OCCUPATIONAL QUALIFICATION STANDARD

Diploma Biomedical Engineer, EstQF Level 7

An occupational standard is a document which describes the set of skills, knowledge and attitudes, i.e. competence requirements, needed to successfully accomplish duties. Occupational standards are used for compiling curricula and awarding qualifications.

Occupational title	Level of Estonian Qualifications Framework (EstQF)
Diploma Biomedical Engineer, EstQF Level 7	7

Part A
DESCRIPTION OF WORK

A.1 Description of work
The goal of biomedical engineers is to maintain the medical devices necessary for studying biological systems, diagnostics and treatment and to develop them through engineering and medical physics applications. Action is taken to improve the health and quality of life of people in need. Biomedical engineering technologists are engineering and/or technology specialists or managers with relevant higher education who work in engineering fields associated with medicine and biology: health care institutions and the planning, manufacturing, repair, handling and sales businesses, training institutions, development teams of standards and legislation associated with medical technology, etc. The duties of a Diploma Biomedical Engineer, EstQF Level 7 are associated with operating high-tech equipment. The job requires an ability to cope in situations that are difficult and call for an innovative approach, the management of resources and taking responsibility for the actions of subordinates. Related standards: Diploma Biomedical Engineer, EstQF Level 7 initial occupational qualification Chartered Biomedical Engineer, EstQF Level 8.
A.2 Tasks
A.2.1 Operating medical devices and systems. A.2.2 Management. A.2.3 Commitment to the occupation. A.2.4 Communication and cooperation.
Elective areas of work
A.2.5 Developing and producing (manufacturing) medical devices and systems.
A.3 Work environment and specific nature of work
Work is performed both indoors and outdoors. The workload may be distributed unevenly. The work schedule may be flexible. When working in health care institutions, the requirements in force in clinical environments must be observed.
A.4 Tools
A biomedical engineering technologist uses contemporary technical equipment (diagnostic devices and measuring instruments), engineering software and information networks in their work.
A.5 Personal qualities required for work: abilities and characteristics
Traits required in order to be a successful biomedical engineering technologist: logical thinking characteristic of an engineer, visual memory, spatial imagination, ability to concentrate, mathematical capability (understanding quantitative relations), courage to make decisions, punctuality, ethical conduct, accountability and conscientiousness, readiness to communicate and cooperate, adaptability, quality culture and ability to perform under stress.

A.6 Professional preparation
The prerequisite for applying for the occupational qualification of Diploma Biomedical Engineer is generally a Master's course in biomedical technology and medical physics in the volume of 120 ECTS and at least two years of professional experience after obtaining the diploma. For the prerequisites for applying for the occupational qualification, see "Prerequisites for engineer's occupational qualification" in Annex 2. For the requirements for the continuing education of engineers, see Annex 3 ‘Accounting of continuing education of engineers’.
A.7 Most common occupational titles
Biomedical engineering technologist, service engineer, quality engineer, medical physicist, etc.

Part B
COMPETENCY REQUIREMENTS

B.1 Structure of occupation
Certifying competences B.2.1-B.2.4 is required for obtaining the qualification of Diploma Biomedical Engineer, EstQF Level 7. The optional competence B.2.5 is a competence expanding the occupational qualification of Diploma Biomedical Engineer, EstQF Level 7 and its certification is voluntary.

B.2 Competences

MANDATORY COMPETENCES

B.2.1 Operating medical devices and systems	EstQF Level 7
Performance indicators: 1. Applies engineering and medical physics knowledge and practical skills to the continued operation of existing technology. 2. Installs, maintains and repairs medical devices and systems and monitors quality standards. 3. Advises users of medical devices and systems: offers after-sales support and instructs users. 4. Resolves engineering problems using generally accepted methods. 5. Uses general and special-purpose application software and apparatus.	
Knowledge: 1) general science (mathematics, physics, physiology and anatomy); 2) engineering (information technology, engineering graphics, electrical engineering and measuring technology); 3) concepts of biomedical technology, research methods, possible applications, theoretical trends and topical issues; 4) principles of the management of medical technology; 5) national and international performance, safety and environmental standards required for operation and quality control; 6) principles of medical informatics.	
B.2.2 Management	**EstQF Level 7**
Performance indicators: 1. Applies and develops managerial knowledge and implements appropriate management techniques. 2. Devises and carries out studies (experiments). 3. Plans and manages economic activities in their area of responsibility. 4. Acquires the necessary resources and keeps their use in balance. 5. Ensures that operations and objectives are in compliance with legislation. 6. Gathers information on an ongoing basis, gives feedback and adjusts and analyses activities as necessary. 7. Takes into account the abilities and development needs of employees. 8. Utilises appropriate information and communication technology tools and options.	
Knowledge: 1) principles of management and organisational behaviour;	

2) fundamentals of andragogy and psychology; 3) fundamentals of quality and environmental management; 4) fundamentals of management in the field of biomedical technology.

B.2.3 Commitment to occupation	**EstQF Level 7**
Performance indicators: 1. Understands the nature of being an engineer and acts in the interests of society, other engineers and the environment. 2. Promotes the occupation and protects its interests. 3. Assumes responsibilities and obligations associated with the occupation. 4. Is guided by the engineer's professional ethics and code of conduct (see Annex 4). 5. Is responsible for operations associated with the working group's occupation. 6. Understands aspects of the occupation, identifies bottlenecks and makes proposals for innovative changes. 7. Maintains their qualifications and keeps up to date on technological developments. 8. Passes on professional skills and knowledge. 9. Promotes engineering culture and advances the occupational qualification system of engineers, including explaining the opportunities of applying for the occupational qualification.	
Knowledge: 1) institutions and cooperative networks associated with the occupation; 2) trends in medicine and the industry associated with the occupation; 3) standards and regulations associated with the occupation.	

B.2.4 Communication and cooperation	**EstQF Level 7**
Performance indicators: 1. Works in an interdisciplinary team and communicates with specialists involved in associated fields. 2. Uses proper spoken and written Estonian and expresses themselves clearly. 3. Among foreign languages, uses at least English at the B2 level (see Annex 5). 4. Participates actively in discussions and meetings. 5. Compiles technical texts, letters, reports, articles and presentations. 6. Creates a positive communication environment and acts in accordance with best practice in communication.	
Knowledge: 1) principles of communication psychology; 2) principles of public speaking; 3) presentation techniques.	

OPTIONAL COMPETENCES

The optional competence B.2.5 is a competence expanding the occupational qualification of Diploma Biomedical Engineer, EstQF Level 7 and its certification is voluntary.

B.2.5 Developing and producing (manufacturing) medical devices and systems	**EstQF Level 7**
Performance indicators: 1. Devises, engineers, constructs and tests devices or their components. 2. Puts together the technology for manufacturing a device and the product's technical documentation. 3. Arranges for evaluation of conformity and markets the devices.	
Knowledge: 1) principles of certification; 2) legislation associated with the manufacturing of medical devices; 3) product and safety standards.	

Part C
GENERAL INFORMATION AND ANNEXES

C.1 Information concerning compilation and certification of occupational qualification standard and reference to classification of occupations	
1. ID of occupational qualification standard in register of occupational qualifications	24-08052019-2.6.1/4k
2. Occupational qualification standard compiled by:	Jaanus Lass, AB Medical Teeninduse OÜ Kalle Kepler, Tartu Ülikool Tairi Täht, Sotsiaalministeerium Ivo Fridolin, Tallinna Tehnikaülikool Andrus Aavik, SA Tartu Ülikooli Kliinikum Kristjan Pilt, Eesti Biomeditsiinitehnika ja Meditsiinifüüsika Ühing
3. Occupational qualification standard approved by:	Engineering, Manufacturing and Processing
4. No. of decision of Sectoral Council	12
5. Date of decision of Sectoral Council	08.05.2019
6. Occupational qualification standard valid until	30.01.2020
7. Occupational qualification standard version no.	4
8. Reference to International Standard Classification of Occupations (ISCO 08)	2111 Physicists and Astronomers
9. Reference to European Qualifications Framework (EQF)	7
C.2 Occupational title in foreign language	
English:	Diploma Biomedical Engineer, EstQF Level 7
Russian:	Дипломированный инженер по биомедицинской технике
C.3 Annexes	
Lisa 1 Kutsetasemete kirjeldused ja profiilid	
Lisa 2 Inseneerikutsete taotlemise eeldused	
Lisa 3 Inseneri täiendusõppe arvestus	
Lisa 4 Engineer's Professional Ethics and Code Of Conduct	
Lisa 5 Language skills level descriptions	