



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus universiteto  
**STUDIJŲ PROGRAMOS FIZIKA**  
*(valstybinis kodas – 612F30001)*  
**VERTINIMO IŠVADOS**

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**EVALUATION REPORT**  
**OF PHYSICS** (*state code – 612F30001*)  
**STUDY PROGRAMME**  
at Vilnius University

**Experts' team:**

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Išvados parengtos anglų kalba  
Report language – English

## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Fizika</i>
Valstybinis kodas	612F30001
Studijų sritis	Fiziniai mokslai
Studijų kryptis	Fizika
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė (4)
Studijų programos apimtis kreditais	240
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Fizikos bakalauras
Studijų programos įregistravimo data	1997-05-19, Nr. 565

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## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Physics</i>
State code	612F30001
Study area	Physical Sciences
Study field	Physics
Type of the study programme	University studies
Study cycle	First
Study mode (length in years)	Full-time (4)
Volume of the study programme in credits	240
Degree and (or) professional qualifications awarded	Bachelor of Physics
Date of registration of the study programme	19-05-1997, No. 565

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## I. INTRODUCTION

### 1.1. Background of the evaluation process

The evaluation of on-going study programmes is based on the **Methodology for evaluation of Higher Education study programmes**, approved by Order No 1-01-162 of 20 December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC).

The evaluation is intended to help higher education institutions to constantly improve their study programmes 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) *visit of the review team at the higher education institution*; 3) *production of the evaluation report by the review team and its publication*; 4) *follow-up activities*.

On the basis of external evaluation report of the study programme SKVC takes a decision to accredit study programme either for 6 years or for 3 years. If the programme evaluation is negative such a programme is not accredited.

The programme is **accredited for 6 years** if all evaluation areas are evaluated as “very good” (4 points) or “good” (3 points).

The programme is **accredited for 3 years** if none of the areas was evaluated as “unsatisfactory” (1 point) and at least one evaluation area was evaluated as “satisfactory” (2 points).

The programme is **not accredited** if at least one of evaluation areas was evaluated as “unsatisfactory” (1 point).

### 1.2. General

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

No.	Name of the document
1.	Minutes of the Study Programme Committee meeting at 11/09/2015 (unsigned).

### 1.3. Background of the HEI/Faculty/Study field/ Additional information

The study programme of *Physics* is administered by the Faculty of Physics who operate the study programme in relation to contemporary trends of science development and also the labour market needs. Both a history of practice and scientific potential developed by the Faculty have educated and trained physicists to be top specialists in the physical sciences’ field. Showcasing a study programme in high-velocity physical science, traditions together with the history of the physics studies and science in Vilnius University, is attractive to the youth of today; and students are keen and proud to be a part of research of global level. Registered in 1997, the study programme of *Physics* today is reviewed, complemented and improved on a regular evaluative basis. An external evaluation of the programme was carried out in 2008, at which time the programme was accredited unconditionally. The changes of programme course units and equipment are discussed in the chapter, “Programme analysis”. This Self-Evaluation Report (SER) was discussed in the Study Programme Committee, the Department of Quantum Electronics and during the meeting of heads of the departments of the Physics Faculty. Eleven staff members and three students were responsible for its composition and compilation. While it

is not wholly clear in the SER which material changes have taken place in accordance with and in relation to, the evaluation of 2008, the programme was as that date accredited unconditionally.

The Review Team had the opportunity to visit the laboratories, classrooms and library and familiarized themselves with a number of documents and with students' final theses, presented by University representatives. All personnel involved in the process of evaluation were open and cooperative and both staff and students were articulate in the English language. The Review Team would like to thank everyone involved in organizing the event and participating in the meetings. After the visit, the Review Team discussed and agreed the content of this report, which represents its consensual view.

#### ***1.4. The Review Team***

The Review Team was completed according *Description of experts' recruitment*, approved by order No. 1-01-151 of Acting Director of the Centre for Quality Assessment in Higher Education. The Review Visit to HEI was conducted by the team on 8/9 October, 2015.

- 1. Dr. Terence Clifford-Amos (team leader)** *academic*, Université Catholique de Lille/International Consultant, UK.
- 2. Prof. dr. Janis Spigulis**, *academic*, University of Latvia, professor of Physics Department, Latvia.
- 3. Dr. Rynno Lohmus**, *academic*, University of Tartu, Senior Research Fellow, Institute of Physics, Estonia.
- 4. Prof. dr. Artūras Jukna**, *academic*, Vilnius Gediminas Technical University, Head of Department of Physics, Lithuania.
- 5. Dr. Danas Ridikas**, *social partner*, Research Reactor officer, IAEA, Austria.
- 6. Mr Benas Urbonavičius**, *student member (PhD)*, Kaunas University of Technology, Lithuania.

## **II. PROGRAMME ANALYSIS**

### ***2.1. Programme aims and learning outcomes***

Programme learning outcomes, which are clear, incisive and accurately set at the Bologna first cycle are implemented through the main broad aim of the study programme and are realised and achieved through the study modules, the aims and learning outcomes of which are distilled from the programme aims and learning outcome structures (SER: A-D respectively). The programme *Physics BA* evinces a very broad aim, embracing the training of specialists who are able to meet international standards and who are capable of pursuing master and doctoral studies. Fundamental knowledge of physics, early research experience and professional work enable graduates to pursue and contribute to international cooperation towards developing the science of physics, the generation of new ideas and the solving of physical and technological problems in Lithuania as effectively as their high-level knowledge and skills permit. (SER, 2.1, 7) The learning outcomes, which address cognitive domains in learning, personal and professional development, ethical dimensions, comparative professional systems, qualitative and quantitative skills, communication (and the psychological concomitants appropriate to the understanding of communicative processes), language and creative skills, self-development and the skills required for evaluation and responsiveness appropriate to the field and beyond, are refined, appropriately focused and interfaced in the respective subject areas, of which there are 50, including work placement and electives.

Programme aims and learning outcomes were framed according to the Dublin Descriptors, the Resolution No. 535 of May 4, 2010 of the Government of the Republic of Lithuania “On Approval of the Description of Lithuanian Qualifications Framework”, the Decree No. V-2212 of November 21, 2011 of the Minister of Education and Science of the Republic of Lithuania “On Approval of the Description of Study Cycles”. (SER, 2.1, 7)

The broad aims, the necessary skills, the demands and specialisms of study process and learning outcomes are published on the Internet (in Lithuanian): <http://www.vu.lt/studijos/apie-studijas/studiju-programos> Both websites of Vilnius University and the Physics Faculty contain special sections for students and applicants: <http://www.vu.lt/lt/studijos>/<http://www.vu.lt/en/studies>/<http://www.ff.vu.lt/studijos/stojantiesiems/bakalauro-studijos> A facility for questions about the study programme is also available online <http://www.vu.lt/kviecia/klausk/kreipkis>. (SER, 2.1, 11)

The first-cycle study programme, *Physics*, achieves and sustains wide outcomes relating to the destination of the faculty’s talented graduates who, for example, successfully work in research institutions, schools and gymnasiums, various spheres of economy and trade, banks and insurance companies. (SER, 1, 3) The faculty is confident that high-level specialists of physical sciences are trained during the programme and that such specialists meet the needs of European countries and can successfully compete in both Lithuanian and international markets. Moreover, as the SER states, graduates are able to work in research institutions and operate successfully in state-of-the-art facilities and performance. (SER, 2.1, 11)

Long-term experience in physics, mathematics, computing and biophysics in Vilnius University in relation to bachelor study programmes of foreign universities and recommendations of international organizations, provides evidence of soundness both in the national and comparative senses of what levelness means in academic study. There is evidence to suggest that studies in this programme are at the high end of Bologna first cycle and that graduates are soundly-equipped for further study, research and professional engagement. During interviews with students it became clear that they were aware of learning outcomes and their relevance and application to their studies. While some teaching staff felt that learning outcomes could be a challenge, if not a burden to compose and realise, many saw their benefits, and indeed as part of the entire SER portfolio, appreciated the new opportunities for reflection and revision.

That the faculty recognises a broad study (physics) cannot cover everything possible is an understandable evaluation. (SER, 2.1, 11) The study of physics however comprises fifty interrelated subjects, the learning outcomes of which readily operate at Bologna level 1. The qualification offered is therefore appropriately representative of the content and is both contextually and universally appropriate and discerningly understood. The Review Team considers the aims and learning outcomes to be exemplary.

## ***2.2. Curriculum design***

With regard to legal requirements, relating to academic credit allocation, core and elective subjects, final project and student placement, Table 4 of the SER sets out the compliance of the study programme plan to the decrees No. V-501, No. V-1190, No. V-232 of the Minister of Education and Science of the Republic of Lithuania.

On examining the subject modules in Appendix 1, the Review Team found that they have both academic independence and independent properties and comprise a balanced programme without

repetition. The overall programme neither repeats nor excessively weights particular modules, one to another.

The content of the subjects is consistent with the type and level of studies in a modern first-cycle programme encompassing physics. There is a closely-scaled match between content and methods, towards achieving the intended learning outcomes, as illustrated both in overall programme and in subject modules. The scope is readily sufficient, though, as might be expected in a high-achieving traditional university; some programme content and the learning outcomes seem particularly geared at rather high levels. For example, in *Molecular Spectroscopy*, in the final semester, how far will students be able to ‘employ independently UV-Vis absorption, infrared absorption and Raman scattering spectral methods in structural analysis of materials?’ (Appendix 1). Elsewhere, the learning outcomes complement high-level achievement with an appropriate utilitarian emphasis. The stocked, well-accommodated programme endeavours to be progressive and reflects particular elements of a modern physics multi-disciplinarity, which includes languages, general education and elements of philosophy and psychology sociology.

There are links between the programme learning outcomes and the module learning outcomes which lead and support the subject content. The subject content and teaching methods, either covertly or overtly, confidently illustrate how the intended learning outcomes may be achieved. To the benefit of student learning, lecturers have developed a number of teaching aids and have made the ‘content of the delivered course units more accessible and understandable for students’. (SER, 2.2, 12) Physics is one of 6 programmes at Bachelor level in VU and is of 4 years duration with a volume of 240 credits. The average number of contact hours of the teaching staff of the programme is 79 hours and as of 1<sup>st</sup> September 2014, there were 112 students in the study programme of Physics (over all semesters). The staff student ratio therefore is 2.6 students per teacher. There is a better age distribution since the last evaluation.

The generally comprehensive, and well-rounded learning outcomes are realisable through the technically robust and varied programme module content.

That laser-physics, electronics, atomic and molecular theory, semi-conductor physics comprise the advanced elements of the programme, might assume the status of ‘some’ latest thinking in science and technology. However and moreover, latest developments related to this study programme are the cooperative research projects: *Innovative high power laser system based on polycrystalline nd:yag for marking, engraving, cutting and micro-drilling metal surfaces (NOVIGLAS)*, *European Defense Agency: Explosive detection - Spectroscopy, Terahertz technology and Radar (E-STAR)*, *Fundamental and Applied Electromagnetics of Nano-Carbons (FAEMCAR)*, to name a few illustrated to the Review Team Experience gained during these developments certainly enriches the study subjects with newest techniques in physics.

### **2.3. Teaching staff**

There are forty-four teachers, who are mainly at Vilnius University and who have on average twenty-five years’ practical work experience, and on average pedagogical experience of fifteen years. Sixteen hold the title of professor, nineteen are associate professors, and nine are assistants (SER Table 5). Nearly 100% hold a doctoral qualification, thus meeting the legal requirements for teaching staff. The high-level qualifications held should confidently ensure the learning outcomes. Since the staff student ratio is optimal (outlined above) the number of teaching staff should comfortably ensure the learning outcomes. Renewal of teaching staff is important and ongoing for academic reasons and also in maintaining a good age balance. Across the programmes staff regard themselves as colleagues rather than competitors.

Besides the pedagogical work in which the teaching staff undertake, they are obliged to carry out research, participate in research projects of the Lithuanian Research Council and make contributions to various other international projects. Research activities and methodological projects directly inform teachers' professional development. Teaching staff were/are related to several international cooperative research projects. (VU webpage: [http://www.vu.lt/en/studijos/58-research/index.php?option=com\\_content&view=article&id=179](http://www.vu.lt/en/studijos/58-research/index.php?option=com_content&view=article&id=179)) Research outcomes are commonly operational in terms of research-informed teaching. Recent cooperative projects gives great incentive to use gained experience not only in future research, but in teaching as well, to introduce students to newest measurement techniques in surface preparation and spectroscopy, as well as new developments in the field of laser physics.

All teachers contributing to the study programme of *Physics* contribute to scientific conferences in Lithuania and abroad, as their CVs attest (SER, 2.3, 23; appendix 3). However, some staff development is recommended in terms of modern teaching and assessment techniques, which the Review Team believes will balance, if not enhance the current traditions of teaching methodologies and their emphasis. Some pedagogical training is also recommended for lab technicians in terms of the work they do with students.

Monographs, papers, overseas visits and internships reveal a highly-qualified and involved teaching staff, pushing at the frontiers of knowledge in their research work who are also incorporating and disseminating their outcomes in terms of programme teaching activities. This means that there is evidence of teaching which engages with current and relevant international developments, often gleaned from current journal publications as well as engagement with the above-mentioned research-informed teaching, of which examples were narrated to the Review Team during interviews.

#### **2.4. Facilities and learning resources**

The study programme, *Physics*, mostly uses the facilities and learning resources of Faculty of Physics as well as VU Centre of Information Technology Development for computer-related courses. The Auditorium of the Faculty of Physics meets the requirements of modern teaching (equipped with computers, projector, and wireless internet access). (SER, 2.4, 28) Its capacities are generally sufficient for lectures and students' practical work; although with some small laboratories (e.g., Teaching laboratory of Atomic and Nuclear Physics II = 1 student place), there may be occasional scheduling problems which need some attention.

The Faculty of Physics has recently invested over 555 thousand EUR in research and teaching equipment renovation in the last 5 years. (SER, 2.4, 29). As a result, the Faculty of Physics can provide a very good infrastructure for the laboratory teaching. There are also sufficient laboratory consumables and equipment for the research of the students due to a number of well-funded research and EU structural fund projects. In 2011 a cooperation agreement between Vilnius University and the Centre for Physical Sciences and Technology was signed that allows for cooperation in the study programmes, permitting students to use the scientific laboratory equipment, perform placement and final theses of their studies. (SER, 2.4, 31)

Almost all the students of the study programme of *Physics* (over 95%) perform their work placement at VU, Centre for Physical Sciences and Technology (CPST) and Laser Research Centre. Students, who perform their practice placement at the University itself, usually perform it at the laboratory of their final thesis supervisor (SER, 2.4, 30).

In 2013, the National Open Access Scholarly Communication and Information Centre was opened. Students have gained full access to the Library resources (books, journals, databases) from which any computer can be connected to the University network. Access to the resources from outside the University can be granted by the use of VPN. This also facilitates the use of e-books. The VU library fund of books necessary for Physics Faculty students is constituted of more than 45 thousand units of documents, more than 30 thousand, out of which are books and 15 thousand are research periodicals. There is an exhibition of the newest books. The library fund can be used by all VU students, teachers and employees. The University subscribes to over 15 of the most important scientific databases. (SER, 2.4, 33) Students and staff can be rightly proud of the state-of-the-art library, its exceptional appointments, bespoke facilities and overall command of student academic needs. That school students, levels 10 and 11 are invited to 'taster sessions' in the laboratories is excellent practice in the quest to popularise science among students and motivate the school graduates to join the University. It was noted, impressively, that the Dean himself visits schools and delivers some teaching.

Overall, the facilities for teaching and learning and research laboratories are of excellent quality and more than sufficient for successful implementation of the programme.

### ***2.5. Study process and students' performance assessment***

Admission of students to the programme is competitive and based on grades in secondary school maturity examination and annual scores. The admission score is mainly based on physics, mathematics, Lithuanian and one extra subject final exam scores. Additional points are added for exceptionally bright pupils who had participated as Physics Olympiads. (SER, 2.5, 37) In 2014, the admission score calculation scheme was changed to 1-10 scale from the previously used 1-20 scale. There is no entrance examination, but there is a minimum admission score of 3. Information related to admission can be accessed through the University's website as well as the Joint Admission Network Association of Lithuanian Higher Education (LAMABPO) informational websites and booklets. (SER, 2.5, 37)

There is a prominent competition during the admission to the programme with student/placement ration fluctuating from 0.8 to 1.3. This is also backed up by the fact that admission scores of the students are high with an average score of 7.99 out of 10 possible in 2014. (SER, 2.5, 39-40) These figures indicate that the programme is popular and is able to attract strong students. The admission rules are consistent with the nature of the studies and skills required from the students.

There is a noticeable drop-out rate, with up 44% of the admitted students failing to finish to programme. (SER, 2.5, 42-43) The most prominent reason (based on the SER (SER, 2.5, 44)) for such a drop-out rate is academic debt. Although during on-site interview with the students it was mentioned that this drop-out rate can also be related to the lack of individual consultations from the teaching staff, especially regarding the practical lectures. A lack of motivation in some first year students was also mentioned during student interviews.

Lectures, seminars, laboratory works and discussions and projects performed in groups, and more individual work, such as presentations and project work form the teaching base. Often the courses combine theory with practical or experimental work which is mandatory for a programme related to physics. Furthermore, the students are given good possibilities to undertake research practice in the laboratories of the units participating in the programme, and sometimes even be recruited as junior staff in projects supported by external funds. (Annex 1 (Course descriptions), SER 2.5, 53-54)

Motivated students can begin research early on – as early as 3rd semester. Participation in scientific conferences is popular amongst students. This shows that students are highly motivated and that the teaching staff gladly accepts and motivates students to join research groups. (SER 2.5 53-54)

Students can seek various financial support. There are scholarships for mobility as well as social scholarships for students from poor backgrounds. Up to this date all students that met the requirements for a social scholarship have obtained it. Disabled students can obtain financial support as well. Various student-driven activities (organizations, clubs and events) within the University provide an important boost of morale and social support. Studies are undertaken in well-equipped learning facilities and students have access to internet everywhere and can use various sports facilities (including swimming pool), as well as living in University dormitories during their studies. (SER, 2.5, 55+58)

An important part of the studies is the Final Thesis, under the supervision of a senior staff member. During the preparation, students have to use previously gained skills and knowledge as well as improve upon them. The Final Thesis is defended at the end of the studies. (SER, 2.5, 51)

The programme team should seriously consider changes in the requirements/evaluation of practical work and final thesis work, so there is no issue in attributing the credits twice for some parts of the same work. This matter was discussed on-site with a senior member of staff and the Dean of the Faculty by providing clear evidence through comparison some reports of practical work and final thesis work. The programme team should also ensure that theoretical work should be consistently related to practical applications where relevant and possible.

The students' performance is assessed by diverse methods in more than half of the study subjects, sometimes combining feedback and evaluation during the course with examinations as a summative assessment. However, some course subject have just an examination (*Basics of Law, Computer application II, General Physics III, General Physics IV, History of Civilizations, Theoretical mechanics, Theory of Atoms, Computer controlled physical experiment, Informatics*). During the scrutiny of some study subjects (*Fundamentals of Photonics, General Physics III, Theoretical mechanics, Theory of Atoms*) the examination structure was found to be lacking. Having just 2-3 theoretical questions (and in some cases practical problems) which according to students, requires learning by heart rather than the achievement of full understanding.

Other study subjects have a large emphasis on a theoretical knowledge assessment examination with weighting factors of 70-80%, while the rest of the final mark (20-30%) is the assessment of laboratory work. Such situations can be found in several study subjects such as: *Computer applications I, Energy and Environment, Fundamentals of Photonics, General Physics V, Laser Physics, Molecular spectroscopy, Physics of Waves*. The Study subject *Computer controlled physical experiment* does have laboratory work in its description, but the final mark does not include the assessments of such works. Two study subjects either had no, or unclear student assessment evaluation criteria: *History of Physics, Algebra and Geometry*. (Annex 1 (Course descriptions)).

During on-site interview with the students it was openly expressed that some of the study subject's content is outdated, such as *Computer Applications I/II*. That some of the mandatory general subjects like History of Civilizations was not seen by some students as being of great importance and could be replaced with a subject for minor studies, such as Pedagogy. During the same interview it was expressed that the possibility to choose minor degree studies in Pedagogy

makes the study process more fulfilling. During interviews with the students it was expressed that optional subjects can be chosen blindly due to the lack of the study subject description availability. This issue should be addressed and avoided in the future.

Students' opinion about the study quality is collected by the mandatory questionnaires at the end of each subject. These questionnaires evaluate the facilities, schedule of the subject, lecture and/or practical session quality, examination procedure quality. According to the results changes are made to required areas. (Annex 1 (Course descriptions), SER 2.5, 49, SER 2.6, 61), although during interviews this view was not universal. Students expressed opinion about the lack of feedback to them after the questionnaires are evaluated. This reduces the motivation in students for any further involvement in the development of the study programme and should be addressed.

There are options to abroad as an exchange student. But the use of this option is not popular. Out of 116 graduates in the past 5 years, 25 (~20%) used the mobility option (SER, 2.5, 47 (Table. 14/15)). This relatively low percentage is mostly due to the fact that it has been possible to use ERASMUS exchange programme only from semester 6 and that most of the students are happy with quality of the studies and do not see the need to travel abroad. More effort should be put into making the information related to the exchange possibility more accessible. (SER, 2.5, 47) The operation of ERASMUS should be more equitably organised, so that Bachelor students do not have to compete for places with Master students.

Graduates are followed up by the use of personal communication; there is no University wide alumni programme. Students and the alumni are largely happy with the teaching methods during the studies, though, again, with students this view was not universal. Over a half of all the graduates of the programme continue their studies at Master level. This shows that the programme prepares the students for further scientific work. (SER, 2.5, 56-57) Some improvements are recommended in the systems being currently operated for the compilation of destination statistics. This will facilitate contact with former students.

The Study Programme Committee should be Formalised and systematised to make it alive and active to the needs and interests of students. Teaching staff should publicise topics for research (Bachelor Thesis) earlier together with a list of tutors and also publicise all opportunities for students including ERASMUS. Virtual learning practices should be more unified in terms of a policy for staff and students.

## ***2.6. Programme management***

The overall management of the programme is in the hands of the Study Programme Committee, a body drawn from the departments of the Physics Faculty, students' self-government and representatives of social partners and Committee's Head an elected office. The work of the Committee comprises approval of course unit descriptions arising from departmental meetings, makes proposals to the Faculty Council concerning any the changes in the programme or to any changes in admission procedures. Heads of Departments also update the Study Programme Committee about any programme shortcomings in the programme together with the means of addressing them. Information concerning the quality of the programme comes from teachers, Students' Representation Office and social partners for oversight by Heads of Department who are principally concerned with the developmental profile of the programme. The study programme is administered by the Dean's office, via the Dean and the Vice-dean for academic affairs. Programme administration is a weekly agenda issue in the Dean's office. The VU Study

Directorate is involved where there are proposals to change the study plan of the programme during its running. (SER, 2.5)

There is no mention of the European Standards and Guidelines (or other benchmarking mechanism such as the European Foundation for Quality Management (EFQM) within the programme's quality philosophy and mechanisms.

Evaluations on the specific course units take place following examinations at the conclusion of each semester. Surveys are organized by VU Studies Department, Quality Management division. Student participation is obligatory. Students are encouraged to express their opinion on the study fields for the collective improvement of units and programmes. All teachers are able to access the data-base and read the student responses. The Faculty administration can also access survey results about the work of any teacher; such survey results are taken into account in the assessment of a teacher's work. Student survey data also accounts for the quality of studies at Vilnius University. Table 17 of the SER provides an example of a typical student questionnaire. There is also the Total Evaluation Average (TER) in operation as a further indicator. Although there is copious and clear evidence in respect of activity in questionnaire implementation the fuller extent of the programme's (and indeed the faculty's) quality-assurance procedures seems less transparent.

Outcomes for improvement are said to be achieved through the Study Programme Committee, though no 'particular' examples are furnished. A problem with teaching quality is said to be one of academic emphasis, in that teacher evaluation tends to be more focused on research than pedagogy. This 'legal' emphasis is difficult to modify, the SER claims. However, the University does wish to re-emphasise the professional evaluation of teachers.

Centrally, the University now has a strong quality assurance system, which was positively reviewed in 2014. The programme team should make strong connections with the centre and all that is recommended there. While Stakeholders are keenly supportive and vibrant in their attitudes towards the programme generally and the good graduates who take up good and profitable employment, the levels of involvement with this programme are variable. The Review Team recommends their more formal involvement in quality assurance mechanisms, feedback, and action planning towards a strong and developmental future, in particular because many sectors are owned and run by VU graduates.

Equally the programme team, largely through the Study Programme Committee, should listen more to the student voice, the positive nature of their drive for stronger internal satisfaction and their wish for stronger engagement with the management of the programme and its development. The articulate, adroit and excellent students interviewed could be said to be 'pleading' to be listened to more systematically. Programme students are highly supportive, highly aware and yearn to be 'partners' in the learning process.

### **2.7. Examples of excellence \***

An outstanding programme composition dedicated to talented students

Exceptional Research Indexes among teaching staff.

A library that will rank amongst the finest in Lithuanian universities.

Super Computer technology

## **III. RECOMMENDATIONS**

## **General**

1. Consider engaging with some strategic staff development on:
  - a) Modern Teaching Methods;
  - b) Assessment Strategies;
2. Involve Social Partners and Alumni more operationally with staff students and the Curriculum;
3. Formalise and systematise the Study Programme Committee - make it alive and active;
4. Publicise topics for research (Bachelor Thesis) earlier together with a list of tutors and publicise all opportunities for students, including ERASMUS – which needs some attention in terms of fairness for all;
5. Unify virtual learning practices;
6. Consider changes in requirements in requirements/evaluation of practical work and final theses work, so there is no issue in attributing the credits twice for some parts of the same work.

## **Subject: Physics**

1. Be more proactive in attending to the student drop-out rate
2. Consider some pedagogical development for lab practice technicians;
3. Improve student destination statistics at programme Level.

## **IV. SUMMARY**

Epistemologically, the programme aims and learning outcomes are sound in their cognitive, professional, technical and social domains. They have been designed and purposed by university teachers with high subject ideals. In complement, students are aware of learning outcomes and are attuned as to how they are applied to their work. The content of the programme is again very sound in its broad educational principles and is especially relevant to local industry and business and of course further study. The Review Team noted excellence in the composition of the study programme.

Teaching staff are talented members whose research work receives very high index scores. They are highly active in conferencing both nationally and internationally and are well known in their fields and the programme benefits from their celebrated academic achievements. Teaching staff are often well connected with influential social partners. The Review Team respects their professional standing. However, some staff development is recommended in terms of modern teaching and assessment techniques, which the Review Team believes will balance, if not enhance, the current strong traditions of teaching methodologies and their emphasis. Some pedagogical training is also recommended for lab technicians in terms of the work they do with students.

Concerning resources, they are all considered by the Review Team to be very good; in particular they were impressed with the super computer, available to all students. The programme's students can also be rightly proud of the outstanding new library, substantially equipped to meet their academic needs. Aesthetically, the new library is attractive and tasteful.

Student academic support in many ways is very good, both academically and socially. Notwithstanding, there are some matters in need of attention. These generally concern student participation in the study process, largely through the Student Study Committee, and in other matters concerning a feeling of shared ownership of the programme, effective feedback and involvement in programme development and change. Changes are also recommended for the programme team to consider in terms of assessment strategies and practice as indicated in section 5 of this report. The Review Team believes that development is required in these various respects.

Programme management could be improved with more student involvement. Systems are largely in place, though destination statistics appear to be less strong. Furthermore, the programme team should ensure that all quality assurance mechanisms fully tie into university central systems. The university's quality assurance system was positively appraised in 2014. Again the student voice should feature in programme management.

Stakeholders are keenly supportive and vibrant in their attitudes towards the programme generally and the good graduates who take up good and profitable employment. Involvement in the framework of this programme could be far stronger, especially since many sector owners are graduates from this programme or other programmes at Vilnius University. The Review Team recommends their more formal involvement in quality assurance mechanisms, feedback, and action planning towards a strong and developmental future.

In so many ways, overall, this programme is deserving of high commendation, but from the evidence provided, the Review Team believes there is work to be done in areas outlined in sections 5 and 6 of this report in particular.

## V. GENERAL ASSESSMENT

The study programme *Physics* (state code – 612F30001) at Vilnius University is given positive evaluation.

*Study programme assessment in points by evaluation areas.*

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	4
2.	Curriculum design	4
3.	Teaching staff	3
4.	Facilities and learning resources	4
5.	Study process and students' performance assessment	2
6.	Programme management	3
	<b>Total:</b>	<b>20</b>

\*1 (unsatisfactory) - there are essential shortcomings that must be eliminated;

2 (satisfactory) - meets the established minimum requirements, needs improvement;

3 (good) - the field develops systematically, has distinctive features;

4 (very good) - the field is exceptionally good.

Grupės vadovas: Team leader:	Dr. Terence Clifford-Amos
Grupės nariai: Team members:	Prof. dr. Janis Spigulis
	Dr. Rynno Lohmus
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	Dr. Danas Ridikas
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**VILNIAUS UNIVERSITETO PIRMOSIOS PAKOPOS STUDIJŲ PROGRAMOS FIZIKA  
(VALSTYBINIS KODAS – 612F30001) 2015-11-27 EKSPERTINIO VERTINIMO  
IŠVADŲ NR. SV4-309 IŠRAŠAS**

<...>

**VI. APIBENDRINAMASIS ĮVERTINIMAS**

Vilniaus universiteto studijų programa *Fizika* (valstybinis kodas – 612F30001) vertinama **teigiamai**.

<b>Eil. Nr.</b>	<b>Vertinimo sritis</b>	<b>Srities įvertinimas, balais*</b>
1.	Programos tikslai ir numatomi studijų rezultatai	4
2.	Programos sandara	4
3.	Personalas	3
4.	Materialieji ištekliai	4
5.	Studijų eiga ir jos vertinimas	2
6.	Programos vadyba	3
	<b>Iš viso:</b>	<b>20</b>

\* 1 - Nepatenkinamai (yra esminių trūkumų, kuriuos būtina pašalinti)

2 - Patenkinamai (tenkina minimalius reikalavimus, reikia tobulinti)

3 - Gerai (sistemiškai plėtojama sritis, turi savitų bruožų)

4 - Labai gerai (sritis yra išskirtinė)

<...>

**2.7. Išskirtinės kokybės pavyzdžiai**

Išsiskirianti studijų programos struktūra, skirta gabiems studentams

Išskirtiniai dėstytojų mokslinių tyrimų indeksai.

Biblioteka, galinti varžytis su geriausiomis Lietuvos universitetų bibliotekomis.

Superkompiuterių technologijos.

#### IV. SANTRAUKA

Šios studijų programos tikslai ir numatomi studijų rezultatai yra pagrįsti, turint omenyje pažintinį, profesinį, techninį ir socialinį aspektą. Juos parengė universiteto dėstytojai, keliantys didelius reikalavimus savo dėstomiems dalykams. Studentai yra susipažinę su numatomais studijų rezultatais ir suvokia, kaip jie taikomi jų darbui. Studijų programos turinys taip pat labai stiprus, turint omenyje taikomus pedagoginius principus, ypač susijęs su vietos pramone bei verslu ir, žinoma, tolesnėmis studijomis. Ekspertų grupė mano, kad studijų programos sandara yra puiki.

Dėstytojai – talentingi specialistai, kurių mokslinis tiriamasis darbas itin aukštai vertinamas. Dėstytojai aktyviai dalyvauja nacionalinėse ir tarptautinėse konferencijose, yra žinomi savo sričių specialistai, jų žymūs moksliniai pasiekimai naudingi šiai studijų programai. Daugelis dėstytojų palaiko glaudžius ryšius su įtakingais socialiniais partneriais. Ekspertų grupė gerbia dėstytojų profesinę reputaciją, tačiau kai kuriems jų rekomenduoja kelti profesinę kvalifikaciją šiuolaikinio dėstymo ir vertinimo metodų požiūriu, nes, ekspertų grupės nuomone, tai subalansuotų, o gal ir sustiprintų gyvuojančias dėstymo metodikų tradicijas ir jas dar labiau pabrėžtų. Pedagoginiai mokymai rekomenduojami ir kai kuriems su studentais dirbantiems techniniams laboratorijų darbuotojams.

Visi materialieji ištekliai, ekspertų grupės nuomone, labai geri; vertintojams ypač didelį dėmesį paliko superkompiuteris, kuriuo gali naudotis visi studentai. Be to, šios programos studentai gali pagrįstai didžiuotis nuostabia nauja biblioteka, įrengta taip, kad patenkintų jų akademinis poreikius. Naujoji biblioteka yra estetiškai patraukli ir skoninga.

Parama studentams (ir akademinė, ir socialinė) labai gera. Nepaisant to, reikia atkreipti dėmesį į kai kuriuos dalykus. Studentai turėtų būti labiau įtraukiami į studijų procesą, visų pirma per Studentų komitetą, ir jaustis programos šeimininkais, teikti veiksmingą grįžtamąjį ryšį ir įsitraukti į programos kūrimą bei pokyčius. Programos grupei rekomenduojama apsvarstyti pakeitimus, susijusius su vertinimo strategijomis ir praktika, kaip nurodyta šių vertinimo išvadų 5 dalyje. Ekspertų grupės manymu, tobulinimas reikalingas visais šiais atžvilgiais.

Programos vadybą būtų galima pagerinti labiau įtraukiant studentus. Sistemos didžia dalimi veikia tinkamai, nors statistika apie tai, kur įsidarbina studentai, atrodo prastokai. Be to, studijų programos komandai reikia pasirūpinti, kad visi kokybės užtikrinimo mechanizmai būtų iki galo susieti su universiteto centrinėmis sistemomis. Universiteto kokybės užtikrinimo sistema 2014 m. buvo įvertinta teigiamai.

Bet programos vadybos procese turi dalyvauti ir studentai.

Socialiniai dalininkai entuziastingai remia studijų programą ir gabius absolventus, o šiems pavyksta rasti gerą ir pelningą darbą. Dalyvavimas su programa susijusioje veikloje galėtų būti gausnesnis, ypač turint omenyje, kad daugelis sektoriaus verslo savininkų yra šios arba kitų Vilniaus universitete vykdomų studijų programų absolventai. Ekspertų grupė rekomenduoja, kad jie būtų oficialiau įtraukiami į kokybės užtikrinimo mechanizmus, grįžtamojo ryšio sistemą ir veiksmų, skirtų tvirtai ir tvariai ateičiai užtikrinti, planavimo procesą.

Apskritai šią programą galima daugeliu atvejų pagirti, bet iš pateiktos informacijos ekspertų grupė sprendžia, kad dar yra ką nuveikti, ypač šių vertinimo išvadų 5 ir 6 dalyse nurodytose srityse.

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### III. REKOMENDACIJOS

#### **Bendrosios rekomendacijos:**

1. Apsvarstyti dėstytojų kvalifikacijos kėlimo strategiją šiose srityse:
  - a) šiuolaikiniai dėstymo metodai;
  - b) vertinimo strategijos.
2. Labiau įtraukti socialinius partnerius ir alumnus į bendrą veiklą su dėstytojais ir studentais, susijusią su studijų turiniu.
3. Formalizuoti ir susisteminti studijų programos komiteto veiklą, kad jis būtų gyvybingesnis ir aktyvesnis.
4. Anksčiau paskelbti mokslinių tyrimų (bakalauro baigiamojo darbo) temas ir darbo vadovų sąrašą visiems studentams, įskaitant atvykusius pagal programą ERASMUS, ir sudaryti sąlygas su šia informacija susipažinti viešai – tai būtų sąžininga visų besimokančiųjų atžvilgiu;
5. Suvienodinti virtualaus studijavimo praktikas.
6. Apsvarstyti reikalavimų, taikomų praktikai ir baigiamajam darbui bei jų vertinimui, pakeitimus, kad kreditai nebūtų suteikiami du kartus už tą patį darbą.

#### **Studijų dalykas: Fizika:**

1. Aktyviau domėtis studentų nubyreėjimo priežastimis.
2. Apsvarstyti laboratorinės praktikos specialistų pedagoginio tobulinimo galimybę.
3. Pagerinti statistiką apie tai, kur įsidarbina programos studentai.

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Paslaugos teikėjas patvirtina, jog yra susipažinęs su Lietuvos Respublikos baudžiamojo kodekso 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė, parašas)