



CENTRE FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

EVALUATION REPORT
STUDY FIELD of MEDICAL TECHNOLOGY
at Vilnius University

Expert panel:

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Report language – English

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Study Field Data

Title of the study programme	Systems Biology
State code	6213GX002
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 in Health Sciences
Language of instruction	English
Minimum education required	Bachelor's degree in Life, Health (Medicine, Medical Technology), Informatics (Bioinformatics, Informatics Engineering), Mathematics (Applied Mathematics, Biostatistics), Engineering (Bioengineering), Technology (Biotechnology) study field groups (study fields)
Registration date of the study programme	22/05/2017

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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 *1 December, 2021*. Due to the coronavirus pandemic, the site visit was conducted online using video conferencing tools (MS Teams).

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;*

Prof. dr. Julius Griškevičius, *Head of Department of Biomechanical engineering at Vilnius Tech University, Lithuania;*

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.	Examples of non-centrally conducted surveys in the field of Medical technologies (29/11/2021) and their results
2.	Systems Biology study programme course syllabi
3.	Final theses of the Systems Biology graduates 2020-2021

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

Vilnius University (hereinafter - VU, University), established in 1579, is among the oldest in Middle-Eastern Europe, and by now the largest higher education institution in Lithuania. The Faculty of Medicine was established in 1781.

The Faculty today is organised in 4 institutes: Institute of Biomedical Sciences, Institute of Clinical Medicine, Institute of Dentistry, Institute of Health Sciences. From 2018, VU Faculty of Medicine operates one graduate study programme in Medical Technology field (Systems Biology). Its interdisciplinary approach adds a technical dimension to the spectrum of study programs in Medicine, and it has a strong international dimension (and is also delivered in English). Faculty also implements doctoral studies in the fields of science of Medicine, Odontology and Public Health.

II. GENERAL ASSESSMENT

Medical Technology study field and *second cycle* at Vilnius University 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	5
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:	29

*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 second cycle study programme “Systems Biology” in the Medical Technology study field aims to train specialists who can effectively use biomedical and computational skills and knowledge to solve problems in medicine through application of artificial intelligence and computational modelling techniques.

The aims and learning outcomes are defined in terms of both the academic content and scientific and professional requirements for Master level studies in Medical Technology field and growing industry of synthetic biology and biotechnology with the recent trends and advancements in AI-based technologies and applications in medicine in general.

According to the SER, graduates of the “Systems Biology” programme are needed in the biology/bioinformatics/biotechnology labour market. During the site visit, it has been noted by the social partners that there is a shortage of highly skilled professionals in the biotech industry and the study programme “Systems Biology” is providing those needed skills. However, Study programme committee (hereinafter - SPC) should make more efforts towards providing more clear career perspectives for the graduates, together with advertising the programme in professional social networks, like LinkedIn.

The programme is international as it is delivered in English language only.

(2) Expert judgement

Second cycle study programme aims and learning outcomes conform to the needs of the companies working in biology/bioinformatics/biotechnology markets. The study programme is newly established (running for the last 3 years) and corresponds to the current trends in the world – synthetic biology, AI-based technologies, data-analysis with the focus on clinical/medical data and application.

Study programme overall has a lot of growth potential.

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 second cycle study programme “Systems Biology” is: “to prepare highly qualified biological systems analysts, laboratory specialists, and specialists who are able to organise and lead research projects, understand the processes of fundamental biological systems, describe the processes of evolutionary biological systems mathematically, and improve

technological solutions and develop new ones to solve systems biology problems.” (SER, p. 9-10). The aims are in line with the mission and goals of Vilnius University described in the Strategic plan for 2021-2025, especially being an interdisciplinary programme it directly contributes to the implementation of two strategic priorities of HEI, namely building society and the state, and a cooperating university.

(2) Expert judgement

The overall study field aim is perfectly in line with the vision and mission of Vilnius University.

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

(1) Factual situation

The scope of the second cycle study programme “Systems Biology” is 120 credits, with the volume of full-time studies no more than 30 credits per semester and no more than 5 subjects per semester.

Study programme is modular. Scope of credits to accomplish the study results of the study field amount to 80. Preparation for final thesis and examination is 30 credits, plus 10 credits for Science forum I and II modules. All of these comply with the legal requirements for the field and for the second cycle of studies.

Study plan provides only compulsory course modules with a set of three different modules during the first semester for students coming from different fields. No credits for free electives.

The contact hours are at least 37.5% and the share of students’ independent work is 62.5% (SER, Table 2). As follows from the meeting with the SER group, there is no established system on how to monitor the hours of students’ independent work. 92% of academic staff have scholastic degrees and 59% are professors.

(2) Expert judgement

Second cycle study programme 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

Learning outcomes of the study programme are divided into 5 competence groups: Knowledge and its application, Ability to conduct research, Special abilities, Social abilities, Personal abilities. Each competence group consists of at least two learning outcomes, with 5 learning outcomes defined in the Special Abilities competence group (SER, Appendix 1). The learning outcomes are in line with the aims of the study field and needs of Lithuania and the EU labour market.

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 assignments, written projects, oral and written 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 field and cycle of studies.

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

Study programme is modular. Study plan provides only compulsory course modules from the second semester, while two sets of three different modules during the first semester are intended for students coming from different fields (life sciences and technology) to fill the knowledge and skills gaps required for later semesters and intended learning outcomes of the study programme.

Based on the feedback from the students and graduates during the site visit, it has been noted that some of the courses for the students coming from biology/biochemistry background were a bit too basic and students would rather choose other subjects. Plan of the study programme does not contain credits for free elective courses and therefore there are limited possibilities for students to individualise their studies more. Besides, students mentioned that planning of the 2nd and 3rd semester has been a bit chaotic as some of the courses were presented as compact modules in a few weeks while some others - over the whole semester.

(2) Expert judgement

Overall, the totality and sequence of the study modules and the focus on research enable the students to develop the competencies 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

Since it is a modular study programme, the first semester is different depending on the awarded bachelor degree of enrolled students - there are two versions of 3 modules groups for different studies. Undergraduates of Physical, Life and Health science studies filling the gaps of GNU/Linux OS, Programming for biological data analysis and Multivariate statistics with R; while undergraduates from Mathematics, Informatics, Engineering and Technology sciences studies would study Human physiology, Cell biology and Essential concepts of Biology. Two modules of Science Forum I and II are related to Master thesis - preparation of research proposal and literature review. The last semester is fully devoted to the Master's thesis.

In general, students are provided with many different possibilities to personalise their studies: individual study plan, participation in academic exchange, study modules outside of the scope of the programme.

(2) Expert judgement

Study programme provides students with many different possibilities for the personalization of their studies. However, there are no free elective modules in the study plan, and therefore limited possibilities for students to individualise their study programme.

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

(1) Factual situation

The master thesis and final degree projects are regulated by Regulations for the Preparation, Defence and Storage of Research Papers of Students Studying at Vilnius University. Students can choose the topic of their Master's thesis (SER, Appendix 5) from the list or can propose their own during the first semester. During the internships at the companies, there are possibilities to perform a master thesis research on the topic proposed by the company.

(2) Expert judgement

Master theses show a good combination of analysis, simulation and experimental work for research-oriented topics and also comply with field and cycle requirements.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Second cycle study programme aims and learning outcomes conform to the needs of the companies working in biology/bioinformatics/biotechnology markets as there is a shortage of highly skilled professionals in the biotech industry and the study programme "Systems Biology" is providing those needed skills.
2. The programme has a great opportunity for growth locally and internationally, as it is completely taught in English.
3. Study programme provides students with the possibility to personalise their studies by choosing elective courses, participating in academic exchange, studying various foreign languages, and choosing their research topics.
4. The totality and sequence of the study modules and the focus on research enable the students to develop the competencies to analyse non-standard situations and pursue research and self-guided activity.

(2) Weaknesses:

1. There are no free elective modules in the study plan, therefore limited possibilities for students to further individualise their 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

The study fields/disciplines are associated with respective research directions: the primary Medical Technology study field (G09) with Medicine (M001) and Physics (N002); the secondary study field Informatics, Information systems and Informatics engineering study fields (B01, B02, B04) - with Computer science (N009) and Informatics Engineering (T007); the secondary Mathematics study field - with Mathematics (N001); the secondary Life Sciences study fields Biology, Genetics Molecular biology, Biophysics and Biochemistry (D01, D02, D04, D05, D06) - with Biochemistry (N004) and Computer Science (N009). In all these research areas, Vilnius University was highly evaluated by the recent science and study monitoring and analysis centre MOSTA appraisal (SER, Tables 3 and 4). The programme's academic staff has participated in the implementation of five international and eleven national research projects (SER, Table 5); several students have been involved in projects as well. Appendix 4 of the SER provides information on the main publications of 33 teachers of the study programme; almost all papers are published in top-level peer-reviewed scientific journals which confirms high level of the performed research. This ensures transfer of the latest research findings into the taught courses of the programme.

(2) Expert judgement

The science activities in the field of research related to the field of study are fully sufficient for successful implementation of the programme.

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

(1) Factual situation

Each professor/lecturer is giving courses related to his/her research activities, and students are encouraged to familiarise themselves with the latest and most relevant research when performing their study tasks and preparing research papers. A distinctive feature of the programme is the Science Forum course, where invited lecturers from Lithuania and abroad present current hot topics in their research fields. As a part of Science Forum, students participate in Journal club activities where recent publications in the course related research fields are analysed and discussed.

(2) Expert judgement

The link between the content of studies and the latest research developments is active and well organised.

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

(1) Factual situation

Students are offered topics for their Master thesis from the research repertoire of respective teachers. Besides, students are involved and actively participate in the work of VU research groups (three students mentioned their involvement during the site visit). Some of the student's results are published or submitted for publishing in prestigious international scientific journals.

(2) Expert judgement

The conditions for students to get involved in scientific activities are favourable.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Majority of course teachers are doing high-level research so the latest findings can be directly reflected in the taught courses.
2. Students are involved in the research activities/projects and familiarised with the latest research news at the Science Forum course where invited lecturers from Lithuania and abroad present current hot topics in their research fields.

(2) Weaknesses:

1. Not identified.

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 studies is carried out in accordance with the "Procedure for Admission to Second Cycle Study Programs at Vilnius University", which has been approved by the Senate of Vilnius University and is available on the VU website. The competitive score is calculated according to the formula $0.4 * V + 0.6 D + P$, where V is the average of the diploma supplement marks, D is the final thesis mark, and P is the additional score. The conditions of admission to the second cycle study programmes at Vilnius University differ for Lithuanians and foreigners as national students are competing for a state funded studentship. Nationals of European Union and non-European countries apply for admission through the Dream apply system and must satisfy the entry requirements.

(2) Expert judgement

Based on experts' opinion, the criteria for the selection and admission process for students are eligible for application to the Systems Biology programme. Although the VU website

provides sufficient information on recruitment and selection for the Systems Biology study programme, more publicity measures related to students admission criteria could be used.

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

Vilnius University follows the Lisbon Recognition Convention, various descriptions of procedures and other documents when making decisions. The University evaluates each foreign qualification individually. University accordingly evaluates previously acquired learning outcomes and competences acquired through non-formal and informal learning.

(2) Expert judgement

Vilnius University carries out appropriate recognition of foreign qualifications, part-time studies and prior non-formal and informal learning. It has a high-level assessment system that is individualized for each student applying for admission. University has set appropriate criteria for the evaluation and recognition of equivalent foreign qualifications.

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

(1) Factual situation

Vilnius University students have the opportunity to participate in ERASMUS, ERASMUS+, ISEP and other mobility programs. The University is also currently involved in ARQUS (a network of 7 European universities that have agreed on an open mobility model) activities. This allows students to go on part-time study, attend international conferences and more. Covid-19 has restricted student travels abroad.

(2) Expert judgement

There are sufficient conditions for university students to participate in mobility programs. While information on mobility opportunities is provided, ways to further increase students' interest in mobility programs could be considered.

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

Students are provided with a wide range of social, academic, financial and psychological support. Since 2019, the mentoring program has been running, which seems to be successful - the numbers of students using the program are growing. Students are increasingly using career counseling. Vilnius University offers students the opportunity to live in a dormitory, and offers discounts for students with disabilities. Students have the opportunity to express their hobbies at Vilnius University Culture Centre, engage in sports at Vilnius University Health and Sports Centre.

(2) Expert judgement

Vilnius University students are given all the opportunities to engage in the desired hobbies and sports. Various trainings, mentoring programs and events are organised for them. The

university also has a well-developed academic, financial, psychological and social support system.

3.3.5 Evaluation of the sufficiency of study information and student counselling

(1) Factual situation

Students who were accepted to study in Medical Technology field studies are initially introduced to their study programme during the VU integration week, which is the first week of studies. The schedule of this week contains meetings with members of the study programme committee who introduce students to the aims, intended outcomes, methods, and individualization opportunities; there is a separate lecture about the study process and lectures to introduce various forms of support and leisure. The first lecture for “Systems Biology” programme students is informal, dedicated for acquainting students with lecturers and courses, where lecturers represent their courses in general and get to meet students.

(2) Expert judgement

Students are provided with sufficient study information through a variety of channels. Student counseling is provided not only by the Faculty but also by members of the study programme committee, the Student Services and Career Centre.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Students at the University receive a range of services and are informed on how to get the help they need.
2. The reliability of the procedure for the recognition of foreign qualifications, part-time studies and previous non-formal and informal learning, and the system of its application.
3. Information is disseminated to students in a variety of ways.

(2) Weaknesses:

1. The potential of mobility should be better exploited.
2. Greater publicity related to students admission criteria and student support system should be considered.

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

Teaching staff helps learners to understand the importance of the information and what they will gain from their engagement with the learning activity. The teaching staff set up and communicate learning goals/targets in a way that students can understand and articulate for each lesson. Most of the teaching activities are using clear communication, problem-solving skills, and values. Students are highly motivated, participate actively in the learning process and receive feedback as to the progress made. The assessment and feedback are provided in a timely manner.

(2) Expert judgement

The information obtained from SER and supplemented during conversations of site visit have shown that most graduates obtain a deep knowledge in the MT study field and that enables them to work as a team-player. They can also work independently in clinical research and industry settings. In particular, students understand the concept that they are being taught and are able to apply it.

Overall, the teaching and learning process takes into account the needs of the students. In addition to the benefit of the multidisciplinary nature of the studies, more practical tasks should be promoted along with the theoretical knowledge by: a) equipping students with real word knowledge; b) improving contacts with industry and developing job search skills.

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

(1) Factual situation

As it is presented in SER, and also confirmed during our site visit, the students from socially vulnerable groups are able to receive state scholarships from the State Study Foundation. Also, the University allocates a single-payment social scholarship to students of all study cycles, which represent a great support in case of a need. There are also numerous incentive scholarships awarded to students for excellent academic performance and involvement in other activities.

On the University's website students can find necessary information about scholarships or to explore the opportunities to get a reduction of their study fees.

It has been noticed that Vilnius University has started a fundraising campaign to give access to studies for a larger number of Belarusian citizens to study and is ready to accept scientists persecuted by the regime too.

(2) Expert judgement

The obtained information from SER and interactions during the site visit shows that University ensures study access conditions for socially vulnerable groups and students with special needs, providing them with ongoing assistance in case of any type of discrimination

during their study process. The University creates and ensures a supportive environment where everybody could feel safe, accepted, and able to realise their potential.

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

Based on information from the SER and the site visit, it is noticeable that the University has a well developed monitoring system, which allows it to monitor the study progress of field students on several levels: the module, all students of a given year, and the study programme.

The Student Services and Career Department monitors student performance, their drop-out levels and implements an action plan for prevention of failure or drop-outs (SER p. 36-37).

The data about the final semester results are analyzed and failing students have an opportunity to retake an exam and also to receive informational letters about various options of exam retaking and may receive counseling on how to prepare.

On the level of a field study programme, the monitoring of student progress is done by the SPC, which evaluates the results of final thesis defense and the proportion of students who timely defended their final theses.

The evaluation of the distribution of final results of learning outcomes helps to identify the cases of failing or students behind the study plan and is used to clarify the most important reasons for this.

(2) Expert judgement

Based on the systemic nature of monitoring and feedback provision to students, the Programme has very good standards and implements them well by promoting timely self-assessment regarding preparation and completion of assessments/examinations.

Students receive informational letters about various options of exam retaking and may identify their problems and needs. They can also use the offered options, including counselling, how to prepare to retake a test or to deal with problems leading to failure.

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

(1) Factual situation

According to the information presented in the SER, the Systems Biology programme, as a rather new postgraduate programme in the Medical Technology field, has the first post-graduation edition released in 2020 only with four students graduated. As it has been stated in the SER (p. 39), a Lithuanian Government Strategic Analysis Center (STRATA) could not provide data regarding employment as first data about employability is gathered 1 year after graduation. Therefore, the Faculty itself implemented the graduate career tracking.

(2) Expert judgement

The feedback from employers given during the site visit shows that they are satisfied with the knowledge of graduates, their ability to work in groups, and the ability to apply different methods. However, it also depends on individual students learning and how they behave in

their working environment. This has been noticed as alumni commented about the lack of better knowledge regarding employment opportunities within the field of their primary competencies. The university should improve this aspect when developing contacts with businesses.

During panel discussions it was noticed that the University should make more progress by connecting, joining and collaborating with local and European industry organisations and other research groups. Better collaboration, communication, and expanded access to information would help to share a vision, encourage new ideas and boost productivity for graduates.

During the site visit, the alumni also pointed out the lack of skills of how to search for a job. Therefore, the inclusion of job search skills training into the programme could benefit the students and strengthen the programme's ties with the industry.

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

(1) Factual situation

As it is stated in the SER (p. 39), University strives to ensure a diversity of opinion within the academic community as well as mutual respect, openness to ideas, trust, tolerance, and to combine autonomy with accountability to the state and society, by grounding its activity and relationships between community members on the principles outlined in the Vilnius University Statute, the Academic Ethics Code of Vilnius University, the Diversity and Equal Opportunities Strategy and other documents.

There are a variety of regulations used to ensure that students adhere to academic integrity, such as the (already mentioned) Academic Ethics Code of Vilnius University, VU Study Regulations and others.

During the Exam period, invigilators delegated by the Students Representation monitor the Exam and help lecturers (SER, p. 39).

The University has a research paper electronic overlapping identification system (ESAS) to identify cases of plagiarism.

In addition, University uses a Virtual Learning Environment which allows an application of various tools to ensure fairness of using open book tasks and blocking the attempt to open pages other than task. Also students can independently remotely deliver tasks by broadcasting themselves.

No cases of the breach of academic integrity or other policies have been identified (SER, p. 40).

(2) Expert judgement

University has sufficient policies to ensure academic integrity, tolerance and non-discrimination, and no violations have been recorded over the last three years.

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

Based on information in the SER (p. 40), the complaints about the examination of any course can be reported through the Core Academic Units (CAU). Students can file a complaint with the Appeals Commission of CAU within 5 days after the publication of examination results.

Based on this process the decision of the Appeals Commission regarding evaluation is final, while the decision regarding the examination procedure can be contested to the Vilnius University Dispute Resolution Committee.

(2) Expert judgement

The procedure for the appeal lodging is in place. During the three years of the “Systems Biology” studies, students did not file any appeals or complaints.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Overall, based on experts' opinion, the programme uses a wide variety of methods for information delivery and seeks to build knowledge of students in combination with the development of practical skills following trends in research, innovations and scientific discoveries. This leads to the ensuring of the desired competencies.

2. The lectures are recorded in order to give an opportunity for students to review the study material and improve their preparation for examinations.

(2) Weaknesses:

1. The contacts with the industry are insufficient to guarantee extensive practise and involvement in applied R&D activities for students, as well as foster the employability of students according to the professional competencies, provided by the programme.

2. The inclusion of visual materials (including explanations to the slides) should be more widely used.

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 number of teachers for this programme is high – 40 teaching staff members are mentioned in Table 17 of SER, 38 in Table 16 and 33 in Appendix 4 (where only those working for at least 3 years are listed). 12 professors, 7 associate professors, 13 assistants, 3 junior

assistants and 5 lecturers are currently teaching in the programme; 92% of them hold a research degree and 8% are practitioners. All subjects are taught in English. Professors are teaching 59% of all field course units. In total, 15 subjects (modules) are taught (Appendix 2 of SER), number of teachers per module - up to 5. Total number of contact hours is 1199 (Table 2 of SER), so the mean workload of a teacher is ~30 hours. Annex 4 shows that 11 members of the teaching staff are working full time (FTE=1) and 3 even more (FTE>1). It concerns their total workload at VU and the work time related to this programme is not specified. A majority of the teaching staff (~85%) also work as senior or junior researchers in various projects. Their results are published in top-level peer-reviewed scientific journals (Appendix 4 of SER). 4 teachers have raised their didactic competences in courses organised by VU. As the total number of students last year was only 5, the teachers/students ratio in this programme became abnormally high - 8 teachers per student (Table 13 of SER).

(2) Expert judgement

The above-mentioned percentages are notably higher than the thresholds established by the study field descriptor; also, the research done by teachers on topics related to the study field is on an international level, which demonstrates high qualification of the teaching staff. As the mean workload of teachers in this programme is only ~30 hours, lowering the number of teaching staff per course could be a way to make the programme more efficient and less costly.

3.5.2. Evaluation of conditions for ensuring teaching staff's academic mobility

(1) Factual situation

The teaching staff mostly use the opportunities of mobility via the Erasmus+ exchanges; the usual duration of training visits abroad is 7 days. Project-based activities also support exchange visits and conference travels. Long-term research was performed in the Center for Neurodegenerative Science (Grand Rapids, USA), University of Ottawa (Canada), Ottawa Institute of Systems Biology and Children's Hospital of Eastern Ontario in Canada, as well as at the University Pompeu Fabra in Barcelona, Spain. Several teaching assistants have previous research work experience abroad – e.g. at the Harvard Medical School and Columbia University in the USA, and Osaka University and Tokyo University in Japan.

(2) Expert judgement

The conditions for ensuring academic mobility of the teaching staff are good and a number of visits to foreign institutions have taken place already.

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

(1) Factual situation

The lecturers improve their research competences mainly by participating in research projects and by attending national and international conferences. As for didactic competencies, four persons of the programme's teaching staff (10%) participated in training workshops about innovative teaching, learning, and evaluation methods together with colleagues from other study fields and other units of Vilnius University. Training events for VU

lecturers on teaching competence development are organised permanently so there are good conditions to improve the competences of the teaching staff.

As SER indicates (p. 7-8), in 2020, Vilnius University teaching staff developed their teaching skills in 16 different training programs the duration of which ranged from 3 to 40 hours. The most popular programs were “Active learning methods”, “Student group work”, “Research paper supervision”, “Communication skills”, “The integration of communication technologies into the teaching process”, “The application of mixed learning in university studies”, etc. Furthermore, five training workshops about innovative teaching, learning, and evaluation methods were delivered by guest lecturers from abroad. The four of the teaching staff of the Systems Biology programme participated in this training.

(2) Expert judgement

The conditions to improve the competences of the teaching staff are favourable.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Teaching staff is highly qualified both scientifically and pedagogically.
2. Most teachers participate in research related to the study field and publish results in highly-ranked international journals.
3. Teachers have good international relations and have performed short- and long-term visits to partner institutions abroad; some teachers have previous work experience in foreign countries. No doubt on their ability to teach their subjects in English.

(2) Weaknesses:

1. The number of teachers per study course/module (2...5) and the teachers/students ratio (4...8) appear too high for a well-manageable, sustainable and cost-efficient study programme.

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

From the information given in the SER (p. 48), it can be stated that learning facilities, including the library (with a reading room and 90 workplaces) and the access to other information resources are adequate for an effective learning process. It has been also noticed during site visit that Vilnius University holds a high-level of services to insure an adequate

access to all resources related to the field of studies as it is required for the Systems Biology programme.

The new modern University's library (MKIC) at Saulėtekio St. 5 is available for students and is operating 24/7, and MKIC facilities include lounges and independent work spaces for students.

In addition, the information obtained during site visit meetings with staff and students has proved that during the COVID-19 pandemic quarantine period (2020-2021), lectures were given remotely and practical laboratory work was demonstrated by video recordings ensuring an effective teaching process.

In general, the University takes significant steps towards the implementation of digital transformation. As it is stated in the SER (pp. 48-49), whiteboards, projectors and computers are used in classrooms and high speed and wireless internet access is available in all university buildings. The physical and ICT facilities allow students to work collaboratively and effectively.

Moreover, the Information Technology Services Centre provides various advanced IT services for employees, academic staff and students, enhancing opportunities for constructive learning. As it is specified in the SER (pp. 49-50), students can work with different operating systems (Linux, Windows, iOS) and use a variety of software, statistical-econometric packages such as SAS, Eviews, R, SPSS, Matlab + Simulink and others, all of which are provided in the Faculty of Mathematics and Informatics.

(2) Expert judgement

The overall suitability and adequacy of the physical, informational and financial resources of the field studies to ensure an effective learning process is very good. However, there are the following remarks for improvement:

- Lack of financial resources for IT back up systems is not only a risk, but also a limiting factor for developing world class research in the bioinformatics field.
- Lack of canteen and gym reduces work-leisure-active lifestyle balance for staff and students which indirectly limits quality of scientific dedication in the long run.
- More financial resources should be secured for reagents to provide students with more lab research opportunities than they currently have due to lack of funds and cost saving policy on lab expenses. Without practical experience, the students are not fully capable to benefit from the extensive cohort of lecturers and their expertise knowledge, which is gathered for the course.

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

(1) Factual situation

During the period of evaluation the university has provided information on consistent monitoring and improvement of resources needed to enhance remote studies and to carry out efficient field studies. The recent improvements include the investments into: InSimu platform⁹⁰ to advance skills in clinical diagnostics (22,500 EUR); Mastering A&P platform⁹¹

to study physiology (2,950 EUR); Interactive Laboratory Microbiology (ILM)⁹² (1,600 EUR); Biostar Handbook „Research Group Edition“⁹³ online bioinformatics training material (150\$); Complete Anatomy 3D4Medical from Elsevier⁹⁴ subscription for 2021; Medical exam tutor (MET)⁹⁵ platform of virtual patients to train for clinical skills (9,600 EUR); SMOWL⁹⁶ (13,000 EUR out of which the MF invested 10,000 EUR and 3,000 EUR invested VU) (SER, p.53).

During the interviews, the staff indicated the risk of outdated backup infrastructure of the university's IT system, which is a huge investment currently beyond the scope of the university's budget. Since the latter risk is strategic for the University overall and not the study programme in particular, most likely this is a reason why it was not mentioned in the SER.

(2) Expert judgement

Due to a lack of permanent backup storage for large amounts of data there is 2.5M€ investment in IT resources improvement during a few upcoming years, which would become a great improvement to cover growing academic and research needs.

New facility at the Faculty of Medicine building is underway; this will improve facilities for laboratory training.

Overall, the planning and upgrading of resources needed to carry out the field studies is very good.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. There are sufficient academic material resources for the successful implementation of the study programme. The premises are adequate and of adequate quality.
2. Learning resources (software, books in the library, etc.) are constantly updated to meet the needs of teachers and students.
3. Virtual learning environments are increasingly being exploited.
4. The programme is founded on three founding faculties: Life sciences, Medical and Mathematical and informatics, and the developers of the programme is a motivated team of ice breakers, which potentially provides rich access to resources and competencies across the faculties.

(2) Weaknesses:

1. Physical and mental well-being facilities are good according to Lithuanian standards, but could be improved following the good international practises to ensure comfort and wellbeing of student and academic staff, providing comfort and motivating them to focus on academic work.
2. There is no canteen for students, as it used to be before.

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

From the information given in the SER (pp. 54-55) and from the site visit, it is noticeable that Vilnius University has developed a study quality assurance system to utilise various processes and procedures of internal quality assurance from study programme approval, monitoring, and evaluation to the monitoring and analysis of the study process.

The existing internal quality assurance system assists with the implementation and improvement of student performance evaluation, blended learning, computer testing and plagiarism screening systems. In addition to that, it serves for teaching staff competence improvement and encourages applications of innovative teaching and performance evaluation methods in the study process to implement student-centred learning (SER, pp. 54-55).

It should be noticed that Vilnius University has developed a study quality assurance system as part of the project “The Development and Implementation of an Internal Study Quality Assurance System at Vilnius University”; the system is implemented in accordance with the standards and guidelines for quality assurance in the European Higher Education Area.

This means that effective support is present and it meets expectations.

(2) Expert judgement

Overall suitability and adequacy of an internal quality assurance system contributes to improved teaching learning and administrative processes, and helps disseminate best practises with the goal of leading to overall improvement of higher education in Vilnius University. Resources, additional training, improving competences is an ongoing process leading to improved quality of the programme.

The structure of study field management and decision making, periodicity of internal evaluation are sufficient and provide adequate information about the means used for study process quality assurance.

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

(1) Factual situation

As a part of the internal quality assurance system, there is the Study Programme Committee (SPC) composed from the teaching staff, social partners, student representatives and alumni.

According to the SER (p. 55), one of the main objectives of the SPC is to improve the programme by seeking to ensure coherence between its aims, developed competences, content, methods, and outcome assessment. It is important that the social partners provide useful insight and they are invited to participate in every meeting of the SPC.

The institutional social partner, Thermo Fisher Scientific, is tightly involved in the process of evaluation and improvement of the studies. As an example - its representative initiated an improvement to the Master's Thesis guidelines by the addition of recommended software hosting platforms. This social partner also plays a role in providing topics and advisors for final theses and participates in thesis defense committees (SER, p. 57).

(2) Expert judgement

The involvement of stakeholders is highly important for the programme's well-being, future planning and successful growth, and this was widely discussed during our site visit. During these discussions it was shown that social partners/stakeholders are satisfied with their role and value the option to be involved in the process of teaching and field research. However, as was already mentioned in the paragraph 3.4.4., University could make more progress by connecting, joining and collaborating with local and European industry organisations and other research groups, aiming to guarantee extensive practise and involvement in applied R&D activities for students.

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 the information presented in SER (p. 54), there is a separate webpage for Systems Biology programme created, such as systems-biology.vu.lt and embedded into the webpage of the Faculty of Medicine. Information about the programme is also available from the list of study programmes that Vilnius University is offering, as well as in the national study portal "Study in Lithuania", and information about it is constantly updated.

By the initiative of the university marketing department, the Systems Biology programme is also advertised in the international databases, such as Study Portals, Keystone, Educations.com or StudyLink.

It is noticed that dissemination of information about the Systems Biology programme in international databases of study programmes requires paid subscription (SER, p.54).

(2) Expert judgement

Although the University is doing a lot to publicise and advertise this programme nationally and internationally, even more advertising would be highly beneficial for the programme. This is important from the possible employers (like bioinformatics start-ups, etc.) perspective as well.

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

Opinion of field students about study quality is collected by using surveys. These surveys are conducted both centrally and individually (depending on the choice of each lecturer and /or by mutual agreement with the students, as stated in the SER, p. 58). It is collected twice per

study year (at the end of each semester), and the University also conducts a centralized survey.

These surveys are designed for collection of information about specific subjects students study during the semester and about general satisfaction with studies.

Detailed survey results are published in the “Feedback” section of the University website (intranet) and is used for programme improvement (SER, p. 58).

According to the SER (p. 58), surveys of general satisfaction of field students of the programme generally have turnout of 50% and above. Up to date, 19 responses to these surveys have been collected. Students have generally expressed satisfaction in the content quality of the subjects (around 50% of students gave 4 out of maximum 5 points). Teaching quality is regarded as positive (over 80% of students gave 3-5 points), and the studies in VU enjoy a very similar evaluation. Students feel really encouraged to express their opinion (42% gave 5, 32% gave 4 points) and analyze problems on their own (over 80% gave 4-5 points). Over 60% of students confirm (4-5 points) that during the course they were given tasks encouraging critical thinking. Over 80% of students said they would recommend their study programme to their relatives and friends. In written responses to the previous question, three respondents were concerned about the quality of the courses, while two respondents expressed satisfaction in their quality and volume (SER, p. 58).

(2) Expert judgement

Overall, there is an effective measurement "tool" that can provide valid and reliable data for university educators to use to improve teachers' instructional practises and student outcomes. In addition, it ensures that teachers receive feedback from students about their classroom performance and suggestions on how to improve studies.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Students' feedback is immediately reacted upon.
2. The social partners have provided useful insight, which resulted in actual changes in the programme of the study field.

(2) Weaknesses:

1. As a study programme in the Medical Technology field, “Systems Biology” has a lot of growth potential but has a limited number of students. There is a need for more effort to improve its advertising.
2. More advertising should be highly beneficial from the possible employers' perspective as well (like bioinformatics start-ups, etc.). A stronger link between the institution and stakeholders, also with prospective employers, is missing.

IV. EXAMPLES OF EXCELLENCE

A distinctive feature of the programme is the Science Forum course, where invited lecturers from Lithuania and abroad present current hot topics in their research fields.

As a part of Science Forum, students participate in Journal club activities where recent publications in the course related research fields are analysed and discussed.

This is a novel and very effective approach to inform students on the cutting edge scientific achievements and to get them interested in further research activities.

It is recommended to spread this experience to other HEIs in Lithuania and abroad.

V. RECOMMENDATIONS

Evaluation Area	Recommendations for the Evaluation Area (study cycle)
Intended and achieved learning outcomes and curriculum	<p>The curriculum of the programme might benefit from the inclusion of credits for free elective courses which are not from the programme.</p> <p>Promote more bioIT aspects of the programme to increase awareness in the market of companies who might need graduates from the study programme.</p>
Links between science (art) and studies	<p>The successful implementation of the latest research achievements in the study course contents should continue.</p>
Student admission and support	<p>The information on mobility and about the potential opportunities for students has to be provided in a way to increase students' interest in mobility programs.</p> <p>Greater publicity would be beneficial for the growth of the study programme and better marketing is an important future step.</p>
Teaching and learning, student performance and graduate employment	<p>Contacts with the industry are insufficient to guarantee extensive practise and involvement in applied R&D activities for students, as well as foster the employability of students according to the professional competencies, provided by the programme.</p> <p>The lecturers should include more visual materials (including explanations to the slides) for review of the study material or for improving the option of virtual teaching.</p>
Teaching staff	<p>The teachers/students ratio and number of teachers per study module should be decreased to optimise the programme costs and to simplify its management.</p>
Learning facilities and resources	<p>To keep up to date the facilities for laboratory training is recommended.</p> <p>The search for additional financial resources for IT back up systems is suggested.</p> <p>Explore the opportunities to return the canteen to serve students and develop facilities for physical wellbeing.</p> <p>More financial resources should be secured for reagents for</p>

	laboratory works.
Study quality management and public information	<p>More effort for advertising the programme should be given in order to increase the numbers of students in “Systems Biology”.</p> <p>More appropriate programme naming (e.g. “Computational Medicine”, “Biomedical Informatics”, “Bioinformatics”) could be considered.</p>

VI. SUMMARY

Intended and Achieved Learning Outcomes and Curriculum. Systems Biology is a newly established programme (offered during the last 3 years) and well fulfils requirements for Master level studies in the Medical Technology field. It also corresponds to the trends of growing industry in the area of synthetic biology and biotechnology with applications in medicine. The graduates of this programme are needed in the biology/bioinformatics /biotechnology labour market, and social partners have confirmed that this programme is providing needed skills for graduates. Being an interdisciplinary programme, it contributes to the implementation of strategic priorities of HEI, such as building society and the state, and has it in a great alignment with the vision and mission of Vilnius University. A good mix of teaching and learning methods used for the delivery of information is appropriate for achieving desired learning outcomes (lectures, practice, laboratory work and projects), and the assessment is based on a mixture of practical assignments, written projects, oral and written presentations and examinations. Overall, the study modules and the focus on research enables the students to develop their competencies, including their ability to analyze non-standard situations and pursue research and self-guided activities. The programme has a great opportunity for growth locally and internationally, as it is completely taught in English.

Links between Science (Art) and Studies. The majority of teachers in the programme are doing high-level research by including the latest findings from the research field and reflecting on this in their courses. Students can obtain the latest research news at the Science Forum course where invited lecturers from Lithuania and abroad are presenting and also through involvement in the research activities or projects.

Student Admission and Support. Students are provided with sufficient study information and they may receive the counseling not only from the teaching faculty but also from the members of the Study Programme Committee, the Student Services and Career Center. There are multiple opportunities for students to participate in mobility programs and necessary information on mobility options is provided. Additional measures could be needed to increase students' interest in the mobility programs.

Teaching and Learning, Student Performance and Graduate Employment. The teaching and learning process takes into account the needs of the students by equipping students with real world knowledge and by improving contacts with industry and developing job search skills. The University ensures necessary access for socially vulnerable groups and creates a supportive environment for everyone. The programme maintains good standards for timely self-assessment and regarding preparation and completion of assessments and examinations. The feedback from employers shows their satisfaction with the knowledge of graduates, their ability to work in groups, and their capabilities to apply different methods or techniques. As a suggestion, the contacts with different industries (in which the skills and competencies taught

by the study programme are applied) should be improved. More internships would ensure more practical skills development and would open wider employment opportunities for the graduates.

Teaching Staff. Teaching staff in the programme is highly qualified both scientifically and pedagogically and most teachers participate in the research. They have publications in highly-ranked international journals. In addition, they have good international relations, including short and long term visits abroad or have previous work experience in foreign countries. Therefore, overall the conditions to maintain the competences of the teaching staff are favorable. It should be noticed that the number of teachers per study course/module (2...5) and the teachers/students ratio (4...8) appear too high, therefore, it would be beneficial to reorganize the teaching load and to improve the ratio in order to keep a sustainable and cost-efficient study programme.

Learning Facilities and Resources. The programme has sufficient academic resources for the successful implementation of the studies, and learning resources (such as software, books in the library, etc.) are constantly updated with increased usage of virtual learning environments. As the programme is founded by three founding faculties: Life sciences, Medical and Mathematical and Informatics, it provides rich access to resources across these faculties. As a new facility (at the Faculty of Medicine building) is underway, it will improve facilities for laboratory training for this programme as well. More attention should be given to physical and mental well-being facilities and improvement following the good international practises in order to ensure comfort and well-being of students and academic staff.

Study Quality Management and Public Information. The suitability and adequacy of an internal quality assurance system contributes to improved teaching learning and administrative processes, and helps disseminate the best practises. Available resources and sufficient training help to improve competencies leading to higher quality of the programme. As this study programme in the Medical Technology field has a lot of potential for the growth, there is a need for more significantly improved advertisement. A stronger link between the institution and stakeholders, prospective employers should become significantly stronger in the future.

Overall, it is an outstanding study programme with an exemplary curriculum and prepares graduates with valuable applicable skills for today's labour market.

Expert panel chairperson signature:

Prof. Dr. Dalia Giedrimienė