CENTRE FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

EVALUATION REPORT

STUDY FIELD of MEDICAL TECHNOLOGY

at Kaunas University of Technology

Expert panel:

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Study Field Data

Title of the study programme	**Medical Physics***
State code	6213GX001
Type of studies	University studies
Cycle of studies	Second cycle
Mode of study and duration (in years)	Full-time (2 years)
Credit volume	120
Qualification degree and (or) professional qualification	Master of Health Sciences
Language of instruction	Lithuanian and English
Minimum education required	Bachelor's or equivalent
Registration date of the study programme	19/02/2003

** interdisciplinary study programme*

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I. INTRODUCTION

1.1. BACKGROUND OF THE EVALUATION PROCESS

The evaluation of study fields is based on the Methodology of External Evaluation of Study Fields approved by the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC) 31 December 2019 Order No. V-149.

The evaluation is intended to help higher education institutions to constantly improve their study process and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: *1) self-evaluation and self-evaluation report prepared by Higher Education Institution (hereafter – HEI); 2) site visit of the expert panel to the higher education institution; 3) production of the external evaluation report (EER) by the expert panel and its publication; 4) follow-up activities.*

On the basis of this external evaluation report of the study field SKVC takes a decision to accredit study field either for 7 years or for 3 years. If the field evaluation is negative then the study field is not accredited.

The study field and cycle are **accredited for 7 years** if all evaluation areas are evaluated as exceptional (5 points), very good (4 points) or good (3 points).

The study field and cycle are **accredited for 3 years** if one of the evaluation areas was evaluated as satisfactory (2 points).

The study field and cycle are **not accredited** if at least one of evaluation areas was evaluated as unsatisfactory (1 point).

1.2. EXPERT PANEL

The expert panel was assigned according to the Experts Selection Procedure (hereinafter referred to as the Procedure) as approved by the Director of Centre for Quality Assessment in Higher Education on 31 December 2019 Order No. V-149. The site visit to the HEI was conducted by the panel on *6 December, 2021.* Due to the coronavirus pandemic, the site visit was conducted online using video conferencing tools (Zoom).

Prof. Dr. Dalia Giedrimienė (panel chairperson), *Professor of Biology and Pharmaceutical Sciences, School of Arts, Sciences, Business and Education, University of Saint Joseph (West Hartford), USA;*
Prof. Dr. Janis Spigulis, *Professor of Laser Physics and Spectroscopy, Faculty of Physics, Mathematics and Optometry, and the Head of Biophotonics Laboratory of the Institute of Atomic Physics and Spectroscopy, University of Latvia, Latvia;*
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Dr. George Kolostoumpis, *Researcher at "Stelar Security Technology Law Research UG", Hamburg, Germany;*
Ms. Giedrė Kvedaravičienė, *Innovation Development Manager at the Center for Innovative Medicine and a Co-Founder of "Biostartas" LTD, Lithuania;*
Ms. Eivilė Šopagaitė, *3rd year student of General Practice Nursing at Klaipėda State University of Applied Sciences, Lithuania.*

1.3. GENERAL INFORMATION

The documentation submitted by the HEI follows the outline recommended by SKVC. Along with the self-evaluation report and annexes, the following additional documents have been provided by the HEI before the site visit:

No.	Name of the document
1.	Medical Physics study programme course syllabi
2.	Examples of students' opinion surveys and their results 2017-2021

1.4. BACKGROUND OF THE STUDY FIELD/STUDY FIELD POSITION/STATUS AND SIGNIFICANCE IN THE HEI

Within the Medical Technology field studies Kaunas University of Technology (hereinafter – KTU, the University) runs one study programme – Medical Physics. The Medical Physics programme is managed by the Department of Physics of the Faculty of Mathematics and Natural Sciences and is being implemented already since 2003.

It is worth noting that there are only two university second-cycle programmes in Lithuania in the Medical Technology field. Medical physicists are trained at KTU only, which offers some benefit for KTU graduates who have obtained bachelor's degree in physics, chemistry, technology sciences or engineering and they can continue their studies at Master's level.

The graduates of Medical Physics programme are trained to work as medical physicists in health care institutions or as radiation protection specialists (in medical institutions or state-owned enterprises) as their main competencies are related to the application of ionizing radiation for the diagnostic and treatment.

As the interdisciplinary study programme, Medical Physics combines the subjects of medical technology and physics and provides additional opportunity for graduates to continue their studies in Physics, Materials Engineering or other third-cycle studies in physical or technological sciences (in Lithuania or abroad).

II. GENERAL ASSESSMENT

Medical Technology study field and *second cycle* at Kaunas University of Technology is given **positive** evaluation.

Study field and cycle assessment in points by evaluation areas

No.	Evaluation Area	Evaluation of an Area in points*
1.	Intended and achieved learning outcomes and curriculum	4
2.	Links between science (art) and studies	4
3.	Student admission and support	4
4.	Teaching and learning, student performance and graduate employment	4
5.	Teaching staff	4
6.	Learning facilities and resources	4
7.	Study quality management and public information	4
	Total:	**28**

*1 (unsatisfactory) - there are essential shortcomings that must be eliminated;
2 (satisfactory) - meets the established minimum requirements, needs improvement;
3 (good) - the field is being developed systematically, has distinctive features;
4 (very good) - the field is evaluated very well in the national and international context, without any deficiencies;
5 (excellent) - the field is exceptionally good in the national and international context/environment.

III. STUDY FIELD ANALYSIS

3.1. INTENDED AND ACHIEVED LEARNING OUTCOMES AND CURRICULUM

Study aims, outcomes and content shall be assessed in accordance with the following indicators:

3.1.1. Evaluation of the conformity of the aims and outcomes of the field and cycle study programmes to the needs of the society and/or the labour market

(1) Factual situation

The aims and learning outcomes of the second cycle study programme are expressed in five categories and are defined in terms of both the academic content and scientific and professional requirements for Master level studies in the Medical Technology study field. Graduates of the Medical Physics study programme are prepared to work as medical physicists in health care institutions or as radiation protection specialists (SER, p. 11-12). The aims and learning outcomes conform with the shortage of medical physicists who are essential members of teams of professionals in healthcare service, ensuring safe and effective use of radiation technology in the treatment and diagnosis of patients, contributing to the development of different radiation technologies and methods.

During the meeting with the alumni and social partners/employers, it was emphasised that graduates of the study programme acquire basic knowledge and a really good understanding about radiation, dosimetry, doses and other important skills medical physicists have gathered during the studies.

Moreover, the study programme complies with international requirements and is included in the list of international organisation of medical physics eligible programs (SER, p. 12), and is one of two IOMP-recognized programs in Europe (except UK) that are being taught in English language. Therefore, strong internationalisation is present, as well as a potential for growing the programme further.

(2) Expert judgement

The aims and learning outcomes are in line with the study field and cycle and the needs of Lithuania and the EU labour market.

3.1.2. Evaluation of the conformity of the field and cycle study programme aims and outcomes with the mission, objectives of activities and strategy of the HEI

(1) Factual situation

The aim of the Medical Physics programme is to provide graduates with knowledge and comprehensive understanding of medical technology, their role in medicine and application possibilities when solving public health issues, to develop critical thinking, argumentation skills, the ability to creatively and professionally assess problem situations and make adequate decisions based on deep knowledge and competencies in the field (SER, point 53). The aim is in line with the KTU mission to provide research-based studies at the international level, create and transfer interdisciplinary knowledge and innovative technologies, and create an open-minded and creative environment. Interdisciplinarity of the Medical Physics

programme is related to the combination of subjects from Medical Technology and Physics study fields, enabling graduates to continue their studies in a broad variety of third-cycle studies in physical and technological sciences.

(2) Expert judgement
The overall study field aim is perfectly in line with the vision and mission of Kaunas University of Technology.

3.1.3. Evaluation of the compliance of the field and cycle study programme with legal requirements

(1) Factual situation
The volume of the Medical Physics study programme is 120 credits, with the scope of the full-time studies that is 30 credits per semester (total 4 semesters). Credits to accomplish the learning outcomes of the study field amount to 72 credits, 18 credits related to research, 6 credits for elective courses from the list provided by the study programme plan. Preparation for final degree project and examination is 30 credits. Contact hours account for 44% and individual work for 56% of the total study time. 85% of academic staff have doctoral degrees and 33% are professors. All of these comply with the legal requirements for the field and second cycle of studies.

(2) Expert judgement
Second cycle study programme Medical Physics is in compliance with the legal requirements.

3.1.4. Evaluation of compatibility of aims, learning outcomes, teaching/learning and assessment methods of the field and cycle study programmes

(1) Factual situation
The aims and learning outcomes of the second cycle study programme are expressed in five category groups: Knowledge and its Application, Research skills, Subject-specific skills, Social skills and Personal skills. Each group of the competences contains from 4 to 7 learning outcomes, which seems a bit overcomplicated and it would benefit from shortening the list of learning outcomes from 4-7 to 2-3 per competence group.

There is a good mix of teaching and learning methods that are used to deliver the courses which are appropriate for achieving the desired learning outcomes such as lectures, practice, laboratory work and projects (applied and research oriented). Assessment is also based on a mixture of practical and laboratory works, presentations and examinations which is appropriate.

(2) Expert judgement
The teaching/learning and assessment methods are compatible with the aims and learning outcomes of the study programme. However, the learning outcomes should be more expressed in terms of what the students are able to do after graduation. We would like to suggest avoiding such formulations like: “have ability”, “have … knowledge”, “understand”, etc. Reviewing the list of learning outcomes per competence group with the intention to shorten and fine-tune the outcome definition is recommended.

3.1.5. Evaluation of the totality of the field and cycle study programme subjects/modules, which ensures consistent development of competences of students

(1) Factual situation
In the second cycle study programme Medical Physics, the research focus is introduced from the first semester, with the knowledge on the basics of research as well as the recent knowledge of the study field of Medical Technology. The study programme is research-oriented and from the first semester the research skills are developed applying some credits to the master thesis. The last semester is fully devoted to the Master thesis.

From the feedback gathered during the meeting with alumni and employers, it was noted that quality assurance topics were not fully addressed during the studies and could be included in the programme.

(2) Expert judgement
The focus on research and the combination with higher level topics in Medical Physics enable the student to develop abilities to analyse non-standard situations and pursue research and self-guided activities, which are required of a graduate of the field and second cycle studies.

3.1.6. Evaluation of opportunities for students to personalise the structure of field study programmes according to their personal learning objectives and intended learning outcomes

(1) Factual situation
Different possibilities for the students of the Medical Physics programme are provided to individualise their studies: students can choose one module from the optional modules list provided by the study programme plan, participate in various KTU research groups, study foreign language and choose the topic for the final research project. Erasmus mobility programs and summer internships are also provided as choices for individualising their studies. However, no credits in the study programme plan are assigned for free elective courses, therefore conditions for broader individualisation of the studies could be improved.

(2) Expert judgement
It seems that there are limited possibilities to individualize the study programme: choosing a different module than it is provided in the study plan is not possible, while other activities, such as more choices for summer internships, are not fully formalised.

3.1.7. Evaluation of compliance of final theses with the field and cycle requirements

(1) Factual situation
The preparation and defence of final degree projects are regulated by KTU Guidelines for the Preparation and Defence of Final Degree Projects and the Methodological Recommendations for the Preparation and Defence of Final Projects of the Faculty of Mathematics and Natural Sciences (SER, p. 18). Students can choose from the topics provided by the teaching staff, social partners and propose their own. University provides different training to increase the quality of final degree projects: about citation, use of information sources, bibliography, style of academic written works, etc.

(2) Expert judgement

According to the list of final degree projects (Annex 3 of SER), the topics presented are related to research-oriented thesis. The Final degree projects show a good combination of analysis, simulation and experimental work for research-oriented topics.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Study programme complies with international requirements and is one of two IOMP-recognized programs in Europe (except UK) that are being taught in English language; therefore, strong internationalisation is present, as well as the potential for growing the programme further.
2. As an interdisciplinary study programme, it provides graduates with very good knowledge and skills required to work as a medical physicist.

(2) Weaknesses:

1. List of learning outcomes is very long and seems outdated. While formulating learning outcomes it is recommended to lower the number of outcomes per group of competences, having 2 to 3 achievable/measurable LOs rather than ranging from 4 to 7. The phrasing of learning outcomes could be refined, to follow a study-field descriptor, for example "have ability" should be changed to "is able" and similar. A2 learning outcome is more suitable for C group (subject-specific skills).
2. Limited possibilities for personalization of the study programme: choosing a different module than it is provided in the study plan is not possible, while other activities, including summer internships, are not fully formalised.
3. Quality assurance topics could be added or more emphasised in the study programme.

3.2. LINKS BETWEEN SCIENCE (ART) AND STUDIES

Links between science (art) and study activities shall be assessed in accordance with the following indicators:

3.2.1. Evaluation of the sufficiency of the science (applied science, art) activities implemented by the HEI for the field of research (art) related to the field of study

(1) Factual situation

Health technologies and materials for medicine are among 5 long-term activity areas of science and innovation breakthrough approved by KTU Senate (SER, p. 23). 18 lecturers of the programme have declared their assignment to the field of physics (N002) and 7 - to the field of medicine (M001); their scientific contributions over 2018-2020 are presented in Table 2.1 of SER. 50% of the teaching staff working time (720 hours per year) has to be spent for research, as stated in the work contracts with KTU. KTU research group *Radiation and medical physics* (which is directly responsible for the integration of scientific knowledge into the Medical Physics study programme) and the *Institute of health sciences and telematics* are the main contributors to the research and development in the field of programme. Teachers of the study programme Medical Physics have carried out 4 international and 4 national research projects in 2017; 5 international and 4 national projects in 2018; 5 transnational and 8 national projects in 2019 and 6 transnational and 14 national projects in 2020 (Chapter 5 and Annex 4 of SER). In 2017-2020, study field teachers published 57 CA WoS articles with a

citation index, 22 of them in journals assigned to the Q1 quartile and 17 - to the Q2 quartile. Active research enables sharing the latest results and trends in the study field with students.

(2) Expert judgement
Strong links between the science and study activities are demonstrated.

3.2.2. Evaluation of the link between the content of studies and the latest developments in science, art and technology

(1) Factual situation
The contents of specific programme modules are updated every year to follow the rapid global development of medical equipment technologies and methods. Research-based topics related to the future professional activities of the graduates were prevailing in the final degree projects of 2017-2020 (Annex 3 of SER). Integration of the scientific knowledge into the study content is ensured not only thanks to high research competences of lecturers but also by cooperation with foreign and national scientific and business partners. International scientific seminars and interactive workshops were led by prominent experts of IOMP, EANM, ERS, WHO, ICRP; students also participated in annual seminars of the Medical Physicists Society on topical issues of radiation medicine.

(2) Expert judgement
The link between the content of studies and the latest developments in science and technology is strong.

3.2.3. Evaluation of conditions for students to get involved in scientific (applied science, art) activities consistent with their study cycle

Students participate in research in parallel with studies and work with the newest equipment; their results have been presented at the bi-annual international conference "Medical Physics in the Baltic States'' (organised by KTU) and other conferences. 57% of all study field students were participating in research activities in 2017; 33% - in 2018 and 71% - in 2019. Students participate in the activities of the research group "Radiation and Medical Physics", KTU Dosimetry and Medical Physics laboratories, as well as work with the newest radiotherapy equipment in Kaunas healthcare institutions. Since 2003, ~10% of the Medical Physics programme graduates have completed their doctoral studies; 8 graduates are PhD students now - 6 in Lithuania (Materials Engineering, Physics) and 2 abroad (Medical Physics in Germany and Italy). Unfortunately, there is no PhD study programme on Medical Physics in Lithuania.

(2) Expert judgement
The conditions for students to get involved in research activities on Medical Physics are favourable.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Teaching staff are active in research projects (spending 50% of their working time) and able to include their own research results in the content of taught courses. They

regularly participate at international conferences so being well-informed about the latest research trends in the study field.
2. Majority of the students are involved in research during their studies; results are reported at conferences, published in journals and included in their Master theses.

(2) Weaknesses:

1. Student's research activities on Medical Physics end-up with their Master theses, no continuation of such research towards the doctoral degree in Lithuania is possible as there are no PhD study programmes in the Medical Physics field.

3.3. STUDENT ADMISSION AND SUPPORT

Student admission and support shall be evaluated according to the following indicators:

3.3.1. Evaluation of the suitability and publicity of student selection and admission criteria and process

(1) Factual situation

Admission to the second cycle study programme in the field of medical technology is carried out by KTU in accordance with the rules for admission of students to KTU approved by the KTU Senate every year before December 1. The selection of prospective students is carried out at KTU, applications are submitted electronically in the KTU Master's Admission Information System (MPIS). Detailed information about the Medical Physics study programme and admission to the second cycle study programmes is published on the LAMA BPO website, AIKOS website, KTU website, MGMF website, and is published annually in the KTU information publication on master's studies. Information about studies is also provided at study fairs, student competitions, open days and other information events about studies.

(2) Expert judgement

Kaunas University of Technology applies high evaluation criteria when admitting students to the study programme Medical Physics. The information about the study programme and the admission process is sufficiently presented.

3.3.2. Evaluation of the procedure of recognition of foreign qualifications, partial studies and prior non-formal and informal learning and its application

(1) Factual situation

Learning outcomes that are achieved in other higher education institutions and in an informal way are credited according to a large number of procedure descriptions. The study modules of a student seeking to credit the results of previous formal learning are credited after assessing their compliance with the formal and subject requirements of the study programme. Learning outcomes are validated if they substantially correspond to the results provided in the study programme, are part of the intended module or compulsory module. Credits in elective modules are transferable without restrictions.

(2) Expert judgement

In order to confirm the learning outcomes, it is taken into account whether they substantially correspond to the results provided in the study programme, are part of the module to be studied or form part of the compulsory study module. Appropriate procedures for the

recognition of foreign qualifications, part-time studies and prior non-formal and informal learning are in place.

3.3.3. Evaluation of conditions for ensuring academic mobility of students.

(1) Factual situation

Students are given the opportunity to go on an international internship or part-time study abroad. Erasmus+ is available for part-time study in all EU countries and many other countries. Students can also go on a 1-2 semester exchange study or summer/winter program abroad under bilateral cooperation and student exchange agreements signed between KTU and university partners. Students have to pay for their own travel and subsistence, but they can apply for a KTU mobility scholarship. Information on mobility is disseminated through the "KTU DISCOVERed International Student Exchange", on the university website, in newsletters, during events, and there are monthly meetings with students who have already been on the exchange and those who are still planning to go on to disseminate information about mobility.

(2) Expert judgement

Kaunas University of Technology has a well-developed system for publicising mobility opportunities. Students have all the necessary mobility opportunities: they have the opportunity to win a mobility scholarship, they can go under different mobility programs, such as Erasmus+, and they can also go under NORDTEK, State Scholarships or other programs.

3.3.4. Assessment of the suitability, adequacy and effectiveness of the academic, financial, social, psychological and personal support provided to the students of the field

(1) Factual situation

KTU provides comprehensive academic support to students through the GUIDed mentoring program, also, students can communicate with faculty by email or meet through contact counselling. There are plenty of opportunities for financial support: scholarships, possible reduction in the price of the dormitory, benefits for tuition fees are provided. The University has provided opportunities for students to participate in non-formal education programs, play sports, actively spend their free time, and also provides students with special needs with study, infrastructure adaptation, financial, psychological and other assistance.

(2) Expert judgement

The University has well-tailored academic, psychological, financial and social support for students.

3.3.5 Evaluation of the sufficiency of study information and student counselling

(1) Factual situation

Admitted students are provided with a memo, communicated via email. One week before the start of studies, there is an "Introductory Week". Relevant information and documents for students and relevant study information are available on the KTU student intranet, in a newsletter sent periodically once a week by Office365, Academic Information System, Student

Information and Services Center, e-mails, faculty information screens, and information notices distributed by the faculty.

(2) Expert judgement
Students are provided with sufficient information about their studies in a variety of ways. Student counseling as well as academic and other support is ongoing.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. There are excellent conditions for using mobility applications.
2. Students from abroad are accepted into the study programme every year.
3. The University has well-tailored academic, psychological, financial and social support for students.

(2) Weaknesses:

1. Using established conditions for international mobility, more advertisement and wide-spread of available opportunities should be provided.
2. More students from European and other countries could be targeted by marketing and be admitted into the programme.

3.4. TEACHING AND LEARNING, STUDENT PERFORMANCE AND GRADUATE EMPLOYMENT

Studying, student performance and graduate employment shall be evaluated according to the following indicators:

3.4.1. Evaluation of the teaching and learning process that enables to take into account the needs of the students and enable them to achieve the intended learning outcomes

(1) Factual situation
As it is presented in SER (points 159 and 163), the teaching and learning process includes a variety of teaching methods including classroom work (lectures, practice works, laboratory works, consultation seminars, visits to enterprises, medical companies and medical institutions, etc.) and other individual work.

In response to student needs the classes are provided in the following forms of the academic timetable: day time studies (the classes are provided during the day, on working days), evening studies (the classes are provided in the evening, on working days), weekend studies (the classes are provided on weekends), remote (the theoretical classes are provided remotely, a part of practical works is performed at the University, the examinations are taken at the University, in exceptional cases – remotely) or a combined form of studies. It has been noticed that this form of module management has proved particularly useful during the pandemic.

To ensure a constant and involving work of students during the entire semester, the University applies the accumulative assessment system when the final evaluation of the

module consists of the marks of intermediate assessments and final assessment, multiplied by the weighted coefficients (components in percentage) and adding the multiplications.

(2) Expert judgement

The information presented in SER (point 161) and the response received from virtual site meetings with faculty and students proves that the process of study modules assessment and the evaluation system are well established. The learning process sufficiently takes into account the students' needs and enables students to achieve learning outcomes. However, the advancements in training equipment availability is an ongoing outstanding goal to be pursued by the programme's administration. As it was already mentioned under 3.1.5., the training regarding quality assurance should also be considered and more widely covered during the studies.

3.4.2. Evaluation of conditions ensuring access to study for socially vulnerable groups and students with special needs

(1) Factual situation

The implementation of the Equal Opportunities and Diversity Policy that creates an open environment for all its employees and students is in place. It is also noticed that the potential and contribution of socially vulnerable groups and students with special needs are recognized and valued as it is described in SER (point 174). The University organises its activities and ensures that every employee and student has a right to work and study in the environment that promotes respect for personal dignity.

(2) Expert judgement

Based on information obtained from SER and additional information received during the site visit (meeting with administration and students), it can be concluded that equal opportunities for studies and work to all the community members, including socially vulnerable groups and students with special needs, are provided by the programme.

3.4.3. Evaluation of the systematic nature of the monitoring of student study progress and feedback to students to promote self-assessment and subsequent planning of study progress

(1) Factual situation

SER (p. 45) shows that once per year, in September, the Department of Academic Affairs prepares an annual report of the monitoring of the students' learning outcomes (according to the faculties and the study cycles) and presents it to the Rector's office. The report includes the indicators of the progress of students and repeated examinations, the evaluation of the effectiveness of newly introduced measures for the quality of studies, the discussion about the reasons for termination and interruption of studies, the attendance indicators, the violations of academic ethics and other information relevant to the assessment of the systematic monitoring of the quality of studies and the progress of the students' studies. The students' achievements are evaluated after each semester applying the Regulations on the Assessment of Study Modules (SER point 182, p. 46). Additional requirements for attendance have been introduced in order to manage better the dropout of students.

(2) Expert judgement

It has been shown that the study evaluation system aims to provide feedback to students about the validity of their assessment and work done (SER, point 185). Information from site visit also confirms that there is a sufficient process in place for monitoring and providing the feedback to students. At the same time, it has been also noticed that more interactions and better communication would be useful to ensure dynamic exchange of ideas, needs and opportunities between the students, teachers, administration, alumni and the related industries.

3.4.4. Evaluation of employability of graduates and graduate career tracking in the study field

(1) Factual situation

KTU together with other Lithuanian higher education institutions is connected to the Career Management Information System (SER, p. 48). It helps to monitor the careers obtained by graduates after 6, 12 and 36 months after graduation. According to the information provided by this System and by Data and Career Monitoring Tool for Graduates of the Government Strategic Analysis Center (STRATA), the employability of graduates of Medical Physics study programme is high.

The meeting with administration, faculty, employers and students during site visit confirmed a need for medical physicists and multiple jobs available in health care.

It is important fact that 5 programme graduates, recently PhD students, are employed as medical physicists/radiation protection specialists.

(2) Expert judgement

Overall, the employability of graduates of medical technology field programme Medical Physics is high, and graduates work by profession or build their own businesses. The programme ensures a high level of employability of graduates and the graduates of the programme have their successful careers in health care field.

3.4.5. Evaluation of the implementation of policies to ensure academic integrity, tolerance and non-discrimination

(1) Factual situation

The University assures tolerance and non-discrimination by implementing the Equal Opportunities and Diversity Policy (SER, point 212). It insures the equal position of all employees, students and others who apply to the University regardless of their age, sexual orientation, disability, race, ethnic origin, nationality, religion, faith, language, social status or other factors regarding diversity. In case of discrimination or violation of equal opportunities the complaint should be submitted to the University's Equality Committee.

Based on SER (pp. 205-206), the University applies the Guidelines for the Organization and Performance of the Assessment of Study Modules. The main objective is the assurance of integrity, transparency and quality of the assessments performed at the University. For the assurance of academic integrity the students present their personal identity card for identification during the examinations. Most of the assessments are in writing and the examinations are supervised by invigilators.

The lecturers are constantly provided with training teaching them to formulate the tasks allowing assuring academic integrity. The monitoring of examinations at the University's level is performed by the assessment monitoring groups.

(2) Expert judgement
The programme has all necessary policies in place to ensure academic integrity, tolerance and non-discrimination.

3.4.6. Evaluation of the effectiveness of the application of procedures for the submission and examination of appeals and complaints regarding the study process within the field studies

(1) Factual situation
The University applies the Guidelines for the Submission and Processing of the Students' Appeals and Complaints. Based on information provided in SER, point 216, a complaint can be submitted regarding the alleged violation of the student's rights and legitimate interests caused by the actions or omissions of the University's employee, another student, department, commission or other body functioning at the University in the areas of the organisational processes of studies, following the procedures, following the provisions of the Code of Academic Ethics, etc. Appeal can be submitted individually or by a group of students. Before the submission of appeal, a student can consult with the Vice-Dean. If an Appeal or a complaint is related to the violation of academic ethics, the document is transferred to the Board of Academic Ethics.

(2) Expert judgement
The procedural process for appeals and complaints is effective and appropriate.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Various and flexible learning and student achievement assessment methods are applied.
2. Due to the relatively small number of the students in the programme, training is practically accomplished as an individual process.
3. A relatively large number of medical physics graduates continue with their doctoral studies.

(2) Weaknesses:

1. More interaction and communication would be useful to ensure a dynamic exchange of needs, ideas and opportunities between the students, teachers, administration, alumni, researchers, and related industries such as research centres and institutes.
2. The advancements in digital systems promote the communication and fulfilment processes. The improvement of training equipment and its availability should be an on-going outstanding goal of the programme's administrative staff.

3.5. TEACHING STAFF

Study field teaching staff shall be evaluated in accordance with the following indicators:

3.5.1. Evaluation of the adequacy of the number, qualification and competence (scientific, didactic, professional) of teaching staff within a field study programme(s) at the HEI in order to achieve the learning outcomes

(1) Factual situation
The programme is taught by 13 teachers, core of which is formed by 3 professors, 4 assistant professors and 2 lecturers; 10 teachers (including all core-teachers) hold the doctoral degree. Well-structured table with teachers' scientific and pedagogical activities is provided in Annex 5 of SER; Table 5.1 presents the changes in composition of the teaching staff. Age distribution of teachers is well-balanced (Table 5.2 of SER). Contribution of the main study field credits taught by professors amounted to 25% (18 ECTS/72 ECTS). 78% of teachers have practical experience in the activities related to the subject being taught. Teacher CVs (Annex 6 of SER) confirm high research activity. In 2017-2020, study field teachers published 57 CA WoS articles with a citation index, 22 of them in journals assigned to the Q1 quartile and 17 - to the Q2 quartile.

(2) Expert judgement
Teaching staff is highly qualified both pedagogically and scientifically, with well-balanced gender and age structure.

3.5.2. Evaluation of conditions for ensuring teaching staffs' academic mobility

(1) Factual situation
Mobility of teachers is supported by Erasmus+ academic exchange programme; 11 outgoing and 20 incoming visits took place over 2017-2019 (Table 5.3 of SER). The planned 2020 visits were cancelled due to the pandemic; instead, virtual seminars/trainings were attended (Annex 7). Lecturers may participate in Lithuanian Research Council calls for funding of research internships and use travel funds of research projects for mobility, including conference travels to present results of their research.

(2) Expert judgement
Generally, the mobility conditions of the teaching staff are good.

3.5.3. Evaluation of the conditions to improve the competences of the teaching staff

(1) Factual situation
KTU has approved Procedure for the Development of the Lecturers' Didactic Competences, in the framework of which development of such competences is ensured by the EDU_Lab Centre for Excellence in Learning and Teaching, operating for the last five years. The EDU_Lab organises training for construction of study programmes and conducts analyses of study programmes in cooperation with the members of the study programme committee and the lecturers. In 2017-2020, all lecturers of the study field participated in one or several trainings and seminars organised by EDU_Lab, as well as in Didactic competencies courses at Lithuanian University of Health Sciences (LSMU) and trainings organised by COST, CERN, NATO, LMT, the Office of the Ombudsman for Academic Ethics and Procedures of the Republic of Lithuania (2020) and SKVC trainings for preparation of study field descriptors (2019). The numbers of attended courses and trainings are summarised in Table 5.4 of SER. The research

competences are raised by participating at international conferences (Table 5.5 of SER) and by implementing research projects related to the study field (Table 5.6 of SER).

(2) Expert judgement
To conclude, the conditions to improve the competences of the teaching staff are good. More active use of long-term (several months) sabbaticals abroad could be recommended as teachers prefer only short-term (1-2 weeks) travels to conferences or for visiting their foreign collaboration partners.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. All core teachers of the programme have doctoral degrees and are active in research.
2. Gender and age structure of the teaching staff is well-balanced.
3. 4 out of 5 teachers have practical experience related to the subject being taught.
4. All teachers have attended courses and training to raise their didactic competences.

(2) Weaknesses:

1. Only short (1-2 weeks) foreign visits are preferred by teachers, longer term sabbatical leaves abroad could be beneficial.

3.6. LEARNING FACILITIES AND RESOURCES

Study field learning facilities and resources should be evaluated according to the following criteria:

3.6.1. Evaluation of the suitability and adequacy of the physical, informational and financial resources of the field studies to ensure an effective learning process

(1) Factual situation
According to the SER (p. 61), the Faculty of Mathematics and Natural Sciences has 13 auditoriums (510 workplaces), fully internet enabled (cable and wireless) internet connection, multimedia equipment, including smart boards in some of the auditoriums. The faculty has two computer classes where, according to the SER, computers are renewed every 5-6 years (42 workstations in total) and licensed Microsoft Office software, programming tools, mathematics software (MathCad, Matlab, Statistica) are installed.

SolidWorks, Autodesk Inventor, ANSYS, CATIA, LSDyna and other software packages are used for engineering calculations and design work. In case of special need, the university claims to provide access to other licensed programs. The Physics Laboratory Center has 18 laboratories, including the Radiometry and Dosimetry laboratory, as well as a specialized training laboratory of Medical Physics (12 computerized working places), equipped with a special computerized radiation therapy dose planning system PLUNC (Switzerland). If necessary, students use the services of the Chemistry Laboratory of the Department of Physics, Physics Technology Laboratory, two applied optics laboratories, newly established 3D Printing Technology Laboratory and Medical Electronics Laboratory (SER, p. 62). Various dosimetry equipment and phantoms can be used to learn quality control and dose

measurement in X-ray diagnostics, radiation therapy and brachytherapy and literature collections related to the Medical Physics study programme are available (SER, pp. 62-63).

The University computer network provides open access to the multiple foreign electronic databases.

(2) Expert judgement

The physical, informational and financial resources of the field studies are suitable and adequate to ensure an effective learning process. The University provides a wide range of teaching, learning, practical skills development and research facilities for students, enabling them to cover a wide range of research topics. Good coverage of information and communication technologies, both general ICT infrastructure and study specific software availability support the quality of study process, minimising the negative impact of Covid-19 and allowing international connectivity and cooperation, whenever for distant teaching or international research projects' fostering. Access to related natural sciences' laboratories allows the development of multidisciplinary skills and complementarity in practical application comprehension, which is as important as the technical skills development by the programme.

3.6.2. Evaluation of the planning and upgrading of resources needed to carry out the field studies

(1) Factual situation

According the information given in the SER (p. 64), the University is implementing several large infrastructure modernisation projects, such as:

• The "M-Lab" project aimed to establish the interdisciplinary prototyping laboratory centre at KTU for the research, technological and experimental development works (R&D).

• Creation of the multifunctional centre with integrated library and study areas following such criteria: integration of modern technologies; use of environmentally-friendly and/ or recycled materials; physical and emotional wellbeing inspiring interior is in the process.

• Modernisation of the University's infrastructure, including the Department of Physics' group work spaces, to better support the active process of the students' learning, including group works, and the studies based on innovative methods of studies (24 classrooms updated).

The management team of the Medical Physics programme has also stressed its continuous dedication for fundraising via collaborations with the stakeholders.

(2) Expert judgement

The University and the Department of Physics display strong commitment to continuous improvement of infrastructural and teaching resources. The projects under completion indicate a holistic perspective towards the study and research processes at the University and good prospects for sustaining and improving the resources and infrastructure needed for the programme of Medical Physics.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Students are able to use the most modern medical equipment located at LSMU hospital Kaunas clinics.
2. Equipment used in the study process (at premises of the Physics Department and of SANTAKA Valley) is constantly updated according to the needs of students and following the research trends.
3. Significant investment in equipment and working space renovation during the last three years.
4. KTU Open Access Center at Santaka Valley and connections with LSMU Kaunas Clinics hospital support different career pathways for students outside the academia in industry and/or clinical practice.

(2) Weaknesses:

1. Due to the lack of a PhD programme, the University's capacity is limited to develop a stronger scientific excellence base of Medical Physics at the University.

3.7. STUDY QUALITY MANAGEMENT AND PUBLIC INFORMATION

Study quality management and publicity shall be evaluated according to the following indicators:

3.7.1. Evaluation of the effectiveness of the internal quality assurance system of the studies

(1) Factual situation

Based on the information from SER (p. 66), the university has implemented a matrix system for internal study quality monitoring, involving different internal and external stakeholders. Senate performs the monitoring of changes in the organisation of studies, the management of the package of study programmes, the quality assurance, the system improvement and other functions stipulated by the Statute of the University. The Vice-Rector for Studies is responsible for the development of the vision and strategy of the quality of studies and the standard and system of quality. The University also has an advisory committee as the University's Study Quality Committee. This committee is responsible to submit the expert proposals (related to the development of the University's studies or the improvement of study programmes) to the University's governing bodies. The Department of Academic Affairs is responsible for the development and implementation of the quality guidelines and monitoring of the quality of studies and the assurance of the competitiveness of study programmes.

The role of the Field's Study Programme Committee (FSPC) of Physics, Materials and Medical Technology is highly important as it is responsible for the management of the study field Medical Technology and it also cooperates with social partners from the business area (industrials and employers) and representatives of students and lecturers. The implementation, improvement of the study programme and the quality assurance is coordinated by the head of FSPC and the administration of the Faculty of Mathematics and Natural Sciences.

(2) Expert judgement

Internal quality assurance system follows a complex structure which is intended to secure complex evaluation of the quality of the programme's material. The management of the

process looks well developed and coordinated. Given that the University has very active and supportive industrial stakeholders who have interests in the study programme, the advice would be to acknowledge their input and use it as an opportunity to develop tighter contacts with the industries where the alumni are concentrated.

3.7.2. Evaluation of the effectiveness of the involvement of stakeholders (students and other stakeholders) in internal quality assurance

(1) Factual situation

As stated in the SER (p. 67), the University values comments and suggestions provided by the external stakeholders (students, graduates, and employers) and sees them as an important input for improving the quality of studies. According to the SER, there are meetings, roundtable discussions organized with stakeholders annually to discuss the competencies of students, stakeholders' observations, employment opportunities for graduates, etc. External stakeholders are participating in the final thesis defence commissions by evaluating the content and quality of the performed investigations. They provide comments and suggestions from the point of view of possible employers.

(2) Expert judgement/indicator analysis

The overall involvement of stakeholders in internal quality assurance is good. However, some comments received from stakeholders during the interviews indicate that the University could benefit more from its interactions with stakeholders by collecting more specific, detailed feedback on the competencies to be developed by the programme. For example, lack of quality assurance training and importance to promote practical applicability of technological knowledge were mentioned.

3.7.3. Evaluation of the collection, use and publication of information on studies, their evaluation and improvement processes and outcomes

(1) Factual situation

Based on SER, points 321-313, the University website publishes information on study programmes regarding admission requirements for entrants, tuition fees, study results (and their links with learning outcomes and assessment methods), structure of study programmes, accreditation data, acquired qualifications and career opportunities, study subject (module) programmes, values of study programmes, guest lecturers, options for additional competencies. The website also contains the results of study surveys, the opinion of social stakeholders on the currently relevant competencies in the labour market for each study programme.

(2) Expert judgement/indicator analysis

University's website provides concise information and comparatively easy navigation for information on the programme and studies in general. However, the programme has almost no visibility in social media. The university should apply proactive social media communication, increase exposure to potential students and industrial stakeholders proactively communicating the programme, research projects, etc. on such channels as Facebook, Youtube, Linkedin. Lack of exposure limits the university's capacity to attract top quality international students and grow international prestige. Given the University's general

focus on developing close contacts with businesses, which is explicitly shown on their website, dedicated focus on providing facilities for startups development, etc., the University should utilise the opportunities by taking proactive role in communication and develop targeted communication strategy and plan, to be followed and implemented as part of the study quality management system and target students from developed countries in the EU and worldwide.

3.7.4. Evaluation of the opinion of the field students (collected in the ways and by the means chosen by the SKVC or the HEI) about the quality of the studies at the HEI

(1) Factual situation

As it is described in SER (p. 47) and discussed during site visit, the students are active members of the University community. They take responsibility for the assessment of study quality, so they are invited to provide comments and suggestions for improving the quality of studies during roundtable discussions organized in the Faculty of Mathematics and Natural Sciences and electronic surveys. Based on SER (p. 68), study surveys such as round table discussions, evaluation of study subjects (modules) and lecturers, evaluation of study programme quality, evaluation of compulsory practice, evaluation of alternatives (MA +), evaluation of final thesis project preparation and defense, "Students' Voice "and "Employee Satisfaction Survey" are used to obtain the feedback from students. The surveys respect the principles of volunteering and anonymity, transparency and efficiency. Every year, as a result of the research results, a plan of initiatives and action is prepared.

(2) Expert judgement/indicator analysis

The study programme uses multiple surveys for the students to assess their opinion and feedback. Study surveys such as round table discussions, evaluation of study subjects (modules) and lecturers, evaluation of study programme quality help to monitor the quality of the programme.

During the site visit, students expressed satisfaction with their studies, and assessed the administrative and teaching staff as very supportive and open.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. The Study Quality Management model is clear and uniform throughout the University.

(2) Weaknesses:

1. The programme's external communication and outreach is passive and limited to the information displayed on the university's website. Given the dynamics and competitiveness of the field of studies, the importance of active development of networks with potential top level students and industrial partners, proactive communication strategy through social media channels should be developed and implemented to foster quality international students attraction, better program's visibility among the stakeholders' groups and international prestige building.

IV. EXAMPLES OF EXCELLENCE

The uniqueness of the Medical Physics programme is based on its international dimension and interdisciplinary approach.

Teaching in English makes this programme attractive and accessible for the foreign students and for the students from other Lithuanian Universities.

Interdisciplinarity of the Medical Physics programme is related to the combination of subjects from medical technology and physics study fields, enabling graduates to continue their studies in a broad variety of third-cycle studies in physical and technological sciences.

V. RECOMMENDATIONS

Evaluation Area	Recommendations for the Evaluation Area (study cycle)
Intended and achieved learning outcomes and curriculum	While formulating learning outcomes it is recommended to lower the number of outcomes per group of competences, having 2 to 3 achievable/measurable LOs rather than from 4 to 7; the phrasing of learning outcomes could be refined, to follow a study-field descriptor, for example "have ability" should be changed to "is able" and similar. A2 learning outcome is more suitable for C group (subject-specific skills). The possibilities for personalization should be expanded by choosing a different module than it is provided in the study plan. The inclusion of training on quality assurance into the study programme for better preparation of students for actual work in the nuclear physics field in healthcare.
Links between science (art) and studies	To keep students' research activities after graduating the programme, further efforts aimed at establishing a PhD study programme on Medical Physics in Lithuania are recommended. This would offer the progressive growth for graduates of the Medical Physics programme.
Student admission and support	Using established conditions for international mobility, more advertisement and wide-spread of available opportunities should be provided. More students from European and other countries could be targeted by marketing and be admitted into the programme. Student counselling and career related advertisement should be strengthened.
Teaching and learning, student performance and graduate employment	It is recommended to increase the number of students who carry out the research at the institution of the potential employer, thus creating more possibilities to the students to demonstrate their knowledge and competences gained during the studies and get acquainted with the activities performed at the host institution.
Teaching staff	Longer than a few week visits abroad (including sabbatical leaves) of the teaching staff are recommended to become better informed on the recent trends and developments in medical physics.
Learning facilities and resources	Further update of software resources, virtualization of software, more application of simulation methods in the study process is recommended.

Study quality management and public information	Development of proactive communication strategy through social media channels to foster quality international students' attraction, better programme's visibility among the stakeholders' groups and international prestige building is recommended.

VI. SUMMARY

Intended and Achieved Learning Outcomes and Curriculum. The Medical Physics study programme is based on the aims and learning outcomes that are in line with the study field and the needs of Lithuania and the EU labour market. The graduates of the programme are prepared to work as medical physicists in health care institutions or as radiation protection specialists. The study programme complies with international requirements and is included into the list of international organisation of medical physics eligible programs and is one of two IOMP-recognized programs in Europe that are being taught in English language. As an interdisciplinary programme it combines the subjects from medical technology and physics study fields. The programme is research-oriented and from the first semester the research skills are developed applying some credits to the master thesis. Different possibilities for the students of the Medical Physics programme are provided to individualise their studies, including Erasmus mobility programs and summer internships.
More possibilities for personalization of the study programme, such as choosing a different module than it is provided in the study plan, are recommended.

Links between Science (Art) and Studies. The link between the content of studies and the latest developments in science and technology is strong. Students participate in research in parallel with studies and work with the newest equipment; their research results have been presented at the international conferences, published in journals and included in their Master theses. The conditions for students to get involved in research activities are favourable.
The teaching staff is active in research projects (spending 50% of their working time) and able to include their own research results in the content of taught courses. They regularly participate at international conferences.
Students' research activities end-up with their Master theses, but there is no continuation of such research towards the doctoral degree as there are no PhD study programmes in the Medical Physics field in Lithuania.

Student Admission and Support. KTU applies high evaluation criteria when admitting students. The information about the study programme and the admission process is sufficiently presented and supported. In general, the programme has excellent conditions for using mobility applications. Students from abroad are accepted into the study programme every year. However, it is suggested that using established conditions there is a need for more advertisement internationally. More students from European and other countries could be targeted by marketing and admitted into the programme.
The University has well-tailored academic, psychological, financial and social support for students, but student counselling and career related advertisement should be strengthened.

Teaching and Learning, Student Performance and Graduate Employment. Various and flexible learning and student achievement assessment methods are applied. Due to the relatively small number of the students in the programme, training is practically accomplished as an individual process. There is a sufficient process in place for monitoring students' study progress and giving them the appropriate feedback. However, more interactions and better communication would be useful to ensure dynamic exchange of ideas, needs and

opportunities between the students, teachers, administration, alumni and the related industries.
The programme ensures an acceptable level of employability of graduates and the graduates of the programme have their successful careers. A relatively large number of medical physics graduates continue with their doctoral studies in related fields.

Teaching Staff. Teaching staff is highly qualified both pedagogically and scientifically, with well-balanced gender and age structure and core teachers of the programme have doctoral degrees and are active in research. 4 out of 5 teachers have practical experience related to the subject being taught. All teachers have attended courses and training to raise their didactic competences.
Knowing that only short (1-2 weeks) foreign visits are preferred by teachers, longer term sabbatical leaves abroad could be beneficial.

Learning Facilities and Resources. The material resources of the Medical Technology field studies are suitable and adequate. Currently students are able to use the most modern medical equipment located at LSMU hospital Kaunas Clinics disposal. Also, the equipment used in the study process (at premises of the Physics Department and of SANTAKA Valley) is constantly updated according to the needs of students and following the research trends. There has been a plan approved for significant investment in equipment and working space renovation during the last three years. However, the resources for training equipment are limited, which leads to a high level of dependency on external clinical partners. Thus, is it important to further plan and upgrade resources in order to maintain and develop the programme. In addition, due to the lack of a medical physics PhD programme, the University's capacity is limited to develop a stronger scientific excellence base of Medical Physics at the University.

Study Quality Management and Public Information. Every year the programme is reviewed and updated. The stakeholders are involved in all processes of study programme development, quality assessment and improvement. Social partners are also involved in the study programme committee and they also work in the commission for the evaluation of students' final theses.
The University website contains a lot of valuable information about the programme, but it could be more visible on the social media. It is recommended to develop a proactive communication strategy through social media channels to foster quality international students' attraction, better programme's visibility among the stakeholders' groups, and to build its international prestige.

Overall, it is one of the strong and high quality programmes where better marketing and advertising could help to attract more students. Some of these measures have to occur ASAP in order to insure the progressive growth of the programme in the near future.

Expert panel chairperson signature:

Prof. Dr. Dalia Giedrimienė