION OF STUDY PROGRAMMES

8. Requirements for teaching, learning, assessment and study programme implementation are the same as set out in the Descriptor of the study fields of Technology.

9. Higher education institutions implementing study programmes for specialisations that fall under the category of state regulated professions must comply with the requirements of quality system standards of the International Standardisation Organisation.

CHAPTER IV
DESCRIPTION OF LEVELS OF ACHIEVED LEARNING OUTCOMES

10. The following levels of learning outcomes are distinguished: excellent, average and threshold.

11. The levels of learning outcomes of college studies are as follows:

11.1 Excellent level of achievements. In-depth understanding and relevant practical skills in maritime technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of activities in the field of maritime technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain technological

problems. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise manner. New technological knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates can continue their academic careers. A graduate with professional experience becomes a good practitioner. Career prospects are associated with maritime technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

11.2 Average level of achievements. Understanding and relevant practical skills in maritime technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Usual actions in the preparation and management of maritime technology are performed with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to maritime technology management, managerial responsibility and career development up to senior executive positions may be expected;

11.3 Threshold level of achievements. Basic understanding and practical skills in maritime technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it, is able to pursue usual activities in the field of maritime technology, but might need assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in the field of maritime technology where knowledge and understanding of typical maritime technology is important, however, does not require regular application of fundamental knowledge.

12. The levels of learning outcomes of the first cycle university studies are as follows:

12.1 Excellent level of achievements. In-depth understanding and relevant practical skills in maritime technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the literature and activities in the field of maritime technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain problems. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. It is desirable that at this level graduates continue their studies in the following study cycles. A graduate with professional experience becomes a good practitioner. Career prospects are associated with research, development of innovations, maritime technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

12.2 Average level of achievements. Understanding and relevant practical skills in maritime technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, maritime

technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

12.3 Threshold level of achievements. Basic understanding and practical skills in maritime technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in the area where knowledge and understanding of maritime technology is essential, but does not require the application of fundamental knowledge.

13. The levels of learning outcomes of the second cycle university studies are as follows:

13.1 Excellent level of achievements. In-depth fundamental understanding and relevant practical skills in maritime technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking, a thorough knowledge of the literature and activities in the field of maritime technology, planning and conducting of research. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted and uncertain problems. Calculations, explanations, interpretations and analyses requiring deeper knowledge are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates are recommended to seek a doctoral degree. A graduate with professional experience becomes a good practitioner able to demonstrate profound expert knowledge. Career prospects are associated with research, development of innovations, maritime technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

13.2 Average level of achievements. Understanding and relevant practical skills in maritime technology are good, but are likely to be limited to information provided in the process of learning. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, maritime technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

13.3 Threshold level of achievements. Basic understanding and practical skills in maritime technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for higher technical or general management positions. Upon gaining relevant professional experience, he may become a good practitioner in the area of maritime technology.

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Annex 5
to the Descriptor of the study fields
of Technology

DESCRIPTOR OF THE STUDY FIELD OF BIOTECHNOLOGY

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the study field of Biotechnology (hereinafter referred to as the "Descriptor") regulates special requirements for the first and second cycle study programmes in the field of biotechnology.

2. The Descriptor applies to a range of branches in the field of biotechnology, including plant biotechnology, animal biotechnology, environmental biotechnology, industrial biotechnology, medical biotechnology and bioengineering.

3. Biotechnology means any type of technology related to the use of natural biological systems, living organisms or their derivatives and based on DNA manipulations beyond the limits of a living cell in order to obtain a new product or process it or use for a specific purpose, also on the use of biological processes in science and technology for the development and improvement of products or processes of a specific purpose. Biotechnology integrates knowledge of biology, biochemistry, microbiology, chemical engineering and other fields to achieve better understanding and technological use of the capacities of living organisms.

CHAPTER II
SPECIAL AND GENERAL LEARNING OUTCOMES

4. This chapter focuses on the fundamental learning outcomes for study programmes in the field of biotechnology, which, however, are not to be considered as the specification of the detailed content of the study programme or subjects. Developers and executors of study programmes may modify the learning outcomes to adapt them to a specific study programme.

5. College studies should enable graduates to demonstrate:

5.1 Knowledge and understanding:
5.1.1 knowledge and understanding of the scientific basics of biotechnology;
5.1.2 understanding of the key concepts of biotechnology and their content;
5.1.3 basic knowledge of biotechnology (molecular biology, genetic engineering and bioinformatics);
5.1.4 awareness of the wider multidisciplinary context of technology.

5.2 Technological analysis:
5.2.1 ability to apply their knowledge and understanding in solving biotechnological problems by using familiar methods;
5.2.2 ability to apply their knowledge and understanding in the analysis of bioprocesses and the choice of methods and biotechnological equipment;
5.2.3 ability to apply analytical and modelling methods in field of biotechnology.

5.3 Technology design:
5.3.1 ability to apply biotechnological knowledge and understanding in the formulation and fulfilment of tasks in accordance with defined requirements;

5.3.2 understanding of technology design methodologies and ability to apply them.

5.4 Investigations:
5.4.1 ability to find appropriate professional information in databases and other information sources;
5.4.2 ability to conduct necessary experiments, interpret data and draw conclusions;
5.4.3 skills in operating biotechnological equipment.

5.5 Technological activities:
5.5.1 ability to apply appropriate biotechnological equipment, means and techniques;
5.5.2 ability to combine theoretical and applied knowledge in solving biotechnological problems;
5.5.3 understanding of ethical, environmental and commercial implications of technological activities;
5.5.4 understanding of the organisational principles of biotechnological activities and awareness of the basic requirements for safety at work.

5.6 Personal abilities:
5.6.1 ability to function effectively as individual and as a member of a team;
5.6.2 ability to communicate with the engineering and technology community and society at large;
5.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics, bioethics and of technological and engineering activities and awareness of responsibility for technological activities;
5.6.4 knowledge of the principle project management and business aspects at technological level;
5.6.5 recognition of the importance of and preparedness for independent life-long learning.

6. First cycle university studies should enable graduates to demonstrate:

6.1 Knowledge and understanding:
6.1.1 knowledge and understanding of the basics of biotechnology;
6.1.2 awareness and systemic understanding of the key theoretical and applied basics and concepts of biotechnology;
6.1.3 coherently linked basic knowledge of biotechnology (molecular biology, genetic engineering and bioinformatics);
6.1.4 awareness of the wider multidisciplinary context of technology and ability to apply methods and processes of other technologies.

6.2 Technological analysis:
6.2.1 ability to apply their knowledge and understanding in formulating and solving biotechnological problems by using appropriate methods;
6.2.2 ability to apply their knowledge and understanding in the analysis of bioprocesses and the choice of methods and biotechnological equipment;
6.2.3 ability to select and apply appropriate analytical and modelling methods in biotechnology.

6.3 Technology design:
6.3.1 ability to apply biotechnological knowledge and understanding in project development and implementation in line with defined requirements;
6.3.2 understanding of technology design methodologies and ability to apply them.

6.4 Investigations:
6.4.1 ability to find appropriate professional and scientific information in databases and other information sources;

6.4.2 ability to plan and conduct necessary experiments, interpret data and draw conclusions;
6.4.3 skills in operating biotechnological equipment.

6.5 Technological activities:
6.5.1 ability to select and apply appropriate equipment, means and techniques;
6.5.2 ability to combine theoretical and applied knowledge in solving biotechnological problems;
6.5.3 understanding of ethical, environmental and commercial implications of technological activities;
6.5.4 understanding of the organisational principles of biotechnological activities, the importance of safety at work and key requirements and the interaction between individual links of a technological process.

6.6 Personal abilities:
6.6.1 ability to function effectively as an individual and as a member of a team;
6.6.2 ability to communicate with the engineering and technology community and society at large;
6.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
6.6.4 knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the links between technological solutions and their economic outcomes;
6.6.5 recognition of the importance of and preparedness for independent life-long learning.

7. Second cycle studies should enable graduates to demonstrate:

7.1 Knowledge and understanding:
7.1.1 good understanding of the principles of biotechnology;
7.1.2 awareness and appreciation of the forefront of biotechnology.

7.2 Technological analysis:
7.2.1 ability to solve atypical, incompletely defined and specified problems;
7.2.2 ability to formulate and solve problems arising in new and emerging thematic areas in the field of biotechnology;
7.2.3 ability to use their knowledge and understanding for the conceptualisation of models, systems and processes, apply different methods, including mathematical analysis, computational modelling or experiments;
7.2.4 understanding of the importance of social, health and safety, bioethical, environmental and commercial requirements;
7.2.5 ability to use innovative approaches in solving biotechnological problems and the implementation of solutions.

7.3 Biotechnology design:
7.3.1 ability to apply biotechnological knowledge acquired and understanding in solving of atypical problems, also including those related to other scientific and technological fields;
7.3.2 ability to use innovativeness in developing new and original ideas and approaches;
7.3.3 ability to make technological decisions in the case of multidimensional, technically undefined and precisely indescribable problems.

7.4 Investigations:
7.4.1 ability to identify, locate and obtain required data;
7.4.2 ability to plan and conduct analytical, simulation and experimental research;

7.4.3 ability to critically evaluate data and draw conclusions.

7.5 Technological activities:
7.5.1 ability to integrate knowledge in different fields and tackle multidimensional biotechnological problems;
7.5.2 good understanding of the methods and methodologies to be applied in biotechnology and awareness of their limitations;
7.5.3 knowledge of ethical, environmental and commercial requirements for technological and engineering activities.

7.6 Personal abilities:
7.6.1 excellent understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and technological and engineering activities and awareness of responsibility for technological activities;
7.6.2 excellent knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the interrelation between technological solutions and their economic outcomes;
7.6.3 ability to function effectively as an individual and as a member of a team and the ability to lead the team, which may consist of representatives of different fields and levels of study;
7.6.4 ability to function and communicate effectively in national and international context.

CHAPTER III
TEACHING, LEARNING AND ASSESSMENT AND REQUIREMENTS FOR THE IMPLEMENTATION OF STUDY PROGRAMMES

8. Requirements for teaching, learning, assessment and study programme implementation are the same as set out in the Descriptor of the study fields of Technology.

9. Special course units should be delivered by teachers with at least three years' scientific experience related to the subject taught. Some of the special course units are recommended to be taught by highly qualified biotechnology professionals with pedagogical experience.

CHAPTER VI
DESCRIPTION OF LEVELS OF ACHIEVED LEARNING OUTCOMES

10. The following levels of learning outcomes are distinguished: excellent, average and threshold.

11. The levels of learning outcomes of college studies are as follows:

11.1 Excellent level of achievements. In-depth understanding and relevant practical skills in biotechnology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the relevant biotechnological activity. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted biotechnological problems of uncertain development prospects. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise manner. New technological knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates can continue their academic careers. A graduate with professional experience becomes a good practitioner. Career prospects are associated with biotechnology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

11.2 Average level of achievements. Understanding and relevant practical skills in biotechnology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Usual actions in the preparation and management of technology are performed with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to biotechnology management, managerial responsibility and career development up to senior executive positions may be expected;

11.3 Threshold level of achievements. Basic understanding and practical skills in biotechnology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it, is able to pursue usual biotechnological activities, but might need assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in biotechnology where knowledge and understanding of materials and typical technologies is important, however, does not require application of new fundamental knowledge, e.g. in production control.

12. The levels of learning outcomes of the first cycle university studies are as follows:

12.1 Excellent level of achievements. In-depth understanding and relevant practical skills in biotechnology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the literature and biotechnological activity. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted problems of uncertain development prospects. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. It is desirable that at this level graduates continue their studies in the following study cycles. A graduate with professional experience becomes a good practitioner. Career prospects are associated with research, development of innovations, biotechnology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

12.2 Average level of achievements. Understanding and relevant practical skills in biotechnology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, biotechnology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

12.3 Threshold level of achievements. Basic understanding and practical skills in biotechnology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon

gaining relevant professional experience, he may become a good practitioner in biotechnology where knowledge and understanding of materials is essential, but does not require the regular application of fundamental knowledge.

13. The levels of learning outcomes of the second cycle university studies are as follows:

13.1 Excellent level of achievements. In-depth fundamental understanding and relevant practical skills in biotechnology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking, a thorough knowledge of the literature and biotechnological activity, planning and conducting of research. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted problems of uncertain development prospects. Calculations, explanations, interpretations and analyses requiring deeper knowledge are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates are recommended to seek a doctoral degree. A graduate with professional experience becomes a good practitioner able to demonstrate profound expert knowledge. Career prospects are associated with research, development of innovations, biotechnology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

13.2 Average level of achievements. Understanding and relevant practical skills in biotechnology are good, but are likely to be limited to information provided in the process of learning. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, biotechnology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

13.3 Threshold level of achievements. Basic understanding and practical skills in biotechnology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for higher technical or general management positions. Upon gaining relevant professional experience, he may become a good practitioner in biotechnology.

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Annex 6
to the Descriptor of the study fields
of Technology

DESCRIPTOR OF THE STUDY FIELD OF BUILDING TECHNOLOGY

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the study field of Building Technology (hereinafter referred to as the "Descriptor") regulates special requirements for study programmes in the field of building technology.

2. Building technology falls within the area of technological sciences. Building technology includes such branches as building technology, building materials and product technology, building management, maintenance of buildings, quality control of buildings, preservation of buildings and reconstruction of buildings.

CHAPTER II
CONCEPT AND SCOPE OF THE STUDY FIELD

3. Graduates of the study programmes in building technology are awarded by the higher education institution the qualification of higher education allowing them to engage in the activities of a building technologist or an equivalent practice in the construction sector.

4. Graduates in building technology can choose to be construction product production technologists, experts in technological processes of building materials production, managers of construction products manufacturing companies or employees responsible for product quality control, to engage in research and educational work at a research and education institution or administrative functions at public institutions within the limits of their professional competence or build up and develop their own construction business. Graduates with professional experience holding a professional qualification diploma may apply for such jobs as construction managers, special works supervisors, general works supervisors, construction maintenance supervisors or technological, organisational and economic project managers.

5. The procedure for issuing professional qualification diplomas in the field of building technology is governed by the Law of the Republic of Lithuania on Construction and technical construction regulations, which establish the procedure for certification and recognition of entitlement for construction managers, special works supervisors, general works supervisors, construction maintenance supervisors, technological, organisational and economic project managers and other certified construction professionals.

6. The main standard areas and objectives of professional activities in the field of building technology are as follows:

6.1 Planning, designing, organisation and handling of major technological processes of construction and construction products production and involvement in activities that are diversified in terms of objectives and their content;

6.2 Proper economic justification of the building construction or the production of a construction product;

6.3 Safe construction, reconstruction or preservation of buildings, manufacturing of construction products, use of possible construction methods taking account of the construction environment, limiting conditions, aesthetical and architectural aspects, economic factors and planned conditions of operation;

6.4 Implementation of a building project from the start to the end of construction, supervision of construction works, preparation of the technological implementation project for construction works and supervision of specific construction works;

6.5 Application of the legislation of the Republic of Lithuania, European Union law and international construction regulations to the construction of buildings and structures and carrying out quality control of construction;

6.6 Supervision of construction maintenance of a specific building;

6.7 Tackling technological problems of the construction process in a creative, original and efficient manner.

7. By awarding a graduate a professional bachelor or bachelor and/or master degree in building technology, the higher education institution must guarantee that the graduate has acquired relevant knowledge and achieved the level of competence entitling him to work in the construction sector. Building technology studies are designed to prepare students for individual life-long learning enabling them to go beyond the modern technologies and accept future challenges.

CHAPTER III
SPECIAL AND GENERAL LEARNING OUTCOMES

8. This chapter focuses on the fundamental learning outcomes for study programmes in the field of building technology, which, however, are not to be considered as the specification of the detailed content of the study programme or subjects. Developers and executors of study programmes may modify the learning outcomes to adapt them to a specific study programme.

9. College studies should enable graduates to demonstrate:

9.1 Knowledge and understanding:
9.1.1 knowledge and understanding of the basics of natural sciences and mathematics relevant to building technology;
9.1.2 understanding of the key systemic aspects and concepts of the chosen field of building technology;
9.1.3 coherently linked knowledge of building technology, including basic knowledge of building technology;
9.1.4 awareness of the wider multidisciplinary context of technology.

9.2 Technological analysis:
9.2.1 ability to apply their knowledge and understanding in defining, formulating and solving problems of building technology by using familiar methods;
9.2.2 ability to apply their knowledge and understanding in the analysis of products, processes and methods of building technology and the choice of technological equipment;
9.2.3 ability to apply analytical and modelling methods in the field of building technology.

9.3 Practical technology design:
9.3.1 ability to apply knowledge and understanding of building technology in project development and implementation in accordance with defined requirements;
9.3.2 understanding of building technology design methodologies and ability to apply them;
9.3.3 ability to design building technology and conduct relevant practical investigations;
9.3.4 knowledge of promising building technologies and the specific aspects of their application.

9.4 Professional investigations:
9.4.1 ability to find appropriate professional information in databases, literature and other information sources;
9.4.2 ability to conduct necessary experiments, interpret data and draw conclusions;
9.4.3 ability to work in workshops and laboratories.

9.5 Practice:
9.5.1 ability to select and apply appropriate equipment, means and techniques used in the field of building technology;
9.5.2 ability to combine theoretical and applied knowledge in solving the problems of building technology;
9.5.3 understanding of ethical, environmental, commercial and engineering implications of activities in the field of building technology;
9.5.4 understanding of the organisational principles of technological activities and awareness of the basic requirements for safety at work.

9.6 Personal abilities:
9.6.1 ability to function effectively as individual and as a member of a team;
9.6.2 ability to communicate, in various ways, with the engineering and technology professionals community, potential clients and users of building technology and society at large in relation to major issues;
9.6.3 ability to understand of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
9.6.4 knowledge of construction project management and business aspects, risk and change management and disadvantages;
9.6.5 ability to prepare estimate documentation, organise administrative operations of a construction organisation, establish a site, organise works at the site or liquidate it;
9.6.6 ability to formulate rational and cost and time effective solutions to problems based on building technology methods;
9.6.7 recognition of the importance of and preparedness for independent life-long learning;
9.6.8 ability to deal with different problems in applied areas taking into account building technology, economic, social and legal contexts and to present, either in writing or orally, ideas and solutions proposed.

10. First cycle university studies should enable graduates to demonstrate:

10.1 Knowledge and understanding:
10.1.1 knowledge and understanding of the basics of natural sciences and mathematics relevant to building technology and their reasons;
10.1.2 understanding of the key systemic aspects and concepts of the chosen field of building technology;
10.1.3 coherently linked knowledge of building technology, including basic knowledge of building technology;

10.1.4 awareness of the wider multidisciplinary context of technology and the ability to adapt methods and processes of other (modern) technologies;
10.1.5 understanding of calculations used in building technology, the analysis of their results, special digital programmes and approaches.

10.2 Technological analysis:
10.2.1 ability to apply their knowledge and understanding in defining, formulating and solving problems of building technology by using familiar methods;
10.2.2 ability to apply their knowledge and understanding in the analysis of products, processes and methods of building technology and the choice of technological equipment;
10.2.3 ability to select and apply relevant analytical and modelling methods in the field of building technology.
10.2.4 ability to critically evaluate and interpret results in terms of their efficiency and analyse their reliability.

10.3 Technology design:
10.3.1 ability to apply knowledge and understanding of building technology in project development and implementation in accordance with defined requirements taking account of the aspects of sustainable development;
10.3.2 understanding of building technology design methodologies;
10.3.3 ability to design building technology and conduct relevant practical investigations;
10.3.4 knowledge of promising building technologies, the specific aspects of their application and related regulatory documentation.

10.4 Investigations:
10.4.1 ability to search for literature, find professional and scientific information in databases and other information sources in the wider context of technology;
10.4.2 ability to plan and conduct necessary experiments related to building technology, interpret data and draw conclusions;
10.4.3 ability to use laboratory equipment and devises for technological investigations.

10.5 Practice:
10.5.1 ability to select and apply appropriate equipment, means and techniques used in the field of building technology;
10.5.2 ability to combine theoretical and applied knowledge in solving problems of building technology;
10.5.3 ability to prepare construction project implementing documentation, arrange for construction works, their supervision and administration;
10.5.4 understanding of ethical, environmental and commercial implications of activities in the field of building technology;
10.5.5 understanding of the organisational principles of technological activities, the importance of safety at work and key requirements and the interaction between individual links of a technological process.

10.6 Personal abilities:
10.6.1 ability to function effectively as an individual and as a member of a team;
10.6.2 ability to communicate, in various ways, with the engineering and technology professionals community, potential clients and users of building technology and society at large in relation to major issues;
10.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;

10.6.4 knowledge of construction project management and business aspects, risk and change management and disadvantages;
10.6.5 ability to prepare estimate documentation, organise administrative operations of a construction organisation, establish a site, organise works at the site or liquidate it;
10.6.6 ability to formulate rational and cost and time effective solutions to problems based on building technology methods;
10.6.7 recognition of the importance of and preparedness for independent life-long learning;
10.6.8 ability to deal with different problems in applied areas taking into account building technology, economic, social and legal contexts and to present, either in writing or orally, ideas and solutions proposed.

11. Second cycle studies should enable graduates to demonstrate:

11.1 Knowledge and understanding:
11.1.1 good understanding of the principles of building technology;
11.1.2 deeper knowledge of building technology;
11.1.3 awareness of the forefront of building technology or any of branches of study.

11.2 Technological analysis:
11.2.1 ability to solve unfamiliar and incompletely defined problems;
11.2.2 ability to formulate and solve problems in their own specialisation and in emerging areas in the field of building technology;
11.2.3 ability to use their knowledge and understanding for the conceptualisation of models, systems and processes of building technology and to this end to apply different methods, including mathematical analysis, computational modelling or experiments;
11.2.4 ability to use innovative approaches in solving problems of building technology based on knowledge and methods applied in other fields of science;
11.2.5 ability to think and develop creatively new techniques and methods of solving problems in the field of building technology.

11.3 Technology design:
11.3.1 ability to apply knowledge acquired and understanding of building technology in solving of unfamiliar problems, also including those possibly related to other technological fields;
11.3.2 ability to develop new and original ideas and approaches;
11.3.3 ability to use their knowledge and understanding of building technology in handling complex, technically undefined and incomplete information;
11.3.4 knowledge of and the ability to understand the use of building technology methods for special needs and awareness of their limitations;
11.3.5 being informed of modern designing possibilities and practical application of advanced building technologies.

11.4 Investigations:
11.4.1 ability to identify, locate and obtain required data;
11.4.2 ability to plan and conduct analytical, simulation and experimental research in building technology;
11.4.3 ability to critically evaluate data and draw conclusions;
11.4.4 ability to explore the applicability of new building technologies.

11.5 Practice:
11.5.1 ability to integrate knowledge acquired in different areas and manage building technology systems;

11.5.2 understanding of the methods and methodologies to be applied and awareness of their limitations;
11.5.3 knowledge of ethical, environmental and commercial restrictions on pursued activities.

11.6 Personal abilities:
11.6.1 ability to function independently in their professional sphere;
11.6.2 availability of skills required for working in and leading a team, which may consist of representatives of various domains with different level of competence;
11.6.3 ability to function and communicate effectively in national and international context;
11.6.4 knowledge of risk and change management and the ability to manage construction projects and reduce their risks.

CHAPTER IV
TEACHING, LEARNING AND ASSESSMENT, REQUIREMENTS FOR THE IMPLEMENTATION OF STUDY PROGRAMMES AND THE DESCRIPTION OF LEVELS OF ACHIEVED LEARNING OUTCOMES

12. Requirements for teaching, learning, assessment and study programme implementation are the same as set out in the Descriptor of the study fields for Technology.

13. The following levels of learning outcomes are distinguished: excellent, average and threshold.

14. The levels of learning outcomes of college studies are as follows:

14.1 Excellent level of achievements. In-depth understanding and relevant practical skills in building technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of activities in the field of building technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted technological problems of uncertain development prospects. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise manner. New technological knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates can continue their academic careers. A graduate with professional experience becomes a good practitioner. Career prospects are associated with building technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

14.2 Average level of achievements. Understanding and relevant practical skills in building technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Usual actions in the preparation and management of building technology are performed with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to building technology management, managerial responsibility and career development up to senior executive positions may be expected;

14.3 Threshold level of achievements. Basic understanding and practical skills in building technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it, is able to pursue usual technological activities, but might need assistance and control. At this level a graduate will

be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in building technology where knowledge and understanding of materials and typical technologies is important, however, does not require application of new fundamental knowledge, e.g. in construction products production control.

15. The levels of learning outcomes of the first cycle university studies are as follows:

15.1 Excellent level of achievements. In-depth understanding and relevant practical skills in building technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the literature and activities in the field of building technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted problems of uncertain development prospects. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. It is desirable that at this level graduates continue their studies in the following study cycles. A graduate with professional experience becomes a good practitioner. Career prospects are associated with research, development of innovations, building technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

15.2 Average level of achievements. Understanding and relevant practical skills in building technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, building technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

15.3 Threshold level of achievements. Basic understanding and practical skills in building technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in building technology where knowledge and understanding of materials is essential, but does not require the application of new fundamental knowledge.

16. The levels of learning outcomes of the second cycle university studies are as follows:

16.1 Excellent level of achievements. In-depth fundamental understanding and relevant practical skills in building technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking, a thorough knowledge of the literature and activities in the field of building technology, planning and conducting of research. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted problems of uncertain development prospects. Calculations, explanations, interpretations and analyses requiring deeper knowledge are handled

in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates are recommended to seek a doctoral degree. A graduate with professional experience becomes a good practitioner able to demonstrate profound expert knowledge. Career prospects are associated with research, development of innovations, building technology management and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

16.2 Average level of achievements. Understanding and relevant practical skills in building technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, building technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

16.3 Threshold level of achievements. Basic understanding and practical skills in building technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for higher technical or general management positions. Upon gaining relevant professional experience, he may become a good practitioner in building technology.

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Annex 7
to the Descriptor of the study fields
of Technology

DESCRIPTOR OF THE STUDY FIELD OF FOOD TECHNOLOGY

CHAPTER I
GENERAL PROVISIONS

1. The Descriptor of the study field of Food Technology (hereinafter referred to as the "Descriptor") regulates special requirements for study programmes in the field of food technology.

2. Food technology means the exploitation of knowledge of natural, financial and human resources, food science and engineering for the development of food or food chain processes, including the selection of raw materials, processing, product manufacturing, distribution and provision to consumers.

3. Food technology is closely related to food science and engineering and relies on the knowledge of engineering, biology and physical sciences concerning the nature, composition, processing principles, improvement techniques and provision of food to consumers.

CHAPTER II
SPECIAL AND GENERAL LEARNING OUTCOMES

4. This chapter focuses on the fundamental learning outcomes for study programmes in the field of food technology, which, however, are not to be considered as the specification of the detailed content of the study programme or subjects. Developers and executors of study programmes may modify the learning outcomes to adapt them to a specific study programme.

5. College studies should enable graduates to demonstrate:

5.1 Knowledge and understanding:
5.1.1 knowledge and understanding of the key theoretical and applied basics and concepts of food technology and engineering;
5.1.2 availability of the fundamentals of natural sciences, mathematics and engineering relevant to the understanding of food technology;
5.1.3 awareness of and ability to link basic knowledge of food technology;
5.1.4 awareness of the context of food technology within the entire food chain.

5.2 Technological analysis:
5.2.1 ability to use knowledge of food science and technology in the activities related to food production, distribution and consumption and solve practical problems of food technology;
5.2.2 ability to use their knowledge and understanding in the analysis of physical, chemical and biochemical processes and methods of food technology and in the choice of raw materials and technological equipment;
5.2.3 ability to apply analytical and modelling methods in the field of food technology.

5.3 Technology design:
5.3.1 ability to apply knowledge and understanding of food science and technology in the formulation and fulfilment of tasks in accordance with defined requirements;
5.3.2 understanding of food technology design methodologies and ability to apply them.

5.4 Investigations:
5.4.1 ability to find appropriate professional information in databases and other information sources;
5.4.2 ability to conduct necessary experiments, interpret data and draw conclusions on the nutritional value, quality and safety of products;
5.4.3 skills in laboratory work required for the physical, chemical and microbiological analysis of food;
5.4.4 skills in operating equipment used in the field of food technology.

5.5 Practice/technological activities:
5.5.1 ability to select relevant raw materials, materials, equipment, means and techniques and apply them in the field of food technology;
5.5.2 ability to ensure and improve food safety and quality;
5.5.3 ability to engage in food production and production management in compliance with the ethical, environmental and commercial principles;
5.5.4 understanding of the organisational principles of technological activities and awareness of the basic requirements for safety at work.

5.6 Personal abilities:
5.6.1 ability to function effectively as individual and as a member of a team;
5.6.2 ability to communicate with the engineering and technology community, nutritionists, food safety specialists and society at large;
5.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
5.6.4 knowledge of the principle project management and business aspects at technological level;
5.6.5 recognition of the importance of and preparedness for independent life-long learning.

6. First cycle university studies should enable graduates to demonstrate:

6.1 Knowledge and understanding:
6.1.1 coherently linked basic knowledge of natural sciences, mathematics and engineering necessary for understanding food technology;
6.1.2 awareness and systemic understanding of the key theoretical and applied basics and concepts of food technology;
6.1.3 coherently linked basic knowledge in the field of food technology;
6.1.4 awareness of the context of food technology within the entire food chain and the ability to adapt methods and processes of other technologies.

6.2 Technological analysis:
6.2.1 ability to use their knowledge of food science and technology in the activities related to food production, distribution and consumption, also to recognise, formulate and solve practical problems of food technology;
6.2.2 ability to use their knowledge and understanding in the analysis of physical, chemical and biochemical processes and methods of food technology and in the choice of raw materials and technological equipment;
6.2.3 ability to select and apply appropriate analytical and modelling methods in the development and implementation of food technologies and products.

6.3 Technology design:

6.3.1 ability to use knowledge and understanding of food science and technology in the development and implementation of projects that answer consumer needs and expectations, latest recommendations of food science and requirements of the legislation on food;
6.3.2 understanding of food technology design methodologies and ability to apply them.

6.4 Investigations:
6.4.1 ability to find appropriate professional and scientific information in databases and other information sources;
6.4.2 ability to plan and conduct necessary experiments, use mathematical knowledge in the processing of data and draw conclusions on the nutritional value, quality and safety of food;
6.4.3 skills in laboratory work required for the physical, chemical and microbiological analysis of food and for the selection of methodologies and of an instrumental analysis technique;
6.4.4 skills in operating equipment used in the field of food technology.

6.5 Practice/technological activities:
6.5.1 ability to select relevant raw materials, materials, equipment, means and techniques and apply them in the field of food technology;
6.5.2 ability to combine theoretical and applied knowledge in food production and production management, ensuring food safety and quality and solving technological problems;
6.5.3 understanding of ethical, environmental and commercial implications of technological activities;
6.5.4 understanding of the organisational principles of technological activities, the importance of safety at work and key requirements and the interaction between individual links in the food chain from raw material to consumer.

6.6 Personal abilities:
6.6.1 ability to function effectively as an individual and as a member of a team;
6.6.2 ability to communicate with the engineering and technology community, nutritionists, food safety specialists and society at large;
6.6.3 understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and of technological and engineering activities and awareness of responsibility for technological activities;
6.6.4 knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the links between technological solutions and their economic outcomes;
6.6.5 recognition of the importance of and preparedness for independent life-long learning.

7. Second cycle studies should enable graduates to demonstrate:

7.1 Knowledge and understanding:
7.1.1 good understanding of the principles, achievements and ideas in the field of food technology;
7.1.2 critical understanding of the substance of food technology and responsible use of knowledge of food science in new situations;
7.1.3 in-depth knowledge of food science and technology and the ability to use for food processing, quality, safety and research purposes.

7.2 Technological analysis:
7.2.1 ability to solve atypical, incompletely defined and specified problems in the entire food chain;
7.2.2 ability to formulate and solve problems arising in new thematic areas in the field of food technology;

7.2.3 ability to use their knowledge and understanding for the conceptualisation of models and safety and quality management systems of food technology and to this end apply different methods, including mathematical analysis, computational modelling or (practical) experiments;
7.2.4 understanding of the importance of social, health and safety, environmental and commercial requirements;
7.2.5 ability to use innovative approaches and measures in solving problems of food safety, quality and impact on human health and in the implementation of solutions.

7.3 Technology design:
7.3.1 ability to apply knowledge acquired and understanding of food science and technology in solving of unfamiliar problems in the entire food chain from raw material to consumer;
7.3.2 ability to use innovativeness in developing new and original ideas and approaches concerning foods and food technology;
7.3.3 ability to use knowledge acquired and understanding of food science and technology in handling complex, technically undefined and incomplete information.

7.4 Investigations:
7.4.1 ability to formulate independently problems of food technology development, improvement, research and control and to solve them in practice;
7.4.2 ability to plan and conduct analytical, simulation and experimental food research including the analysis and interpretation of results and synthesis of information;
7.4.3 ability to critically evaluate research data and draw conclusions on biological, chemical and other risk factors affecting food quality and the procedures for their elimination;
7.4.4 ability to explore the applicability of new food technologies and evaluate their consistency with consumer needs, latest recommendations of food science and legislation.

7.5 Practice/technological activities:
7.5.1 ability to integrate knowledge acquired in different areas and fields within the food chain from raw material to end consumption;
7.5.2 good understanding of the methods and methodologies to be applied for food processing, quality, safety and research purposes and awareness of how to eliminate their disadvantages;
7.5.3 knowledge of ethical, environmental, food safety, nutritional and commercial requirements for technological and engineering activities.

7.6 Personal abilities:
7.6.1 excellent understanding of the effects of technological and engineering solutions on the public and environment, compliance with the rules of professional ethics and technological and engineering activities and awareness of responsibility for technological activities;
7.6.2 excellent knowledge of the principle project management and business aspects (risk and change management, production scale effect, etc.) and understanding of the interrelation between technological solutions and their economic outcomes;
7.6.3 recognition of the importance of and preparedness for independent life-long learning.
7.6.4 ability to function effectively as an individual and as a member of a team and the ability to lead the team, which may consist of representatives of different fields and levels of study;
7.6.5 ability to function and communicate effectively in national and international context.

CHAPTER III
TEACHING, LEARNING AND ASSESSMENT, REQUIREMENTS FOR THE IMPLEMENTATION OF STUDY PROGRAMMES AND THE DESCRIPTION OF LEVELS OF ACHIEVED LEARNING OUTCOMES

8. Requirements for teaching, learning, assessment and study programme implementation are the same as set out in the Descriptor of the study fields of Technology.

9. The following levels of learning outcomes are distinguished: excellent, average and threshold.

10. The levels of learning outcomes of college studies are as follows:

10.1 Excellent level of achievements. In-depth understanding and relevant practical skills in food technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of activities in the field of food technology. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted technological problems of uncertain development prospects. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise manner. New technological knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates can continue their academic careers. A graduate with professional experience becomes a good practitioner. Career prospects are associated with the management of food technology and engineering solutions and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

10.2 Average level of achievements. Understanding and relevant practical skills in food technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Usual actions in the preparation and management of food technology are performed with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to food technology management, managerial responsibility and career development up to senior executive positions may be expected;

10.3 Threshold level of achievements. Basic understanding and practical skills in food technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it, is able to pursue usual technological activities, but might need assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in food technology where knowledge and understanding of materials and typical technologies is important, however, does not require application of new fundamental knowledge, e.g. in production control.

11. The levels of learning outcomes of the first cycle university studies are as follows:

11.1 Excellent level of achievements. In-depth understanding and relevant practical skills in food technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking and a thorough knowledge of the literature and relevant technological activity. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted problems of uncertain development. Common calculations, explanations, interpretations and analyses are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. It is desirable that at this level graduates continue their studies in the following study cycles. A graduate with professional experience becomes a good practitioner. Career prospects are associated with research, development of innovations, management of food

technology and engineering solutions and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

11.2 Average level of achievements. Understanding and relevant practical skills in food technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, food technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

11.3 Threshold level of achievements. Basic understanding and practical skills in food technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for technical or general management/assistant's positions. Upon gaining relevant professional experience, he may become a good practitioner in food technology where knowledge and understanding of materials is essential, but does not require the application of new fundamental knowledge.

12. The levels of learning outcomes of the second cycle university studies are as follows:

12.1 Excellent level of achievements. In-depth fundamental understanding and relevant practical skills in food technology that are greater than information provided in the process of learning. The analysis and scrutiny of performance reveal original thinking, a thorough knowledge of the literature and activities in the field of food technology, planning and conducting of research. Knowledge and practical skills are readily adaptable to a new situation requiring solutions for any unpredicted problems of uncertain development. Calculations, explanations, interpretations and analyses requiring deeper knowledge are handled in a rapid, smooth and precise way. A problem and its solution are approached in a critical manner. New knowledge is acquired fast and with certainty. Excellent general competences and developed ability to manage the schedule. At this level graduates are recommended to seek a doctoral degree. A graduate with professional experience becomes a good practitioner able to demonstrate profound expert knowledge. Career prospects are associated with research, development of innovations, management of food technology and engineering solutions and significant level of managerial responsibility. Rapid career development up to the senior executive positions may be reasonably expected;

12.2 Average level of achievements. Understanding and relevant practical skills in food technology are good, but are likely to be limited to information provided in the process of learning. Assistance may be needed in early career. A graduate understands which knowledge and skills may be adapted to a new activity situation, is able to quickly choose methods of problem solving and easily acquires new knowledge. Common calculations, explanations, interpretations and analyses are handled with precision. Good general skills and developed ability to manage the schedule. A graduate with professional experience becomes a good practitioner. Career prospects relate to research, development of innovations, food technology management, significant level of managerial responsibility and career development up to senior executive positions may be expected;

12.3 Threshold level of achievements. Basic understanding and practical skills in food technology. A graduate understands which general knowledge may be employed in a new activity situation, but might lack confidence and awareness of how to use it. Common calculations, explanations, interpretations and analyses may be made, but this might require assistance and control. At this level a graduate will be relevant for higher technical or general management positions. Upon gaining relevant professional experience, he may become a good practitioner in food technology.