CENTRE FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

EVALUATION REPORT

STUDY FIELD of PHYSICS

at Vilnius University

Expert panel:

1. **Prof. Dr. Kenneth Peach (panel chairperson),** academic*;*
2. **Assoc. Prof. Dr. Mate Csanad,** *academic;*
3. **Prof. Dr. Roger Erb,** *academic;*
4. **Assoc. Prof. Dr. Rynno Lohmus,** *academic;*
5. **Dr. Jonas Berzinš,** *representative of social partners;*
6. **Mr. Dominykas Tvaska,** *students' representative.*

Evaluation coordinator – *Dr. Domantas Markevičius*

Report language – English

Study Field Data

Title of the study programme	**Physics**	**Applied Physics**
State code	6121CX003	6121CX006
Type of studies	University studies	University studies
Cycle of studies	First Cycle	First Cycle
Mode of study and duration (in years)	Full-time, 4 years	Full-time, 4 years
Credit volume	240	240
Qualification degree and (or) professional qualification	Bachelor's Degree in Physical Sciences	Bachelor's Degree in Physical Sciences
Language of instruction	Lithuanian	Lithuanian
Minimum education required	Secondary education	Secondary education
Registration date of the study programme	19/05/1997	19/05/1997

Title of the study programme	**Computing Physics and Modelling**	**High-tech Physics and Business**
State code	6121CX004	6121CX005
Type of studies	University studies	University studies
Cycle of studies	First Cycle	First Cycle
Mode of study and duration (in years)	Full-time, 4 years	Full-time, 4 years
Credit volume	240	240
Qualification degree and (or) professional qualification	Bachelor's Degree in Physical Sciences	Bachelor's Degree in Physical Sciences
Language of instruction	Lithuanian	Lithuanian
Minimum education required	Secondary education	Secondary education
Registration date of the study programme	23/04/1999	25/06/1998

Title of the study programme	**Life and Chemical Physics**	**Laser Physics and Optical Technologies**
State code	6211CX005	6211CX006
Type of studies	University studies	University studies
Cycle of studies	Second Cycle	Second Cycle
Mode of study and duration (in years)	Full-time, 2 years	Full-time, 2 years
Credit volume	120	120
Qualification degree and (or) professional qualification	Master's Degree in Physical Sciences	Master's Degree in Physical Sciences
Language of instruction	Lithuanian/English	Lithuanian
Minimum education required	Secondary education	Secondary education
Registration date of the study programme	16/06/2000	16/06/2000

Title of the study programme	**Theoretical Physics and Astrophysics**
State code	6211CX008
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's Degree in Physical Sciences
Language of instruction	Lithuanian/English
Minimum education required	Secondary education
Registration date of the study programme	16/06/2000

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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 *9 November, 2021.* Due to the coronavirus pandemic, the site visit was conducted online using video conferencing tools (Zoom).

Prof. Dr. Kenneth Peach (panel chairperson), *Professor Emeritus, Department of Physics, University of Oxford, The United Kingdom;*
Assoc. Prof. Dr. Máté Csanád, *Associate Professor, Institute of Physics, Eötvös Loránd University, Hungary*;
Prof. Dr. Roger Erb, *Professor for Education of Physics, Faculty of Physics, Goethe-University Frankfurt, Germany;*
Assoc. Prof. Dr. Rünno Lõhmus, *Associate Professor in Material Science, Institute of Physics, Faculty of Science and Technology, University of Tartu, Estonia;*
Dr. Jonas Berzinš (social partner), *Application Engineer, Department of Scientific Laser Systems, Light Conversion, Lithuania;*
Mr. Dominykas Tvaska (student representative), *4th year student of the first cycle study programme "Bioengineering" at Vilnius Tech University, 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.	Data on the trends in the number of students and the dropout rates in 2018-2020
2.	Number of recognised foreign qualifications and students admitted to the Faculty of Physics in 2018-2020
3.	Statistics of career counselling received by the students at the Faculty of Physics in 2018-2020

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

Physics is one of the core subjects in any portfolio of study fields in a major university, serving not only the need to maintain physics capability in schools and universities but also serving a much wider community, for example, in physics-based technologies and industries, and providing specialized knowledge in many other academic and industrial disciplines from Physical and Life Sciences to Medicine. Physicists are also in demand in other commercial fields, from finance to information technology.

Given this broad range of potential destinations for physics graduates, the degree program must offer a broadly-based curriculum that provides graduates with the basic knowledge that "all physicists should know" as well as preparing them for the local jobs market, taking account of Lithuania's strength in optics. It also needs to provide internationally competitive graduates at all three levels – Bachelors, Masters and Ph.D. To this end, VU offers a suite of degree options at first and second cycle level:

First Cycle (B.Sc.): Physics, Applied Physics, Computing Physics and Modelling, High-tech Physics and Business.

Second Cycle (M.Sc.): Life and Chemical Physics, Laser Physics and Optical Technologies, Theoretical and Astrophysics.

An essential feature of a modern physics degree at first and second cycle level is the early involvement with current research, allowing the student to experience the thrill of research while acquiring through coursework the necessary background knowledge required to become a professional physicist. In VU, this starts during the second year of the Bachelor's program, which is excellent, and is integral to the Master's program, both culminating in a final thesis. This tests not only the students' knowledge of the field but also allows them to contribute to original research, and to develop the translational skills involved in the writing of the thesis itself – the discipline involved in structuring thoughts, creating a logical layout, assembling the information, performing the literature review, ensuring that all relevant sources are cited, and writing coherently and clearly. (The Ph.D. is always research-based.)

II. GENERAL ASSESSMENT

Physics study field and *first 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	5
6.	Learning facilities and resources	4
7.	Study quality management and public information	4
	Total:	**30**

*1 (unsatisfactory) - the area does not meet the minimum requirements, there are fundamental shortcomings that prevent the implementation of the field studies.
2 (satisfactory) - the area meets the minimum requirements, and there are fundamental shortcomings that need to be eliminated.
3 (good) - the area is being developed systematically, without any fundamental shortcomings.
4 (very good) - the area is evaluated very well in the national context and internationally, without any shortcomings.
5 (excellent) - the area is evaluated exceptionally well in the national context and internationally.

Physics 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	5
5.	Teaching staff	5
6.	Learning facilities and resources	4
7.	Study quality management and public information	4
	Total:	**31**

*1 (unsatisfactory) - the area does not meet the minimum requirements, there are fundamental shortcomings that prevent the implementation of the field studies.
2 (satisfactory) - the area meets the minimum requirements, and there are fundamental shortcomings that need to be eliminated.
3 (good) - the area is being developed systematically, without any fundamental shortcomings.
4 (very good) - the area is evaluated very well in the national context and internationally, without any shortcomings.
5 (excellent) - the area is evaluated exceptionally well in the national context and internationally.

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

The aims and the intended outcomes of the study programmes in the physics study field correspond to the goals of the Lithuania's Progress Strategy "Lietuva 2030" and Lithuanian Innovation Development Programme 2021-2030. It is also important to note that in 2019 LINPRA published the results of their initiated survey, which shows the critical need for an increase in the number of graduates in engineering and related fields for the development of the industry. In 2019 and 2020, during the main admission to the first-cycle study programmes, Vilnius University was the only university in Lithuania to start study programmes in Physics.

The Vilnius University's Physics study programmes are well in line with the needs of the society and the labor market. There are a few places of doubt, such as physics graduates working as engineers, which is not possible in many engineering fields. Also, the Self-Evaluation Report overemphasizes manufacturing, whereas the related R&D may be more important to the society and the economy as well. One key point is however the connection of the Laser Physics and Optical Technologies MSc, as graduates of this program align very well with the R&D sectors of Lithuanian laser industry. One also has to note the keen interest of Lithuanian employers on VU graduates from many of its physics programmes. In that regard, probably more frequent discussions and engagement between the University and a possible forum of employers could be favorable.

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

The mission and objectives of Vilnius University are defined in the Statute of Vilnius University. "The University, executing its mission, shall seek to preserve and enhance leadership in all spheres of science and education inherent in the nature of a classical university; promote scientific and artistic research of international level; create conditions for learners to acquire universal education based on the unity of scientific research and studies, to become committed, responsible specialists with strong need and abilities to pursue life-long cognitive and professional development, to be active participants in the activity of the State and in the life of society." There are a few further important goals:

- To conduct research of high international level.

- To form a creative, critical, responsible and continuously developing personality; to train competent, erudite scientists (researchers) and other highly qualified specialists.

- Allow members of the University community to effectively participate in international scientific and academic cooperation.

- Foster the significance of science in society.

It seems that the Physics study field programmes are well suited to achieve the above goals - although it is a very elusive target to achieve.

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

The SER states that "Physics field study programmes were created and are operated in accordance with the Lithuanian Qualifications Framework, the Description of General Requirements for the Provision of Studies, the Descriptor of Study Cycles, the Physics study field description of 2015 July 23 and Vilnius University Study Programme Regulations."

First and second cycle study program details, such as study credit amounts and their relative proportions are well documented. The study programme seems completely compliant with legal requirements.

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

Appendix 2 of the self-evaluation report describes the study plans, which represent the backbone of the teaching and the study programme, which is slightly updated/reorganized for 2021, as detailed in Appendix 15. Appendix 3 describes the contents of the individual study units. For each course the total student workload is given (note also Table II of the SER), the coordinating teacher is identified, and the relations between the course results and the competences and the learning outcomes of the study programme are shown. In the first-cycle studies, on average 250 compulsory contact hours are listed per semester, plus roughly 300 individual working hours. Second cycle programs are similar, except "Theoretical Physics and Astrophysics", where 288 compulsory contact hours in total for the four semesters are indicated. It is important to note furthermore that in first-cycle programmes the fourth year is oriented towards the solidifying of practical skills and research experience: 15 credits are allocated for professional practice or internship, which can be undertaken in a research lab or industry, and another 15 credits are collected for the final thesis (research project).

The proposed curricula follow international standards. Important topics are covered, and the sequence of topics is reasonable, so is the devoted credit number for each subject. Interesting and possibly useful subjects are listed as optional credits. Balance between contact hours and individual work hours is reasonable. There is a large difference in the number of contact hours and individual work hours among the three second-cycle programmes, which may reflect the complexity of these individual programmes. Let us finally note that professional

practice or internship provides the necessary training for first-cycle students to gain experience before entering the job market or starting second-cycle 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

Structure of the study programmes follows a logical setup, in par with international standards. In the first few semesters of the first-cycle programs basic knowledge is acquired, on which the subsequent semesters build. In Physics, this means mathematical and physical basics form the ground of the study programme; and are followed by more specialized courses. Second-cycle programmes assume basic knowledge of the field with deeper knowledge of some special fields.

The programme structures are logical and follow international examples and standards. They ensure consistent development of the competences of the students. For instance in physics they lead from algebra and mechanics to advanced topics in quantum physics, astrophysics, materials science and other subjects.

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

The first semester's programme contains only compulsory credits. In the subsequent semesters, an increasing fraction of elective courses is present. For example, in the reorganized first-cycle Physics programme, the ratio of elective credits to total credits is 0% in the first semester, ~15% in the second semester, 33% in the third semester, and 50% in the fourth year. On the other hand, there are not so many elective courses in the second-cycle programmes; in particular, there are none in "Laser Physics and Optical Technologies" programme. However, students can choose from the courses of other programmes.

There is ample room for specialization for the students, even though the list of elective courses is quite short. One would assume that much more elective courses are offered, but they vary yearly based on the projects and involvement of the faculty of the university. Altogether, students have enough opportunities to personalize the structure of their studies, to optimize learning outcomes.

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

Students choose the topic of the final thesis at the beginning of the last semester, and this can be a topic suggested by a faculty member or an external topic. In the latter case, a faculty consultant is also required. Final theses have to describe experimental or theoretical research performed by the student. This research is in many cases a continuation of their work during the compulsory practice (first-cycle programmes) or research project done earlier (second-cycle programmes). There is first an "internal defense" at the faculty, and then a review takes place, followed by a public defense in front of a commission approved by the Rector. Theses are also checked for plagiarism. The thesis, the thesis presentation as well as the responses during the defense are evaluated.

The thesis requirements comply with the field and cycle requirements. The standard for first-cycle theses to contain original research is high, and accordingly the attached example theses seem to be of high quality, containing interesting research results.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Well thought through curricula, which are up to international standards.
2. Well balanced compulsory and optional subjects.
3. Good balance of faculty members in terms of career levels.
4. Importance of the study field to the Lithuanian society and economy.
5. High quality theses produced.
6. Especially well linked second-cycle programme in laser physics.

(2) Weaknesses:

1. In some areas, there is too much emphasis on manufacturing whereas R&D is more closely related to the discussed study fields.
2. It is not fully clear why the number of contact hours and work hours is so different in the three second-cycle programmes. The differences in the ratio of contact hours to individual work hours could be better explained in the 3 second-cycle programme.
3. A bit more varied list of optional courses would have been better, although maybe this is the case just not all courses were listed in the documentation.

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

Physics topics related scientific activities in the Vilnius University belong to the world level. There are several world level recognized scientists, who have pioneered several topics. They publish in top level journals and also are invited lecturers in conferences. Especially strong competence is in the field of laser physics. There is modern infrastructure and a lot of unique equipment in the region. All research infrastructures are listed in the Mapping of the European Research Infrastructure Landscape. Main users are researchers, students (bachelors, masters, and doctoral students), scientists from other institutions and representatives of companies. In collaboration with social partners and also using EU structural funds, there have been renovated/elaborated several high-quality practice lab facilities. In the period of 2017-2019, the members of research and teaching staff of the Faculty published a total of 1080 peer-reviewed scientific papers in the field of physics and astronomy, list the Web of Science database. 76% of these papers are published with international partners, highlighting a fruitful and long-standing tradition of international

collaboration developed by the Faculty members. Vilnius University scientific achievements in the field are reflected in 2019 QS World University ranking where Vilnius University is ranked among the top 300 universities in the subject of Physics and Astronomy and among 350 in 2020. The overall ranking of Vilnius University was 488 in 2019 and 458 in 2020, indicating that Physics is not only rated in high place overall, but also significantly higher than the average of its own university.

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

The science and teaching are naturally linked in VU. The newest scientific findings that are published in the leading journals are presented to students during the lectures. The scientists, who are involved in science activities and are familiar with corresponding field state-of-the-art can create proper set of knowledges needed for students. Lecturers consistently monitor the latest literature and update the compulsory and supplementary literature lists reflecting the latest publications. The teaching materials include not just textbooks, but also contemporary examples from the industry, case studies. Also, there is a close link between the research interests of the teaching staff and the course units they deliver. This allows lecturers to consistently integrate their research findings into the content of the taught subjects, actively share them with first and second-cycle students, ensuring that student abilities are educated based on the latest knowledge and on appropriate teaching methods. Beside the high-level research many VU scientists are involved into the technological activities. They have elaborated spin-off companies and provide services to companies.

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

In the first-cycle programmes, science activities are integrated into the field studies via two main programme components: professional practice and final thesis preparation. Both of these take place either in industrial, or scientific physics or engineering laboratories at the Faculty or other institution. Students are introduced with the possibility to participate in scientific activities from their very first days in the Faculty. In many final theses strong emphasis is put to the high-level practical works. It is not a rare case, where at the end of the second cycle studies graduate has already scientific track record in peer reviewed journal together with supervisor. The teaching staff of the first-cycle Physics field studies is encouraged to integrate their research into the taught course units. Several courses are directly related with the current scientific activity of the teacher, in these courses newest research results are presented to the students as examples, or problems for exercises. Beside receiving a fundamental knowledge from university, technological input is also gained from the industry. In Lithuania there are several laser companies that provide practice places for students and later offer job position. The knowledge transfer is bilateral. Site visit interviews confirmed that many social partners representatives deliver lectures in the VU. This provides most recent technological information that is currently available. Site visit confirmed that graduates' fundamental skills are excellent. However, more case studies approach should be implemented to lectures for allowing students to fully exploit their knowledge background in

problem solving cases. Each year Students' Scientific Society organizes an international students' scientific conference "Open Readings", in which scientific work is presented not only by students of the Physics Faculty of Vilnius University, but by students from other Lithuanian and foreign universities as well. This conference is exceptional as it is organized only by students. There are oral and poster presentations. For oral sessions, prominent researchers are invited to give review talks on their respective fields. For example, in 2019 "Open Readings" a Nobel prize laureate of 2018 Gérard A. Mourou has given a keynote speech.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Physics Faculty research is at a high level, which strongly supports Physics field studies. Among 350 best universities in QS University ranking by subject in Physics and Astronomy in 2020.
2. Research output is integrated into study activities, and final theses are of scientific nature.
3. Students are actively participating in research activities: in national and international scientific conferences, are co-authors of scientific publications, work in research projects and scientific internships.
4. Link with social partners who deliver lectures.
5. Annual students' scientific conference.

(2) Weaknesses:

1. Integration of problem case studies should be more involved in the lectures.

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

Admission to first-cycle studies of Physics study field is carried out during the General Admission period in accordance with legal acts and procedures of Lithuania and VU. They define requirements for admission, the composition of the admission grade and the methodology for its calculation. Procedure also foresees particular cases when additional points may be added to the admission grade. Information about study programmes as well as admission requirements is publicly available on VU websites as well as other places and is widely publicized (LAMA BPO, various publications, live Facebook events, etc.).

Admission to second-cycle studies of Physics study field is conducted in accordance with Vilnius University Admissions Procedure for Second-Cycle Study Programmes. Graduates of

first-cycle study areas of physical, engineering and technological sciences, as well as graduates from life sciences study field can apply. Graduates from other study fields can also be accepted after finishing subjects of General Physics and Higher Mathematics as well as defending thesis on topics related to the field of physics or technologies.

Admission process to second-cycle studies differs for non-EU/EEA nationals. The admission grade is not calculated. These applicants must provide their motivational letter along with documents proving first-cycle education. Then a committee decides whether the applicant satisfies the level of competences required to study in second-cycle programmes.

A steady increase of applicants to all first-cycle study programs is observed in the last three years. First-cycle programmes are becoming more popular as other priorities as well, though most of the admitted students tend to choose a particular programme as their first priority. It can be seen that the number of signed study agreements also increased last year throughout all first-cycle study programmes. Almost the absolute majority of the students in both cycle programmes are invited to study and sign study agreements for state-funded (SF) places.

Number of applicants for the second-cycle studies has stayed largely the same with the exception of *Laser Physics and Optical Technologies* study programme which managed to steadily increase the number of applicants during the last three years. Also, there is a significantly smaller number of students choosing Physics field second-cycle programmes as other priority in comparison to the 1st priority. As for non-EU/EEA students, in the period of 2018-2020 there was only one non-EU/EEA student admitted to the Physics field study programmes in 2020.

Admission process of Vilnius University is well in line with national and university legislation. Criterias are logical and well constructed. As the ratio of best secondary school graduates compared to total admitted students is fluctuating without a particular trend it can be concluded that the ratio is not dependent on the active efforts of VU. University ought to consider active ways to attract the best talent. The expert panel would suggest to review the admission process of non-EU/EEA students to make sure that the assessment of applicants' competences is carried out in a transparent manner, according to pre-established criteria. More ways to attract non-EU/EEA students should be considered, in case their excellence is on par with that of Lithuanian students.

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

VU conducts academic recognition of education and qualifications related to higher education and acquired under the education programmes of foreign states and international organizations in accordance with a right granted by the Minister of Education and Science of the Republic of Lithuania.

Each foreign qualification is evaluated and a decision about its academic recognition is made individually. VU ensures the consistency of qualification recognition practice by basing each decision on available information and the practice of evaluating and recognizing similar or

equivalent foreign qualifications. In recent years the number of qualifications recognized has risen from 2 in 2018 to 15 in 2020.

Formally or informally achieved learning outcomes can be recognized for persons admitted to studies in the field in accordance with relevant procedures of VU. Formally achieved learning outcomes can be recognized on the basis of a study content that may or may not be specified in the study agreement. For persons who have studied in another country or higher education institution and wish to continue their studies at VU study results are recognized by evaluating their correspondence to formal and course unit (module) requirements. No more than 75 % of the scope of first- cycle, second-cycle, integrated and joint study programmes may be recognized.

Regulations for the recognition of competences acquired by students informally and/or through self-education and the credit recognition of course units enable the recognition of student competences acquired through employment, volunteering, internships, etc. No more than 50% of the scope of a programme can be recognized. Decisions regarding the recognition of learning outcomes are taken by SPCs. During last three years, no procedures of recognition of competences acquired informally and/or through self-education were initiated.

All procedures of recognition are in line with the national regulations.

Only VU students can have their competences acquired through non-formal education or self-education recognized. The expert panel would suggest expanding the number of eligible people to have their competencies recognized.

Considering that during the last three years no procedures of recognition of competences acquired informally and/or through self-education were initiated, the expert panel would suggest reviewing these procedures and determine why the number of applicants may be so low.

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

Field students of all cycles have the opportunity to spend a semester or a year studying abroad, Erasmus+, ISEP, Nordplus or under bilateral cooperation agreements. The University has 51 Erasmus agreements for first-cycle and second-cycle studies with foreign universities related to the physics study field. Recently the scope of international opportunities for students in the field has further increased, as VU became a member of ARQUS European Universities Alliance. As well, students of the field have the opportunity to visit 38 universities that belong to COIMBRA, a network of oldest European classical universities. All information about mobility opportunities is available on the University and Faculty websites. It is also being presented in the newsletters sent to the University community, during informational meetings with students organised each semester by ERASMUS coordinator at the Faculty, and also during various informational events during admission period and freshman integration week.

During the last 3 years approximately 10 first-cycle and 3 second-cycle students have left for part-time studies every year in the Faculty of Physics. The University and the Faculty are formulating the means and setting up the procedures for coordinated student mobility within the ARQUS alliance. These measures aim to increase student mobility and bring it to a different level.

Faculty does not operate first-cycle Physics field programmes in English. However, starting from the 2019-2020 academic year the second-cycle study programmes of Physics field, Theoretical Physics and Astrophysics as well as Life and Chemical Physics, are offered in English as well as in Lithuanian. As of now, only one foreign student has enrolled in Theoretical Physics and Astrophysics study programme. Even though this number is low, we expect it to rise in the future. Also, the courses from these programmes are offered for incoming exchange ERASMUS students as one of the ways to increase their international profile.

Expert panel believes that students have a lot of opportunities for academic mobility although the number of students that use these opportunities is quite low. University has analyzed the reasons for rather low mobility numbers and the expert panel believe that most of them are outside of the administration's influence.

The expert panel would suggest to consider the need for first cycle programmes partially taught in English, that may help to attract more students from EU/EEA and non-EU/EEA countries to second cycle studies and raise overall number of international students. In contrast to that, the expert panel agrees with teaching the entire second-cycle study programme in English.

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

In VU, academic support to students is provided at each Faculty; centralized support is provided by the Student Services and Career Department. Not only Lithuanian, but also international full-time, Erasmus+ or bilateral exchange students can receive counselling. In 2018, over 14 thousand VU students (over 20 thousand in 2019 and 2020, accordingly) received centralised counselling. There is no data on how many of these students are from the Physics study field. Physics study field students are additionally counselled by an academic counsellor at the Faculty.

Volunteer University teaching staff and alumni share their personal experience during the mentorship programme, thereby contributing to the personal and professional development of the students and strengthening the University community. In 2020, 103 volunteer mentors from various fields and 123 students participated in the program, as in 2019, 78 volunteer mentors and 80 students took part in the programme. There is no data on how many of these students are from the Physics study field. Currently, only one teacher from the Faculty of Physics is participating in the programme.

The Student Services and Career Department offers career counselling. In 2020, 499 individual career counselling sessions were held. In 2019, that number was 352, twice as many consultations as in 2018. In 2018 - 5, in 2019 - 14 and in 2020 - 49 of these students were from the Physics study field.

The primary form of social support for students is financial support. Students can receive scholarships: incentive scholarships, social scholarships, one-off earmarked scholarships and one-off social grants. Incentive scholarships are given to students for very good learning results. About 10-15% of students every semester receive an incentive scholarship. Incentive scholarships come in two sizes of 58,5 EUR/month and 97,5 EUR/month. Around 30% of students who receive incentive scholarships receive larger scholarships. One-off earmarked scholarships are distributed every semester by VU. These scholarships are given to students who distinguished themselves in scientific, cultural or public activities as well as sport. The size of this scholarship for a particular student depends on the level and amount of achievements. Data shows that some Physics field students usually get this scholarship. Since this scholarship is given for activities beyond ones conducted during studies, the number of students fluctuate. Also, while students in the first-cycle tend to get this scholarship mostly for sports, public or cultural activities, students in second-cycle usually get this scholarship for scientific activities. One-off social grants are given to students who face a problematic situation which causes additional expenses (serious illness of a close family member, an accident, etc.). These grants are being asked very rarely by students of Physics field and in 2017-2018 one student received it, in 2018-2019 – 1 student, in 2019-2020 – 2 students.

Dormitories are available for students from other cities. The students of the Faculty usually receive accommodation at the dormitories located at the end of Saulėtekio ave. within 10 minutes of walking distance from the Faculty of Physics building. Disadvantaged and / or disabled students receive a discount on the dormitory fee.

VU has a Counselling and Training Center where students can receive professional psychological counselling. The Center offers a limited number of free physiological consultations for students with need, additional consultations with discounts covered by the university. The Center also has crisis consultations when physiologists react as soon as possible in critical situations.

The expert panel believes that the University and the Physics faculty have very good and extensive student support systems. The panel would recommend to track the number of students from each faculty that use these systems and gather feedback about the quality to better judge the effectiveness of the support that is provided.

3.3.5 Evaluation of the sufficiency of study information and student counselling

Students who were accepted to the first-cycle studies initially are introduced to their study programmes during VU integration week, during which new students are presented with a special schedule of lectures and meetings. Integration week 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 of respective study programmes, invited alumni of the programme share their experience and other activities that help students to better understand all the opportunities available.

Information about studies is always provided at several levels: general information about the study process is provided centrally by the Student Services and Career Centre, while information specific to academic units is provided by the Faculty of Physics administration, and in individual meetings with academic consultants and lecturers. Information is also provided to students in the Faculty of Physics: during meetings with vice-deans for studies, heads of study programme committees and an academic consultant. Information is constantly provided by e-mail and is available on the Faculty website. Information about the study process is also provided to students through Vilnius University Study Information System (VUSIS): a student can see their personal data, relevant orders, the study plan, session schedule, results, etc.

All first-cycle programmes have a subject called Study Skills and Work Safety in the first semester. This is an introductory subject which contains information on studying techniques, study regulations, academic ethics, computer software and hardware basics for academic tasks, activities, etc.

The freshmen of the second-cycle studies can register and participate in the introductory activities offered to the first-cycle students. Additionally, they start the studies with the meetings with members of the study programme committee and invited alumni of the programme and discuss how their studies will be carried out, what are the possibilities for scientific research topics and elective subjects. Second-cycle students also have an introductory lecture of vice-dean for studies which cover most important aspects regarding the logistics around the campus, scientific research work and other topics.

The expert panel think that the level of counselling that is received by the first and second cycle students is commendable. During the site visit students also praised the amount of counselling they received, although some of them question the need for a subject called Study Skills and Work Safety as students think that the time allocated to this study subject might be used more productively. Thus, the expert panel would suggest reviewing this study subject.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. A steadily increasing number of applicants to all first-cycle study programs over the last three years.
2. Extensive student support and counselling systems.
3. A lot of opportunities for academic mobility of students.

(2) Weaknesses:

1. Conditions for (incoming) academic mobility are not fully exploited.

2. Reasons for the low number of people applying to have their competences acquired informally and/or through self-education recognized are not yet analyzed.

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

The study program offers a wide range of teaching and learning methods, including such rather well-known ones like lectures as well as those that allow collaborative work among students. The faculty emphasizes methods which improve immersive learning through a huge identification with the given tasks. Those research-oriented elements can be found in the form of problem-based-teaching and writing of essays, for example. The students are asked to contribute to conferences, to present and even publish the results of their own research projects. This effort demonstrates the involvement of the faculty for a modern and highly appropriate study program.

A "professional practice" (internship, 15 credits) is a mandatory part of the first-cycle program. It is fixed that this internship is located in the faculty, another Core Academic Unit (CAU) „or other scientific institutions or enterprises" (SER, p. 52). A more detailed description of the aims of this internship and something about the typical procedure along the used period would be helpful to agree on the information which can be given to students („performing various tasks and activities in the practice place environment", SER, p. 52).

Apart from the compulsory courses, the students have the opportunity to choose different locations for their „scientific research work" (SER, p. 52). This is quite a good step to prepare oneself for the research which is the basis for the Master thesis. However, this work should not be used to extend the time and amount of work for the thesis itself, as it was suspected in the meeting with the social partners, employers and alumni.

Between one-third and a half of the students continue their studies after receiving their first grade with one of the Master programs. However, a huge part of them is already in employment at the same time. This is understandable on the one hand, on the other hand this increases the risk of an unwanted long study duration (SER, p. 59). Just a very small part of the students continue their scientific work after the second cycle (SER, p. 59). This may cause problems in the search for candidates for a career as a researcher.

The discussion with the social partners has shown that the graduates of the university in Physics are very welcomed. The competencies received in both first and second cycle are highly requested. However, it seems not to be really necessary to distinguish between four

different Bachelor programs. What is needed at the beginning to understand physics is the same for all purposes. Moreover, it is quite difficult for high-school graduates who apply for physics to decide which of the programs fits best to their own interests. This pertains particularly to the program „High-tech Physics and Business“: it contains of course classical (general) physics in the beginning, but there is a rather small part of courses addressing business tasks in the whole program, so the expectations which are triggered by the program's name run into the danger of staying unsatisfied.

To sum up, the teaching and learning process, contents and methods fit the needs of the students. The compilation of the study programs is comprehensible but causes the need for preparing good information material and counselling.

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

Following the SER p. 54f, an academic leave is provided by the university in case of illness or in cases of childbirth and childcare. Several measures are described to adapt the study process for people with special needs and for social vulnerable groups, particularly counselling for different needs plays an important role.

Students with visual or auditory disabilities will be supported with assistance in the classes or the laboratory and extra learning material. Not all teaching rooms and laboratories do already allow access for students with movement disabilities. These challenges need to be solved individually in each case.

The faculty is aware of socially vulnerable groups and students with special needs, as it is mentioned in the SER (p. 54f). The discussion with the staff indicated in addition that they are highly committed with teaching tasks and for that reason interested in finding solutions even for particular problems.

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

The faculty emphasizes constructive alignment, the coherence between the contents of teaching and of the examinations. Every teacher is responsible for the assessment in her/his course. The development towards a higher number of cumulative exams distributes this responsibility among more persons. The responsibility for other assessments is clearly arranged.

If students fail, then a bundle of measures is executed (information, training, counselling - SER, p. 56). The progress of all students is monitored by the University's administration. Additional data about the drop-out rate was given during the site-visit. This rate is higher at the beginning than in later semesters - which is not unusual because of the necessary orientation of the students.

On course level, the teachers are responsible for giving feedback to the students. Other feedback seems to be organized well, some is more or less informal, of course. There are several instruments which allow the students to give feedback to the university. One part is a questionnaire for anonymous course evaluation. However, the students seemed to be not sufficiently informed about the purpose of their opportunity to contribute. Even the mechanisms from the questionnaire up to a reaction of the teachers or changes in the study program are not well-regulated and entirely described, as was mentioned in the discussion with the student representatives.

About ¾ of all students get grades 9 or 10 for their final thesis. This is of course the result of a long and successful study. However, this practice allows weak distinction between the graduates and is for that reason not helpful for the job market and the students themselves as well.

To sum up, the faculty is highly interested in the development of their students. Particularly they are looking for contact with the students and to receive informal feedback. The students are provided with feedback both informally and formally (with the examinations). Only the practice of giving grades for the final thesis should be reconsidered.

More detailed information about the average duration of the study between start and final examination should be prepared for the discussion about changes in the study programs.

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

The university provides data about employability of the graduates. This data is given both by a state information system and the university itself. For the purpose of career tracking subjective data are requested one, three and five years after examination. Both table 17 and table 18 of the SER indicate a very good rate of employment of the graduates after the first cycle (approx. 70% in high qualification jobs) and an extremely good rate (nearly 100% in high qualification jobs) after the second cycle.

That very good situation was confirmed during the site-visit by the social partners and the alumni as well.

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

All first-cycle students are obliged to attend a course „Study Skills and Work Safety“, where tasks like study techniques, work safety and academic ethics are also included (SER, p. 50). An anonymous hotline for the report of problems and issues is available (SER, p. 62). No complaints were brought to the Faculty of Physics Academic Ethics Commission during the last three years.

The faculty seems to be well prepared.

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

There are procedures to deal with appeals and complaints in a formal way. During the last three years, four appeals have been brought in by students (these have not been satisfied, reasons are given).

Both the SER and the discussions with the management and the teaching staff illustrated very well that the faculty is highly interested to solve any problem together with persons affected before the problem evolves.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. The members of the Faculty are highly interested in study programs of high quality.
2. They are also interested in the development of the students. This is recognisable both through the formalized processes all around the study programs and the more informal feedback situations.
3. The study programs in general fit to the needs of the students and the job market as well.

(2) Weaknesses:

1. The feedback from teachers to students is well organized, but the feedback mechanism of the course evaluation could be improved.
2. The separation into four different Bachelor programs could be reconsidered.
3. The practice of giving grades for the final thesis should also be reconsidered.

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

The majority of the teaching staff in the Physics field study programmes are permanent or long-term (5 years or longer) employees of the Faculty. In addition to teaching duties, they are involved in scientific research. Time sharing between teaching and science is different among the faculty members. Research/teaching staff actively participates in the research projects and is successful obtaining them. “The equivalent positions of teaching and research academic staff are as follows: Professor/Research professor; Associate professor/Senior researcher; Assistant professor/Researcher; Teaching assistant/Research assistant; Lecturer – teaching only. According to State and University regulations, only persons with doctoral degrees are

eligible to take the positions of Professor/Research professor; Associate professor/Senior researcher; Assistant professor/Researcher" (SER, page 65).

All teaching staff members actively participate in scientific research in the physics, astronomy, material science fields. The numbers of main teaching staff involved in teaching of the study field under evaluation in 2018/2019 was 109 and 219 was the amount of corresponding total academic staff in the faculty. The vast majority of the academic staff are Professors/Research professors or Associate professors/Senior researchers. 8 of the teaching staff members have obtained their doctoral degree or completed long-term post-doctoral training in universities abroad. 3 professors (A. Dubietis, G. Juzeliūnas, G. Tamulatis) are full members of the Lithuanian Academy of Sciences and professors A. Dubietis and G. Juzeliūnas are Vilnius University Distinguished Professors.

There is a clear procedure for VU teaching staff employment and for a regular evaluation. Research staff vacancies are filled on bases of public competition typically for a five years period.

During the evaluation following criteria are considered: the number of published research articles, conference attendance, research supervision, teaching (incl. student feedback), study course development, published teaching materials, training to upgrade teaching and scientific qualifications, participation in the doctoral studies process, student research supervision, expert, organizational, and other research activity. During the evaluated period 7 new persons have been employed. Main part of newly employed staff are young researchers starting their careers.

According to the results of the survey performed in the autumn semester of 2019, 95% of the teaching staff of the Faculty declare that they know English language at least at the B2 level. In the MA programmes where a significant part of the curriculum is dedicated to students' research projects, about 15% of project supervisors are from high-tech industries.

Vilnius University scientists/teaching personnel field related competence is proved by remarkable numbers of high-level publications and invited talks in the conferences. Site visit confirmed that students are satisfied with their pedagogical level and lecture delivering methods. It should be noted that during the pandemic situation in 2020 lecturers promptly changed their contact lectures to on-line ones. Site visit interviews with students proved that no loss in knowledge transfer took place.

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

As stated in the SER p. 69, "University encourages the members of the academic staff to improve their competences by participation in local and international scientific and educational conferences and meetings, schools, seminars, training, visits to other research and higher education institutions, etc.".

VU staff mobility financing is typically foreseen from scientific proposals/projects. Vilnius University also circulates announcements about different mobility funding possibilities from

other Lithuanian or European institutions (e.g. ERASMUS+). In case of mobility co-funding (up to 50%) needed, Vilnius University has a strategic fund for supporting study related international initiatives.

8 teachers from foreign universities came for ERASMUS teaching visits to the faculty during 2018-2020. Each year (except 2020) about 8 world top-level scientists give their lectures at the conference. For example, in 2019, Gerard Mourou; in 2018, Roel Baets; in 2017, Ben Feringa were among invited speakers of this conference for students.

Physics Faculty activities are strongly oriented toward scientific research and development and staff mobility improves competences. In 2019 there were 174 conferences visiting events of the academic staff. Total number of business trips in 2019 was 425.

As stated in the SER p. 70, 90% of the main teaching staff of the study programmes have participated in the international mobility to improve their scientific competences at least once. During the evaluation period all teachers have participated in the national or international scientific conferences, seminars, schools or courses held in Lithuania.

Site visit confirmed that university supports teaching staff mobility via different programs. There is also mobility support from scientific projects, where secondments are foreseen. Current pandemic situation has remarkably decreased the visits, but there is still a track record and with improved situation lecturers are willing to restore their mobility habits.

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

As stated in the SER p. 72, "in 2017, Vilnius University established the Center of Educational Competences whose mission is development and improvement of the teaching and educational competences of the academic staff." The mission of the Center is to organize different level short- and long-term courses, seminars, etc. for VU teachers to improve their teaching and curriculum related knowledges. Course participants receive certificate afterwards. Those activities are funded by the University and are without charge for VU personnel. Information about upcoming courses are distributed via emails and also through VU Intranet.

According to the SER p. 72, "in 2018, 3 teachers completed 8 hour courses, and 1 teacher completed a 20 hour course. Overall, teaching staff can develop their teaching skills in numerous different training programmes the duration of which range from 3 to 40 hours. In total 20 teachers of the field study programmes participated in the courses. The most popular training programmes 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."

Feedback from Teaching staff confirmed their satisfaction with the training possibilities provided by the Vilnius University. Training sessions allowed participants to share their experiences with each other.

As stated in the SER p. 72, "in 2020, 16 teachers from the faculty participated in the programmes offered by the Center to improve their educational competences. However, the main peculiarity of 2020 is the sudden and inevitable transition to distant learning. Nearly all staff members involved in teaching participated in the on-line courses and practices on using available software for distance learning, modifying their courses for distance learning, on students' evaluation techniques for distant learning, etc."

In 2020 126 people took part in contact training, 869 people took part in distance trainings, and the records of these trainings were additionally reviewed 944 times. 127 people took part in a special training program for new teachers.

There are regular courses for improving staff IT and communication skills. The information about training is centrally distributed. University staff are motivated to participate in training, whereas it is part of the regular evaluation procedure.

Site visit confirmed that teaching personnel have improved their pedagogical and scientific competences. Besides participating in courses offered by VU, teachers have exchanged their personal experience between themselves.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Competent and motivated teaching personnel with strong scientific background. Successful participation in scientific grants competition.
2. Strong university support for improving pedagogical competences via different activities.
3. Lecturers from industries.
4. Visiting top-level teachers.

(2) Weaknesses:

1. University should invite more visiting lectures from industry for direct knowledge transfer from latest technological achievements.

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

Currently, the Faculty of Physics occupies three separate buildings. In particular, it contains 15 lecture rooms at the main location, Saulėtekio Ave., and several lecture rooms in the Laser Research Center and the National Center for Physical Sciences and Technology. The total capacity of the rooms exceeds the number of students in the first- and second-cycle studies. In addition, the teaching process involves modern and fully equipped 20 teaching laboratories and 8 research laboratories, which are freely accessible by the students. Each teaching laboratory has a supervisor and is supported by a particular department of the Faculty. The Faculty repairs the rooms annually to keep the teaching facilities fully serviceable and allocates 250 EUR/year/lab for restocking consumables. Also, some equipment uninstalled from the scientific laboratories is reused in the teaching laboratories. In addition, the Faculty has an 8000 EUR/year fund that is used for some additional expenses beyond usual and is administered by the dean's office. The supervisors of the laboratories discuss their proposal for the upgrade/renovation of some set-ups with the vice-dean for studies. Their plan for further improvement of the facilities is relatively modest; thus, showcasing the very good conditions that are already established; see the detailed discussion on the planning and upgrading of resources in Section 3.6.2.

In addition to the lecture rooms and teaching laboratories, Physics students gain access to state-of-the-art scientific laboratories to gain practical experience and conduct research for their final thesis. They are also supported by access to some of the typical software used in research and studies, such as MS office 365, MATLAB, OriginLAB, etc. Furthermore, they can use computer classes and VU HPC supercomputer, if necessary, for their studies and research.

Books and periodicals are stored in the Vilnius University Scientific Communication and Information Center (SCIC), which provides state-of-the-art library functionality and operates 24/7. It is particularly important to note that SCIC involves students and teachers in updating their resources. Students are also able to access databases and other electronic materials subscribed by the university. The list of electronic databases subscribed by Vilnius University for the Physics study field includes but is not limited to American Physical Society (APS), Science, and Nature journals. Furthermore, Vilnius University is subscribed to a list of electronic book collections, and they have an ongoing activity of digitization of books. The overall list of the subscribed electronic material seems to be sufficient for the first- and second-cycle studies.

The Faculty has remained consistent with the development and refurbishment of its facilities and teaching material over the years. Also, their response to COVID-19 related issues was rapid, innovative and very effective, quickly creating a virtual teaching environment and working with social partners to create lab kits for experiments at home. However, there are still several weaknesses that are in the plans but are yet to be addressed. These are mainly refurbishment of some of the teaching laboratories, e.g., electronics, further digitalization of the books, and not all of the students are aware of the available software access; this could be improved via tools of mentorship and guidelines. All considered, the resources of the Faculty are on a very good level, and the Faculty is on the right path to make them excellent.

On a side note, whenever possible, one could consider open-access alternatives to some of the software. This helps students to work on their tasks outside of the computer classes and avoid any legal issues students may face.

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

The plan for facilities improvement includes four priorities: establishment of new teaching laboratories, renewing furniture in some of the classrooms, renewing equipment of the electronics teaching lab, and installing 3 new stationary conference cameras in teaching rooms, the latter being quite an essential step in the pandemic situation. This is expected to be carried out with the help from the social partners.

The plan does cover the main issues, however, there could be a schedule as well as better communication strategy with social partners instead of the case-by-case problem solving as it was with the COVID-19 lab-kits. Social partners are supportive and could be involved more often (according to them, at the moment, they are contacted once per 2 - 3 years).

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Annually allocated funds for the refurbishment of rooms and consumables.
2. Involvement of students/teachers in the selection of resources such as books, etc.
3. High-level library access and the latest improvement on e-resources.
4. Quick reaction to COVID-19 related issues (lab kits, virtual class rooms, etc.).
5. Access to high-level scientific laboratories.

(2) Weaknesses:

1. Lack of scheduling/timetable regarding planning and upgrading of resources.
2. Lack of strategic communication with social partners as at the moment it seems case by case communication instead of long-term and continuous solution.
3. Some of the teaching laboratories, such as the electronics lab, require full renovation.
4. Not all of the students are aware of the access to the available software.

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

Each of the four first cycle and three second-cycle courses have a Study Programme Committee (SPC) that is responsible for all aspects of the course structure, contents, monitoring and quality assurance. Each SPC is chaired by a senior member of the academic staff and has as members three or four members of the teaching staff, at least one social

partner, and a student representative. These meet at least once per term, and report to the Faculty Council at least once per semester, and usually (especially for the first-cycle courses) more frequently. The SPC Chairs, along with a representative of the students and (if none of the SPC Chairs is from the Department) a representative of the department, form the College of Studies, which advises the vice-dean for studies about changes to the study programs; significant changes require approval of the Faculty Council and, for major changes, by the University Senate. The SPCs are being reformed following the revision of the basic course structure. This system is compliant with the Internal Study Quality Assurance program at Vilnius University and is in accordance with European Higher Education Standards and Guidelines.

There is strong and responsive management of the teaching program in all SPs, with frequent monitoring, active involvement of the key stakeholders, and good connection to the faculty. The current changes to the course structure are appropriate and should lead to a better integrated suite of study options and more efficient uses of resources. Teaching staff and students are fully involved in the process, and there is good monitoring and feedback, although students do not seem fully aware of the use made of their input. There is very good engagement in the process.

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

All major stakeholders (teachers, students, social partners) are fully engaged with the SPCs and in the wider course-related activities, and actively participate in the discussions. In particular, the students are involved in decision making.

The active involvement of the major stakeholders in the SPCs is impressive, and was underlined during the discussions with representative stakeholders. With the revised course structure and the new SPC, it might be worth considering a slightly larger SPC with a greater involvement of social partners. The Student Representation (as opposed to the formal membership of the SPCs) and general inclusion of students in key faculty committees is also welcome.

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

The University's Study Information System (VUSIS) is used to compose, review, and edit study programme plans, and allows the review of students' information, including evaluations, elective subjects, and final thesis topics, and other relevant information, which is presented to the College of Studies and Faculty Council, where trends are analysed and discussed.

The Department has, through the VUSIS, access to a comprehensive record for each student, allowing the progress of each student to be monitored, as well as allowing aggregated statistics to be accumulated to inform about the quality of the course teaching and other features. This is used to refine the courses and drive a program of continuous improvement. There is some evidence from the statistics on the proportion of those graduating in the 4th

year out of those entering the program in the 1st year of a general improvement over the past four years, from around 63% to nearly 70%. The students reported that the information provided was adequate to enable them to assess the courses before choosing the SP.

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

At the end of each semester, the students and teaching staff are surveyed about the general levels of satisfaction with the specific courses and more generally. These are available on the intranet. In addition, the Students Representation collects the opinions of smaller groups of students annually on specific issues.

The response rate to student surveys is quite high (around 80%). Generally, the level of satisfaction with the courses is high – around 80% (75%) of first (second) cycle students would recommend the course to others, with some variation between the different courses with computational physics, theoretical physics and astrophysics being the most highly rated. While the quality of the teaching is highly considered by the students, some teachers (as might be expected) perform less well, and there are some concerns that the continuous assessment of their progress is less consistent with the overall aims. The engagement with the scientific research program is much appreciated, and students are generally satisfied with the skills acquired and their access to the jobs market. There are some specific criticisms of specific modules (for example, that there is too little "applied" physics in the applied physics SP), but these may be addressed in the revised course structure. The general trend is a modest improvement in the levels of satisfaction through the last few years, particularly for the first-cycle students – there are too few second cycle students to extract short-term trends.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Strong engagement of all stakeholders in the process.
2. Highly motivated students.

(2) Weaknesses:

1. The feedback to the stakeholders (principally the students) on the impact of their input to the SPC is not as effective as it should be.

IV. EXAMPLES OF EXCELLENCE

Firstly, the Panel were very impressed with the exceptional quality of the teaching faculty, who were strongly motivated and engaged, but also open, self-critical and realistic. There was an excellent balance between teaching and research, particularly in their pioneering work in laser physics, and they were strongly committed to the individual development of the students.

Secondly, and perhaps related to the first, the Panel were very impressed by the strong motivation and enthusiasm of the students. Their comments on the study programs were well-considered and well-articulated. The students were well integrated into the department, and had excellent communications with the teaching and research staff.

Thirdly, and again perhaps related to the first two, the early engagement with current research as part of the first-cycle study program. This is particularly important in maintaining enthusiasm for physics; this is reflected in the high quality of the theses.

Finally, the teaching classrooms were well equipped, and the smaller classrooms light and airy, creating an excellent environment for learning and study.

V. RECOMMENDATIONS

Evaluation Area	Recommendations for the Evaluation Area (study cycle)
Intended and achieved learning outcomes and curriculum	1.1. Consider permeability of first-cycle programmes in the first two years. 1.2. Organize discussions and engagement between the University and a possible forum of employers more frequently.
Links between science (art) and studies	2.1. Consider how to integrate more realistic case studies into the first cycle study program.
Student admission and support	3.1. Consider reviewing the admission process of non-EU/EEA students to make sure that the assessment of applicants' competences is carried out in a transparent manner, according to pre-established criteria. 3.2. More ways to attract non-EU/EEA students should be considered, in case their excellence is on par with that of Lithuanian students.
Teaching and learning, student performance and graduate employment	4.1. Encourage the students to make use of the anonymous course evaluation more often. This could contain the strengthening of the request and the communication about the purpose. Also the mechanism could be reconsidered (the feedback should be given during one session/lecture; if it is given not later than ⅔ of the semester, the teacher can even discuss the results in the last weeks). Follow up on evaluations could be considered as well (in case of extreme scores and text comments indicating worst/best practices). 4.2. Reconsider the practice of giving grades for the final thesis. Discuss standards or criteria. (If too many students get 10, the grade contains no message.) 4.3. Consider the reduction of the number of distinguished first cycle programs. (The social partner would appreciate a broad Bachelor program, and the high-school graduates are forced to make a decision very early. Option: Just one Bachelor-program which separates after two years in different focuses.)

Teaching staff	5.1. Advertise faculty positions in international job registers. (Terms then can include that hired candidates have to learn Lithuanian in 2-3 years, and can teach English BSc or MSc courses in the meanwhile.) 5.2. Develop a strategy for the employment of new teachers, especially young PhDs. It is not sustainable to rely solely on their personal motivation.
Learning facilities and resources	6.1. Develop communication strategy with social partners. They are quite supportive and could be involved more often (according to them, they are contacted once per 2 - 3 years). At the moment it seems to be case-by-case as it is with the Electronics teaching laboratory or the COVID-19 lab-kits. 6.2. Not all of the students are aware of the available software access. This could be improved via tools of mentorship and guidelines. 6.3. Whenever possible, use open-access alternatives to some of the software. This helps students to work on their tasks outside of the computer classes and avoids any legal issues students may face.
Study quality management and public information	7.1. Consider whether the number of social partners in the Physics SPC should be enhanced.

VI. SUMMARY

Intended and Achieved Learning Outcomes and Curriculum

The main positive aspects are that the courses are well in line with international standards, with a good balance between core and elective elements, which produces graduates with an excellent grounding in physics, and skills relevant to the local needs. The early involvement in current research is exemplary. There are no serious weaknesses, although there is perhaps too much emphasis on manufacturing and a wider range of elective courses would allow students more career choices.

Links between Science (Art) and Studies

The main positive aspects are the early and close integration of research into, especially, the first cycle program, the high quality of the teaching staff and the strong engagement of social partners. There are no serious weaknesses, although perhaps an even greater emphasis on problem solving and case studies might be productive.

Student Admission and Support

The main positive aspects are the high quality of the students and their evident engagement with the program, and the provisions for counselling, advice, and academic mobility. The main weakness is that the opportunities for international students are not fully developed and exploited.

Teaching and Learning, Student Performance and Graduate Employment

The main positive aspects are the strong engagement of the teaching faculty in the study program and their commitment to student development, and the high rate of employment on graduation, especially for the second-cycle graduates. There are no serious weaknesses, but the feedback mechanisms could be enhanced.

Teaching Staff

The main positive aspects are the high-quality of the teaching staff and the engagement in an active research program, and the commitment to developing relevant competences, as well as the engagement with social partners in the teaching program (including both lectures and internships). There are no serious weaknesses.

Learning Facilities and Resources

The main positive aspects are the excellent classroom and library facilities, and a robust process for allocating the limited funds for maintenance and upgrades, and the early student access to advanced research facilities. The reaction to the COVID pandemic was excellent. There is a need for a plan and timetable for upgrading some of the laboratories, especially in electronics, which will require investment.

Study Quality Management and Public Information

The main positives are the strong engagement of all stakeholders in the processes, and the high motivation of the students. There are no serious weaknesses, although the feedback to stakeholders, particularly the students, on the impact of their input could be improved.

Expert panel chairperson signature:

Prof. Dr. Kenneth Peach