



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Lietuvos edukologijos universiteto
STUDIJŲ PROGRAMOS *FIZIKA*
(valstybinis kodas – 621F30006)
VERTINIMO IŠVADOS

EVALUATION REPORT
OF *PHYSICS* (state code – 621F30006)
STUDY PROGRAMME
at Lithuanian University of Education

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Fizika</i>
Valstybinis kodas	621F30006
Studijų sritis	Fiziniai mokslai
Studijų kryptis	Fizika
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2)
Studijų programos apimtis kreditais	120
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Fizikos magistras
Studijų programos įregistravimo data	2009-04-02

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Physics</i>
State code	621F30006
Study area	Physical Sciences
Study field	Physics
Type of the study programme	University studies
Study cycle	Second
Study mode (length in years)	Full-time (2)
Volume of the study programme in credits	120
Degree and (or) professional qualifications awarded	Master of Physics
Date of registration of the study programme	02-04-2009

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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-Assessment 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.	Quality assessment manual

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

The Assessment Report was prepared about the Study Programme of Physics at Lithuanian University of Education (hereinafter LEU). This second cycle programme is in the Study area of Physical Sciences, its study field being Physics and the qualification degree given is Master of Physics. The programme was registered on 02-04-2009. The members of the Review Team, who are responsible for the Assessment Report, were selected and appointed by the Centre for Quality Assessment in Higher Education of Lithuania. The personal composition of the Team can be seen on the introductory page of the Self Assessment Report.

The second-cycle Study Programme Physics is managed by the Department of Physics and Chemistry in the Faculty of Science and Technology at Lithuanian University of Education. This programme is one of the natural science second-cycle programmes in Lithuania and its research topics deal with crystallophosphors and semiconductors-ferroelectrics related physics.

The Evaluation Report has been prepared on the basis of the study of the Self-Assessment Report and with the help of a series of group discussions with different teams of related people on the 7th of October 2015. There was a discussion with the administration staff, during which all responsible partners were present from the side of the Faculty of Science and Technology. A meeting was organized with the staff responsible for the preparation of Self-Assessment Report (hereinafter SER). Then the Review Team had a meeting with the teaching staff (5 people, about 42% of the teachers were present) and with the students (4 students, about 50% of all the students of the programme were there). The Review Team visited the lecture rooms, library, and teaching laboratories used in the educational process. The experts had possibility to familiarize with the theses materials of the graduates of the programme. It was followed by a meeting with alumni (8 people came) and a discussion with social partners, where 10 people in managerial position participated. The site visit was concluded by presenting an overview about the site visit observations to the partners responsible for the master degree Study Programme in Physics.

All these steps of the evaluation process took place without any disturbing effects, fully according to the rules of the Centre for Quality Assessment in Higher Education of Lithuania. 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 in a closed session, which represents its consensual view.

1.4. The Review Team

The Review Team was assembled according to *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 7/10/2015.

- 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

The aim of the programme is clearly formulated. However, it is rather broad and needs more focussing. The fundamental or applied physics both have many sub-branches and therefore narrowing for clearer output for the Study Programme graduate is recommended. In SER it is stated that in 2012 the new branch of applied physics (specialization of piezomechanics) was created. (SER ref 1.1, page 5) During the site visit it was confirmed that fundamental branch is mostly related to astrophysics and there is a strong collaboration with Vilnius University within

this field. The Review Team recommends adding specializations for both directions according to above-mentioned topics.

The learning outcomes of the Study Programme are relevant and clear. However, the University English version of the homepage could be more informative. In the Faculty of Science and Technology homepage (<http://leu.lt/en/structure/faculties-and-institutes/faculty-of-science/department-of-physics/all.html>) there is no comprehensive Study Programme-related information publicly accessible. The lack of information in English can diminish the Study Programme's international attractiveness among the international students.

The programme aims and learning outcomes are based on the academic and professional requirements. The site visit confirmed that several graduates continue their studies in the third-cycle programme. In most cases, Vilnius University was chosen for PhD studies, mostly in astrophysics. Other graduates work in IT related fields. Also, one alumnus stated that master level education has helped her working career as a physics teacher as some prestigious schools require their teachers to seek a master degree.

The level of studies is correctly set to the Study Programme. Programme aims and learning outcomes are covered with relevant second cycle subjects. Based on European Qualification Framework level 7 the graduate should have highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research. Also, they should have skills related to critical awareness of knowledge issues in a field and at the interface between different fields. The graduates have a minimum required theoretical Physics background for master level. However, the Review Team encourages the Study Programme management to increase the theoretical subject load. Also, the final thesis scientific and originality quality needs some attention.

The name of the Study Programme "Physics" is too ambitious. The Study Programme has 2 branches and therefore it should be mentioned also through specialisations. "Physics" should cover everything starting from environmental till nanotechnology related topics. The Review Team recommends considering specialisation concretisation for applied or theoretical branch. In the SER both directions are appropriately and neatly covered with relevant subjects. The set of subjects and their content ensure the basic knowledge required for Master level graduates. However, the learning outcome related to students ability to perform contemporary research in the selected area (fundamental or applied physics) needs more attention as the final thesis quality and content is more "descriptive" than analysis based on original results. The Review Team felt that some of the final thesis reports were corresponding to the level of Bachelor thesis and could not fully comply with the requirements set for Master thesis. In most cases, the set aim was quite simple and experimental part proportion to overall work was not sufficient.

2.2. Curriculum design

The programme is composed according to the general requirements for the Master degree Study Programmes approved by Order No. V-826 of the Ministry of Education and Science of Republic of Lithuania of 3 June 2010 and Resolution No. 250 on the description of Study Programme renewal and quality assessment procedure approved by the LEU Senate on November 13, 2013. In the SER table 2.3 (page 10) a summary of curriculum design is presented.

The Study Programme composition covers minimum master level physics knowledge and also corresponds to the legal requirements set by the Minister for Education and Science of the

Republic of Lithuania “Description of General Requirements for the Master’s Study Programmes. Order No. V-826”. The Study field courses volume (87 credits) ensures the basic knowledge in the Study Programme related topics.

In the SER table 2.3 (page 10) it is stated that 30 credits are for Master Thesis. However, if one follows in the SER 2.2.2 (page 11) the description about preparation of Master Thesis, it is clear (and also was confirmed during site visit meeting with students and teaching staff) that subject “Research work” is intended for preparatory works as literature overview and familiarization with research methodology. This subject has 10 credits on second semester and 13 credits on third respectively. Site visit also confirmed that Final Thesis is evaluated in front of commission as one solid set, where final mark forms from the contents/quality of several chapters. It was also found that results/descriptions achieved and presented in “Research work” subject are part of the Final Thesis. In brief, it means that some content of Final Thesis has been assessed already with grades for the “Research work” module and it would be not correct to give additional credits for the same work already performed and evaluated. The Study Programme management should make changes in requirements/evaluation of research work (subject) and final thesis work, so there is no issue in attributing the credits twice for some parts of the same work. This problem needs immediate action. Also, based on final thesis quality, quantity and content of the overall result and time allocated for it are not proportional.

The study subjects and modules are spread evenly. The lecture and practical work balance is well-designed. The courses are reasonably divided between semesters and there is no overlapping (SER (page 9) Table 2.2.). Based on Annex 1 the subjects’ descriptions by lectures, Study Programme content is reasonably distributed. The study plan for the Physics MSc Degree is presented. The subjects division between semesters is in good relation to set specialisations. There are general subjects like Materials Science, Photonics, Mechatronics. Other subjects are related to branch 1 (Solid-state optics, Current transport mechanisms in thin films) and branch 2 (Piezomechanics, Sensors and their applications).

The content and methods of the subjects allow achieving the minimum of the planned learning outcomes. The topics and lectures aims are ascetically composed and coherent to the aim. Still, not all Physics background disciplines are covered with lectures the subjects’ content presented in Annex 1 covers topics needed for chosen specialization and are not repetitive. In the SER’s introduction part (page 4) many research topics (electronic structure, optical and electrical properties, vibration spectra and electronic structure of ferroelectric semiconductors; modelling tasks of modern atomic theory on the basis of normal and symbolic programming; liquid crystal physics; modelling of metal-piezoceramic transducers, analysis and application development of mechatronic systems) related to LEU priorities and research staff are described. Final theses topics are mainly related to supervisor research interest. However, for subjects related to liquid crystal physics theoretical background is missing from the curriculum design. Also, during the meeting with the social stakeholders at the site visit, the problem of the lack of graduate’s IT-knowledge was highlighted. The Review Team proposes that IT-related subjects should be added to the curriculum.

The Study Programme overall aim and subjects learning outcomes are covered with lectures that ensure minimum background knowledge for master level graduate. However, the subject “research work” volume (10 credits in semester 2 and 13 in semester 3; Table 2.2 in SER page 9) is not balanced with theoretical lectures volume. Furthermore, the 4th semester is dedicated only for master thesis and therefore adding more independent research work in 2nd and 3rd semester diminishes the theoretical background lectures role. The Review Team recommends decreasing this “research work” volume and adding more Physics related mandatory subjects. Also, the

legal issues related with Final Thesis “double assessment” (a problem described more in detail at the beginning of this section) needs prompt action.

The scope of the programme is unbalanced in relation to the overall learning time. Lectures should be increased to ensure the declared learning outcomes. Currently there are 67 credits dedicated to lectures and 53 credits for final thesis (Research work + Master Thesis). This 55% for the lecturing part ensures just a minimum Physical knowledge level. During the site visit social stakeholders expressed their opinion about the insufficient basic knowledge in physics of the graduates.

Based on the course descriptions (Annex 1) the lectures are linked to the latest scientific and technological trends. The subjects’ literature choice is modern and updated. The Faculty has unique competence in piezomechanic related field. This technology competence should be increased by adding more area related subjects, as it can open new technological perspective for graduates. Also, as the international visibility is bidirectional, the increase of international cooperation projects is highly recommended.

2.3. Teaching staff

The teaching staff meets the legal requirements. The staff comprises of 11 teachers of the Department of Physics and Chemistry teaching the students of Physics: 3 are professors, 5 associate professors, and 3 lecturers working full-time in the LEU. All teachers have an academic degree. Over 50 percent of the courses are given by professors (SER 2.3.1, page 13).

Teachers meet the minimum requirements of scientific publication activity and international visibility. Still, as the Final Thesis supervisor scientific quality is directly related to graduates’ research skills, the Study Programme management should take actions for improving this level. Another aspect is related to the English language skills of the teaching staff. As within research community most spoken language is English, the Study Programme management should create conditions for improving teaching staff language skills.

The teaching staff number is appropriate for the Study Programme; as for current students, the amount it is more like “personal training”. However, from University’s economic aspect, this approach is not sustainable over a long period of time.

The average age of the teachers is 53 years. This ensures globally the Study Programme sustainability. However, retired lecturers give many mandatory and important courses. One of the professors is 71 years old and has four lecture courses a) The theory machines and mechanism (not related with this Study Programme); b) Theoretical mechanics (not related with this Study Programme); c) Piezomechanics; d) Mechatronics; and the second professor is 72 years old and delivers 3 other lecture courses a) Electrodynamics (not related with this Study Programme); b) Liquid crystal physics (not related with this Study Programme); c) Nanophotonics. It is recommended that the Study Programme management elaborates a plan for transferring the knowledge of experienced lecturers to their younger assistants.

Since 2008, all main course unit teachers have participated in scientific and educational projects, which are directly or indirectly related to teachers' professional training. e.g., scientific project VP1-3.1-ŠMM-07-K-02-046 “Topological effects in ultracold atom and condensed matter” 2012 – 2015. Lecturers have participated in international conferences and workshops. Teachers also have possibilities to participate in academic exchange programmes as LEU has 10 bilateral cooperation agreements with other universities. However, the mobility activity for academic staff

is not too high. There have been 29 international conference visits during the last 6 year. However, there were no longer probation cases among the teaching staff. The meeting with teaching staff during the site visit confirmed that main reason for low mobility rate is related to the lack of funding.

Practically all teachers of the Study Programme participate and present reports in scientific conferences in Lithuania and abroad. The site visit confirmed that one of the lecturers works at LEU and also at secondary school. Therefore, according to her commitments, she has no time for the science-related activities. Most teaching staff have also research activities that are directly related to the Study Programme. However, one aspect related to the teaching personnel is their scientific quality, which is in need of particular attention, as the publication activity and the international visibility (H-index) is moderate. Many lecturers have not been scientifically productive during the recent years. Another problem is related to scientific quality. Based on the ISI WEB of knowledge previous 5 year statistics the highest H-index was 3. Also, in many cases the lecturers have not published in recent years. The higher-level publishing and publishing activity in general is directly related to the research part of the study process and master thesis topics. The set aim based on the University's emblem "to prepare specialists of highest qualifications able to influence the advancements in science."(SER 2.1, 6) is therefore doubtful with such limited scientific backgrounds. The Review Team recommends the Study Programme management to encourage teaching staff to be more active in high-level publishing and also that the University authorities find additional resources for teaching staff mobility as it is directly related to the staff development and latest scientific results and knowledge transfer to the students.

2.4. Facilities and learning resources

The Faculty of Science and Technology in LEU has 4 lecture rooms for delivering the theoretical subjects. They also have specially designed laboratories for Physics practical trainings. The premises size is in most cases a good agreement with Study Programme needs. Students also have access to the internet via WIFI or in computer classrooms.

There are examples of new and upgraded laboratory equipment. In recent years, LEU has purchased some high-level scientific equipment (e.g. ultrasonic setup). However, in most cases the apparatus base is old-fashioned and outdated. Especially optics related equipment. Also, premises size for experimental work is limited. All above-mentioned aspects will limit the international scale science activities. The Study Programme management team states that in cases of missing scientific equipment, the Department of Physics and Chemistry has an opportunity to use facilities in Semiconductor Physics Institute, the Centre for Physical Sciences and Technology, and Molėtai Astronomical Observatory. They have signed long-term cooperation agreements. Part of the laboratory work is performed at the Semiconductor Physics Institute. Their technical bases are used for the practical work and final thesis preparation. The Review Team encourages the Study Programme management to concentrate its applied branch more on piezomechanic related activities as LEU has a unique competence in this area.

There is sufficient practice directly related to lecture materials. This ensures theoretical knowledge transfer and memorizing through practical work. Still, the practice facilities are outdated and need modernization. Furthermore, improved practice should be more closely related to IT. This will ensure students' knowledge on this topic and help them to adapt more easily according to labour market needs.

LEU has a modern library. The LEU Library participates in various national and international projects and therefore students have full access to the Library resources (books, journals,

databases) from any computer that can be connected to the University network. Access to the resources from outside the University is through the Lithuanian Virtual Library. This also facilitates the use of e-books. The LEU library fund consists of more than 644000 copies. The library fund can be used by all LEU students, teachers and employees. The University subscribes to over 40 of the most important scientific databases. (SER, 2.4.2, page 19).

2.5. Study process and students' performance assessment

There are no admission examinations to the Study Programme. All candidates holding a Bachelor Degree in Physics or Technology have state granted admission. Information related to admission can be accessed through the University's website. Table 2.16 in SER (page 21) indicates that the programme is not overly popular and the number of admitted students is decreasing. In 2012-2014 period only 6 students chose this Study Programme. In most cases the entrants to the Master Level Study Programme are from the same university. The drop-out rate is less than 15%. This level is adequate for natural science related field. However, as the overall number of students is decreasing the Study Programme management should determine actions for survival.

The Study Programme employs a wide-range of teaching and learning methods including lectures, projects, practical work, self-study and laboratory work. However, the self-study load is unbalanced in the 2nd and 3rd semester. The subject "Research work" as preparatory phases for the Final Thesis volume of work decreases the theoretical subjects. The Review Team recommends adding more lectures and decreasing self-study load in the subject "Research work". An important part of the studies is the Final Thesis which is under the supervision of staff member. During the preparation, students have to use previously gained skills and knowledge as well as improve them. The Final Thesis defence takes place at the end of the studies. As mentioned in Section 2.2 the Study Programme management should make changes in the requirements/evaluation of research work (subject) and final thesis work, so there is no issue in attributing the credits twice for some parts of the same work. This problem needs immediate action from the Study Programme management. Legal requirements for the Final Thesis are well-founded and clear (Procedure of Learning Outcomes Assessment and Recognition. Order of LEU Senate No. 279 of December 18, 2013 and No. 317 of April 9, 2014.http://www.leu.lt/download/14956/20140409_leu%20studiju%20rezultatu%20vertinimo%20tvarka.pdf (accessed July 17, 2014).). (SER, 2.2.2, page 11). However, site visit confirmed that Final Thesis level (7) needs immediate attention, as described below.

The usage of virtual learning possibilities needs also attention from Study Programme management. The site visit confirmed that only few lectures use such modern methods/facilities.

The site visit confirmed that students participate in research activities preparing their final thesis. However, as the teachers' international scale scientific visibility is moderate, there was no example of the engagement of students with the 1.1 classification scientific papers. Also, during the site visit, familiarization with final quality and content confirmed that most of them have rather "descriptive" than "innovative problem-solving" approach, what is clearly reflected in the final thesis reports.

University has provided students with opportunities to participate in international mobility programmes to obtain important experience and contacts. During the past 5 years, 4 students (~6%) used the mobility option (e.g., Spain, Sweden, Germany). The site visit confirmed two main factors that limit the activity. Many students work during the studies and also additional self-financing part is problematic. There have been no foreign students studying in the Faculty of

Physics in the last 5 years. The Review Team recommends encouraging students to use mobility options and add courses in the English language to attract more foreign students.

The Study Programme teachers and management committee members have regular consultation times with students. As the number of students is small, the personal communication between teachers/students is ideal. The Department is also flexible in arranging the lecturing timetable according to the students' needs and wishes. In most cases the lectures start at 5PM. As many students work, this is also in accordance with their needs and wishes. Departmental staff also provide consultations via e-mail and through the virtual learning environment Moodle SER 2.5.3 (page 22). However, the site visit confirmed that only few teachers use modern virtual learning options. The Study Programme management should encourage this activity.

Scholarships are granted to the students from the budget according to the Regulations of scholarships of LEU, approved by the Senate, No 281, 18/12/2013(SER 2.5.3, page 22). Social scholarships by State Studies Foundations are granted to the students for one semester and are equal to 114 EUR per month. There is also the Carol Martin Gruodis foundation scholarship for the students who achieved good academic results and in need of social support. Additionally, the LEU has incentive scholarships for the best students. The information about different funding opportunities (e.g. scholarships, loans, support for the travel to international events, support for participating in the ERASMUS student exchange programme, etc.) is presented at the University and faculty webpage and the students are informed via e-mail. LEU has sufficient dormitory places for students. There are student-driven activities such as organizations, clubs and various events.

The assessment system is clear. Every syllabus has a definite system. Students' performance is the set of different study process aspects (presentations, laboratory work defence, practical work, final thesis defence). The only serious problem is related to the double assessment of the final thesis as part of it has already received the credits from "research work" subject (detail description in section 2.2). Students are provided with continuous feedback during the course. Course information including the assessment methods is not available online. Students' performance is discussed after each semester.

The some graduates (approx. 15%) from Physics Study Programme continue their studies at PhD level. Graduates work in gymnasias and secondary schools and in public and private IT sectors as well. As the graduates continue their studies in specialisms, or start working in science related field, the Study Programme focus could be more adjusted accordingly.

2.6. Programme management

The Study Programme committee consists of 6 people in total from Department of Physics and Chemistry (LEU), Institute for Scientific Research (LEU), Department of Technology and Technological Education (LEU), Institute of Theoretical Physics and Astronomy (Vilnius University) and students' representative. The quality management of Physics programme has three levels – a) University level: LEU Senate; b) Faculty, department: Faculty of Science and Technology, Department of Physics and Chemistry; c) Programme committee level. There is a distribution of roles and responsibilities. Study Programme related challenges are discussed with students, social partners, alumni and faculty teachers twice a year (SER, 2.6 page 26). However, the site visit confirmed that students', alumni and social partners' engagement with the Study Programme development process is not regular. The Review Team encourages the Study Programme management towards more active regular contacts with above mentioned group.

The management committee monitors the Study Programme's evolution. The Study Programme management has contacts with social stakeholders and monitors the quality of the programme and relevance to the market needs based on the students, lecturers, social partners (graduates, employers) feedback. The subjects' teaching quality, academic needs and learning conditions surveys are performed. As the students' numbers are small, direct feedback about the Study Programme is also gained through private conversations with students. However, the site visit confirmed that contact with graduates and social stakeholders is not regular and feedback is often based on private discussions only. Also, the alumni presented their wish to receive feedback from questionnaires they have completed. The Review Team encourages the Study Programme management to establish regular round table discussion together with teaching staff, alumni and social stakeholders to be up-to-date with the needs of the market and to share other information among the partners.

The Study Programme quality-related topics are discussed in the programme committee, the department and in the faculty council level. Each semester students have opportunity to present their opinion about administration, lecturers' competences and course content through electronic survey. The summaries of programme evaluations are introduced to the master students and the social partners through private contacts. Assessment results are used as input for changing the structure, content, learning forms and methods of the programme. SER (2.7, page 26). Based on the fact that the number of entrants has significantly dropped in recent years, the Study Programme management committee together with university authorities should develop a survival action plan. The Review Team proposes that the Programme Team develops activities related to improving both national and international visibility of the University and Study Programme among foreign students.

The site visit confirmed that social stakeholders are ready to support the Study Programme management. In most cases there are only personal contacts and informal conversations. As stated previously the Review Team supports starting a regular round table format based discussions that could contribute the Study Programme development more efficiently.

Centrally, the University has a strong quality assurance system. There is multilevel quality assurance; first the Study Programme Committee; on second level Head of the Department including Dean's office and finally the Council of the University. The Programme Team should make stronger connections with the centre. While Stakeholders are keenly supportive and vibrant in their attitudes towards the programme generally and there are good graduates who take up good and profitable employment, the overall levels of involvement with this programme are variable. The Review Team therefore recommends their more formal involvement in quality assurance mechanisms, feedback, and action planning towards a strong and developmental future.

III. RECOMMENDATIONS

1. Attract new lecturers who will be able to take over from the older colleagues when they retire. As the university research is positioned in a quite specific area, the new teachers will probably need to be developed internally.
2. The lecturers should be encouraged to perform more internationally-oriented research work and publish more scientific papers in high ranked international journals and conferences.
3. Some laboratories equipment need to be updated as soon as possible – university needs to find funds for this purpose.
4. More lecturers should use Moodle – University administration should provide regular virtual learning training courses – 2 or 3 times a year. More courses should be taught in English.
5. Encourage student and staff mobility by introducing new internal financial schemes.
6. The quality assurance process should be better documented and should form a closed loop by continuously monitoring the implementation of the action plan.
7. English language skills of Study Programme teaching staff need to be improved.
8. More active engagement of alumni and social partners should be targeted through advisory panel and lecture activities;
9. Subject “Research work” and Final Thesis assessment needs prompt attention to avoid double grades for the some parts of the same work;
10. Requirements for Final Thesis content and quality needs to be strengthened. Change from “descriptive” style to the “original results based analysis“ style is recommended;
11. Curriculum needs to be reorganized by adding more basic Physics education subjects and reducing subject „Research work“ credits;
12. Study Programme Management Committee together with University authorities should develop action strategy/plans for making this Study Programme more attractive both nationally and internationally;
13. Study Programme Management should consider programme re-focussing by adding two-way specialisation “Astronomy” in theoretical branch and “Piezomechanics” in applied physics.

IV. SUMMARY

The second cycle Study Programme “Physics” aims and learning outcomes are well composed and cover cognitive, professional, technical and social aspects. They are composed in a way to provide best quality graduates. The number of students is limited and therefore teaching staff have personal contact and also direct feedback from each student. Moreover, the students know the learning outcomes and how they can be applied to their work. The Study Programme curriculum covers the minimum topics needed for Physics theoretical background. The Study Programme management should diminish the “Research work” subject load and add some relevant Physics-related lectures. Most students have continued their master-level studies from the same University and they see bachelor level pedagogical background as benefit in the future labour market.

The Teaching staff comprise a number of motivated members with some unique competences (piezomechanic). Unfortunately, the scientific equipment base is quite old-fashioned and therefore international scientific visibility is moderate. Some lecturers have not published in ISI 1.1 journals in recent years. Study Programme management together with University authorities should pay more attention to this topic. Also, some staff development is recommended in terms of modern teaching techniques. The Review Team also encourages management to support teaching staff English language improvement as key for international communication. The teaching staff age-balance topic needs also attention as some compulsory courses are given by teaching of quite senior years. As the University research is positioned in a quite specific area, the new teachers will probably need to be developed internally.

The site visit confirmed that most scientific and practical work facilities are outdated. Therefore, prompt attention and action are needed for keeping international level science and study process. The theoretical branch students and lecturers have access to Molėtai Astronomical Observatory and facilities there are at an appropriate level. Facilities needed for delivering lectures are also at an appropriate level.

Student academic support in many ways is very good, both academically and socially as the students’ number is limited. Notwithstanding these positives, there are some matters in need of attention. These generally concern students’ participation in the mobility programmes. University and Study Programme management should make efforts towards finding internal resources for students and teaching staff mobility as the financial factor is the most limiting in this case.

Programme management could be improved with more student involvement. Furthermore, the programme team should ensure that all quality assurance mechanisms fully tie into University central systems. In recent years the dropping number of entrants has been quite remarkable. Prompt action is needed for making this Study Programme more attractive locally and internationally.

The site visit confirmed that Social Stakeholders are keenly supportive and vibrant in their attitudes towards the programme generally and also the good graduates are ready to contribute to the Study Programme development. However, 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.

This Study Programme has strong historical background related to Astronomy and Piezomechanics, but from the evidence provided, the Review Team, as illustrated, believes there is work to be done in areas outlined in all sections of this report.

V. GENERAL ASSESSMENT

The study programme *Physics* (state code – 621F30006) at Lithuanian University of Educational Sciences 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	3
2.	Curriculum design	2
3.	Teaching staff	2
4.	Facilities and learning resources	2
5.	Study process and students' performance assessment	2
6.	Programme management	2
	Total:	13

*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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**LIETUVOS EDUKOLOGIJOS UNIVERSITETO ANTROSIOS PAKOPOS STUDIJŲ
PROGRAMOS FIZIKA (VALSTYBINIS KODAS – 621F30006) 2015-11-27
EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-306 IŠRAŠAS**

<...>

VI. APIBENDRINAMASIS ĮVERTINIMAS

Lietuvos edukologijos universiteto studijų programa *Fizika* (valstybinis kodas – 621F30006) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	3
2.	Programos sandara	2
3.	Personalas	2
4.	Materialieji ištekliai	2
5.	Studijų eiga ir jos vertinimas	2
6.	Programos vadyba	2
	Iš viso:	13

* 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)

<...>

IV. SANTRAUKA

Fizikos antrosios pakopos studijų programos tikslai ir studijų rezultatai yra tinkamai suformuluoti ir apima kognityvinius, profesinius, techninius bei socialinius aspektus – tai leidžia parengti aukščiausios kokybės absolventus. Kadangi studentų nedaug, dėstytojai su kiekvienu iš jų palaiko asmeninį ryšį ir gauna tiesioginį grįžtamąjį ryšį. Be to, studentams žinomi studijų rezultatai ir kaip juos pritaikyti darbe. Studijų programa aprėpia mažiausią reikiamą temų skaičių, būtiną teoriniams fizikos pagrindams įgyti. Studijų programos komitetas turėtų sumažinti dalyko „Tiriamasis darbas“ krūvį ir pridėti kitų tinkamų su fizika susijusių paskaitų. Dauguma studentų toliau tęsia magistrantūros studijas tame pat universitete ir siekiant bakalauro laipsnio įgytus pedagogikos pagrindus laiko privalumu ateities darbo rinkoje.

Dėstytojų komandą sudaro daug motyvuotų narių, turinčių unikalių kompetencijų (pvz., pjezomechanikos). Deja, mokslinės įrangos bazė yra gana pasenusi, todėl mokslininkų matomumas tarptautinėje arenoje – menkas. Kai kurie dėstytojai pastaraisiais metais nepublikavo straipsnių ISI 1.1 žurnaluose. Studijų programos komitetas ir universiteto administracija tam turėtų skirti daugiau dėmesio. Be to, dėstytojams rekomenduojama tobulinti šiuolaikinių dėstyimo metodų žinias. Vertinimo grupė taip pat skatina vadovybę palaikyti dėstytojų siekį gerinti anglų kalbos žinias, kurios tokios svarbios tarptautinei komunikacijai. Dėstytojų amžius – dar viena dėmesio reikalaujanti tema, kadangi kai kuriuos privalomuosius kursus dėsto gana

garbaus amžiaus lektoriai. Kadangi universitetas mokslinius tyrimus vykdo specifinėje srityje, naujų dėstytojų veikiausiai reikės pasiruošti universiteto viduje

Apsilankymas universitete patvirtino, kad dauguma mokslinio ir praktinio darbo įrangos yra pasenusi, todėl siekiant išlaikyti tarptautinį mokslo ir studijų proceso lygį, į šią problemą būtina kuo greičiau atkreipti dėmesį ir imtis veiksmų. Teorinės pakraipos studentai ir dėstytojai gali naudotis Molėtų observatorijos infrastruktūra, kuri yra tinkamo lygio. Paskaitoms skirtos patalpos ir įranga taip pat yra tinkamos.

Kadangi studentų nedaug, pagalba jiems tiek akademinio, tiek socialinio požiūriu daugeliu atvejų yra labai gera. Nepaisant šių teigiamų aspektų, į kai kuriuos dalykus būtina atkreipti dėmesį, ypač studentų dalyvavimą judumo programose. Universitetas ir studijų programos komitetas turi stengtis surasti vidinių išteklių studentų ir dėstytojų judumui skatinti, nes šiuo atveju labiausiai varžantis veiksnys ir yra finansai.

Programos vadybą reikėtų pagerinti ir į ją labiau įtraukti studentus. Be to, programos įgyvendinimo grupė turi užtikrinti, kad visi kokybės užtikrinimo mechanizmai visiškai sietųsi su universiteto centrinėmis sistemomis. Pastaraisiais metais gana smarkiai išaugo studijų nebaigusiu studentų skaičius. Būtina imtis skubių veiksmų, siekiant šią studijų programą padaryti patrauklesnę šalies ir tarptautiniu mastu.

Apsilankymas universitete patvirtino, kad socialiniai dalininkai aktyviai remia programą ir apskritai energingai reiškia savo požiūrį. Prie studijų programos tobulinimo yra pasirengę prisidėti ir mokslus gerai baigę absolventai. Vis dėlto į šios studijų programos reikalus įsitraukiama labai skirtingu lygiu. Siekiant aiškios ateities ir užtikrintos tolesnės plėtros, vertinimo grupė rekomenduoja minėtus partnerius formaliau įtraukti į kokybės užtikrinimo mechanizmus, grįžtamojo ryšio procesą ir veiksmų planavimą.

Studijų programa turi tvirtą istorinį pamatą, susijusį su astronomija ir pjezomechanika, tačiau vertinimo grupė, remdamasi pateiktais ir jau minėtais įrodymais, mano, kad prie visose vertinimo išvadų dalyse paminėtų sričių dar reikia padirbėti.

<...>

III. REKOMENDACIJOS

1. Pritraukti naujų dėstytojų, galėsiančių perimti pareigas iš senesnių kolegų, šiems išėjus į pensiją. Kadangi universitetas mokslinius tyrimus vykdo gana specifinėje srityje, naujų dėstytojų veikiausiai reikės pasiruošti universiteto viduje.
2. Dėstytojus reikėtų skatinti imtis labiau į tarptautiškumą orientuoto mokslinio tiriamojo darbo, publikuoti daugiau mokslinių straipsnių aukšto lygio tarptautiniuose žurnaluose ir skaityti pranešimus konferencijose.
3. Būtina kuo greičiau atnaujinti laboratorinę įrangą – šiuo tikslu universitetas turi rasti lėšų.
4. Daugiau dėstytojų turėtų naudotis „Moodle“ sistema – universiteto administracijai reikia pasirūpinti, kad nuolatiniai virtualių studijų kursai vyktų 2 ar 3 kartus per metus. Daugiau kursų turėtų būti dėstoma anglų kalba.
5. Skatinti studentų ir darbuotojų judumą, diegiant naujas vidinio finansavimo schemas.
6. Kokybės užtikrinimo procesas turėtų būti geriau dokumentuojamas ir įgauti ciklišką formą, t. y. veiksmų plano įgyvendinimas turi būti nuolat stebimas.
7. Būtina pagerinti studijų programos dėstytojų anglų kalbos žinias.

8. Siektina aktyviau įtraukti alumnus ir socialinius partnerius, kviesti juos dalyvauti konsultacinėse komisijose ir skaityti paskaitų.
9. Būtina skubiai atkreipti dėmesį į dalyko „Tiriamasis darbas“ ir baigiamojo darbo vertinimą, kad būtų išvengta dvigubo vertinimo už to paties darbo dalis.
10. Baigiamojo darbo turiniui ir kokybei keliamus reikalavimus reikia sugriežtinti. Rekomenduojama nuo „aprašomojo“ stiliaus prie pereiti „originaliais rezultatais grįstos analizės“.
11. Reikia reorganizuoti studijų programą, pridėdant daugiau pagrindinių fizikos mokomųjų dalykų ir sumažinant dalyko „Tiriamasis darbas“ kreditų.
12. Studijų programos vadybos komitetas kartu su universiteto administracija turėtų parengti veiksmų strategiją ar planus, kaip šią studijų programą padaryti patrauklesnę šalies ir tarptautiniu mastu.
13. Studijų programos vadybai reikėtų apsvarstyti programos perorientavimą ir pridėti dvi specializacijas: prie teorinės dalies – astronomiją, o prie taikomosios fizikos – pjezomechaniką.

<...>

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)