



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus universiteto

***LAZERINĖS FIZIKOS IR OPTINIŲ TECHNOLOGIJŲ
PROGRAMOS (621F30002)
VERTINIMO IŠVADOS***

**EVALUATION REPORT OF
LASER PHYSICS AND OPTICAL TECHNOLOGIES
(621F30002)
STUDY PROGRAMME
at Vilnius University**

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Išvados parengtos anglų kalba
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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Lazerinė fizika ir optinės technologijos</i>
Valstybinis kodas	621F30002
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	1994

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme:	<i>Laser Physics and Optical Technologies</i>
State code	621F30002
Study area	Physical sciences
Study field	Physics
Kind 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 credits
Degree and (or) professional qualifications awarded	Master of Physics
Date of registration of the study programme	1994

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The Centre for Quality Assessment in Higher Education

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I. INTRODUCTION

The Evaluation Report was prepared about the Study Programme of *Laser Physics and Optical Technologies* at Vilnius University (hereinafter – VU). This second cycle programme is in the Study area of Physical Sciences, its study field is Physics and gives out a qualification degree of Master of Physics. The programme was registered in 1994. The members of the Expert Team, who are responsible for the Evaluation 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 cover page of the Evaluation Report.

The study programme is one of the nine second cycle programmes in Physics at the Faculty of Physics at Vilnius University. This programme is an outstanding member of the second cycle programme family, because its topics is one in the field of physics, where successful research work has continuously been conducted in the last two decades and a powerful industry was built up in Lithuania. The *Laser Physics and Optical Technologies* master programme belongs to the field of science, where the country has a healthy job market and the graduates are needed both in research and development.

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 10th of October, 2013. There was a discussion (already on the 8th of October) with the administration staff, during which all responsible partners were present from the side of the Faculty of Physics. A meeting was organized with the staff responsible for preparation of Self-Assessment Report (three members of the staff and one person from the central administration were there). Then the Expert Team had a meeting with the teaching staff (7 people, about half of the teachers were present) and with the students (8 students, about a third of all the students of the programme were there). The Expert Team - already on the 8th of October - visited the auditoriums, libraries of the departments, teaching laboratories used in the educational process. The experts had possibility to familiarize with the thesis materials of the graduates of the master programme. It was followed by meeting with alumni (4 persons participated) and with a discussion with social partners, with 8 persons in managerial positions. The site visit was concluded by a discussion with the partners responsible for the master degree study programme *Laser Physics and Optical Technologies*.

All these steps of the evaluation process took place without any disturbing affairs, fully according to the rules of the Centre for Quality Assessment in Higher Education of Lithuania. The Expert Team evaluated all the gathered information in closed section. The Evaluation Report of *Laser Physics and Optical Technologies* was accepted by all members of the Expert Team with a one vote will.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

The programme aims are excellently formulated and focused, namely the programme intends “to train high international level laser physics and optical technologies specialists with master degree, able to develop new lasers and innovative laser systems, to perform scientific research on their own, to study for the doctor's degree and to be a successful competitor on the Lithuanian, European and world markets of scientific work and light technologies and photonics.”

Equally, the learning outcomes are relevant, self-consistent and comply with legal, scientific and pedagogical requirements; they are also publically accessible. In the above context, the Expert Team acknowledges that the programme coordinators took into account the conclusions of the year 2005 external comprehensive assessment by excellently addressing the "lack of certainty, clarity and mutual links in the wording of the programme objectives and aims".

Only for practical reasons it is suggested to group them into sub-groups in the form of two-column table, where each line is filled with different learning outcomes (1st column), contributing to the corresponding aims (2nd column). This would also allow for much easier consistency and completeness review when it comes of the curriculum design elements. Otherwise, the Expert Team found that the aims and learning outcomes of this programme were formulated on a good way.

In conclusion, the Expert Team only encourages the programme coordinators to continue observing the development of related high-tech industries, facilitate staff and student interaction with these applied institutes/industries, seek for formal cooperation and exchange of joint research projects. In addition, the Expert Team also recognizes that the modern experimental base in laser technology that is recently being developed at Vilnius University will create better conditions for the application-oriented research, will further increase the interest of industrial companies, will motivate the students in solving practical problems and lead to even larger job opportunities in the future.

2. Curriculum design

The programme curriculum design presents the latest concepts and theoretical approaches together with experimental methods dedicated in the field of laser physics and optical technologies. Programme content is comprised of 15 compulsory and 2 optional courses. 14 compulsory courses are the study field courses, while the "Synergetic of Life" and the optional courses are general courses.

The programme is designed for preparation for doctoral studies and practical activities. The courses of the programme ensure integrated theoretical and practical knowledge, which is essential for laser and optics specialist. This needs complex approach to understand, master, apply and create the modern laser and optical technologies. This engages modern solid state and fiber lasers, their operation and design principles, principles of detection and management of laser emission, the features of modern optical fiber technology and laser pulse propagation in various optical materials, nonlinear and quantum laser-matter interaction phenomena, with special emphasis given to laser-matter interactions using ultra short light pulses as well as the laser frequency conversion by means of nonlinear optical methods. Also, it provides fundamental and technological know-how on laser applications in materials processing, spectroscopy and optical communication.

The course content is coordinated, preventing overlapping with each other and overall covered topics ensure the complex and balanced approach to develop the competences necessary for specialists. Within this programme students have to acquire skills to perform targeted experiments, analyse and summarise their results. Also the latest scientific facilities and recent scientific achievements are included to ensure comprehensive background and fulfill the set aims of the study programme.

A significant part of the programme is dedicated to the experimental work both in educational and scientific laboratories, especially by encouraging the students into scientific research. Both compulsory and optional course units as well as practical tasks are oriented to this activity. Students are encouraged to take part in research work as early as in their first semesters

of studies, providing course papers and laboratory tasks in research laboratories. In the second year of studies specialisation practical activity is introduced and a lot of time is dedicated for final thesis preparation.

Expert Team confirms the outstanding practical work facilities that guarantee the top level education. The levels of the courses correspond to the study programme level. The scope of the programme covers mostly learning outcomes. All study programme aims are covered within the courses.

The issue linked to achieving professional knowledge in English should be mentioned. In Expert Team communication with students they expressed their will to have more seminars presented by foreign scientists to engage more updated knowledge and therefore improve their scientific language. Site visit have confirmed that students have got excellent language knowledge, as they were able to communicate fluently with the Expert Team. Expert Team encourages study programme leaders to find more lecturers from abroad.

One of the strongest aspects in this particular study programme is well-motivated lectures with strong scientific background. It is not typical that study programme lector is also active in teaching and same time successful in high-level science. Most of lectures have related scientific interests and therefore there is a direct link between course content and latest achievements in science. It should be pointed out, that students are really motivated in study programme and related activities.

One potential improvement issue is tightening relationships with institutions outside to the University for providing students practice opportunities. There are already several laser and optical companies engaged to the study process. However, company representatives expressed their wish to make these links even stronger. Therefore it is highly recommended to establish new or strengthen existing contacts with them for students practice places.

3. Staff

The teaching staff is optimal for this study programme. The staff of 12 teachers of the Faculty of Physics are involved in teaching process of *Laser Physics and Optical Technologies*. Among them 7 professors (4 of them habilitated doctors, 2 doctors of physics having completed the habilitation procedure, 1 doctor of physics) 3 associate professors and 2 lecturers (all having the degree of doctor of physics) working on a full-time basis. Expert Team has confirmed that the number of engaged persons is even bigger as many scientist are involved in study programme as final thesis supervisors. Quantum electronics department teachers are responsible for course units delivered in study programme. Lectures are carried by habilitated doctors, professors or doctors associated professors, or doctors lecturers of the corresponding fields. Expert Team confirms that the engagement of the lecturers is at the top-level science. This guarantees the quality and constant updating of course content.

The average age of the teachers is 48.6 years, scientific work experience - 23 years, pedagogical work - 12.3 years. The teaching personnel are formed according to the legal requirements. Many retired lectors have recently given their course to the younger colleagues. The Expert Team is impressed about average age of teaching personnel. Since 2008 all main course unit teachers participated in scientific and educational projects, which are directly or indirectly related to teachers' professional training. Teachers' professional training also takes place during scientific internships. Almost all of the programme teachers have visited foreign universities or education centres, e.g. in Insubria university (Italy), Hokkaido university (Japan), Max Planck Quantum Optics Institute (Germany), etc. Some of them have experience in industrial work, e.g. former employees of "Light conversion", which is directly related to their scientific work and teaching course specifics. Practically all teachers of the study programme have participated and presented reports in scientific conferences in Lithuania and abroad. Many lecturers have outstanding H-index that confirms above made statements. Teaching staff is

financially encouraged to publish articles by being offered salary bonuses. The majorities of the programme's lecturers have experience in working at European universities and have constant and productive academic contacts with foreign scientists. Faculty administration is also active in recruitment of new teaching personnel. Among the PhD students who have defended their thesis in the Faculty the best ones are invited to teach.

During the site visit, students expressed their wish to have more lectures in English. This could help them into entering to the real scientific work and improve their language skills. The Expert Team encourages study programme leaders to engage more foreign lecturers into study process through seminars or lecture courses.

4. Facilities and learning resources

The premises for studies are adequate both in their size and quality. In Quantum Electronics department of Physics Faculty, there are several auditoriums with enough places for theoretical lectures. Rooms have air-conditioning systems and are equipped with digital slide projectors. For some lectures auditoriums located in Laser research centre are used. Laboratory work is performed in the Laser physics teaching laboratory in the Physics Faculty building and in Laser research centre building. The teaching laboratories are being constantly renewed and equipped with new scientific devices by using EU structural funds, through Sunrise valley project and National Complex programme. The main social partners of programme are Lithuanian laser producing companies "Light conversion" and "Ekspla", which share their modern laser equipment, participate in students training process and research. Laboratory and computer equipment are adequate. Equipment for the studies is modern and constantly being updated.

Teaching materials are adequate and accessible. There were several projects for obtaining books in Laser and Optical Technologies. There is quite long list of textbooks published by teachers of this programme (using EU structural funds).

VU Library subscribes over 50 global databases which make it possible for the University library users to read different scientific magazine articles. VU library is modern, computerized with free internet palaces and free WiFi connections and easily accessible for students. VU library subscribes a number of databases related to the subject-matter of laser physics and optical technology study programme. Study literature is added to the library funds every year. New books are purchased in VU library according to teachers' recommendations. The students can also connect to the subscribed databases from their homes by using the University supplied VPN (Virtual Private Network) service.

5. Study process and student assessment

The process of student admission into the programm is performed in the following way; persons who graduate in the first cycle physical, technological and biomedical university studies and possess a bachelor's qualification degree of these research areas can be admitted to the second cycle of *Laser Physics and Optical Technologies* study programme. Persons from other research areas are admitted only if they attend the required introductory courses of the study programme and present a thesis on the topic of physical or technological research areas. Persons are admitted to the second cycle studies by competition, so, the admission requirements are well-founded.

During visit in Vilnius University Experts Team found at least one student, who participated in joint meeting of Experts Team and students of programme and who graduated from the *Applied Physics* bachelor study programme at Kaunas University of Technology. This person now successfully continues her studies in VU *Laser Physics and Optical Technologies* programme.

The information about organization of the study process ensures an adequate provision of the programme but the achievements of the learning outcomes were somehow not reflected in self-evaluation description. On the other hand during Experts Team visit in VU Physics faculty and discussions with administration, self-evaluation team, staff and students it was found that organization of the study process ensures an adequate provision of the programme and the achievement of the learning outcomes goes on in a good way.

The ratios of time in first three semesters are about: for lectures 20% , workshops 20% and autonomous work 60%. Fourth semester is dedicated only for thesis preparation by autonomous work. The 4th semester is entirely devoted to research work (working on the final master thesis). This time distribution is optimal.

Students are encouraged to participate in research work. This is because of two reasons: 1) they need to prepare final thesis for master degree, 2) they are interested in research work and wants to start for early years. The last statement was conformed during meeting of Expert Team with students of programme during visits. Students are invited to participate in scientific seminars organized by the Quantum electronics department and its research groups, in presentations of visiting scientists, and in doctors' theses defense processes. The scientific activities of the students are encouraged in numerous ways. The students of Laser physics and optical technologies field are active participants of the scientific activities in the laboratories, in autumn and spring practices, organized by the Lithuanian Research Council, as well as in scientific and high technologies projects of the Quantum electronics department, Laser research centre and industrial partners with the support of Lithuanian Research Council

Students have opportunities to participate in student mobility programme. About 20 % of the students of *Laser Physics and Optical Technologies* study programme participate in exchange programmes. However Expert Team would like to see this number even higher. As it was stated during the meetings the difficulties arise due to the difference between the educational programmes: upon return the students have to study part of the programme courses on their own to catch up. Another problem is related to financial support given to the students: such programmes like ERASMUS in some cases offer low grants and support is not sufficient for all needs during the visit.

The higher education institution ensures an adequate level of academic and social support. Some students receive encouraging scholarships for study results (195 Lt and 325 Lt). Since 2009, after the change in the procedures of financing, the scholarships are received by approximately 13% of the best performing students, but students did not emphasize this problem. Social scholarships can be allocated to students who are not so well off. These scholarships are distributed by Students' Representation Office.

The assessment system of students' performance is clear, adequate and publicly available. The students knowledge and progress are assessed on the basis of 'The assessment procedures of study progress at Vilnius University', approved by the VU Senate Committee. Accumulative assessment system applies to most course units of the *Laser Physics and Optical Technologies* programme. The students are familiarized with the assessment criteria during the introductory lecture of every course unit. During meeting this statement was confirmed by the students.

Professional activities of the majority of graduates meet the programme providers' expectations. In average 91 % of admitted students successfully complete the programme.

During the meeting with social partners of programme it could be concluded that most of the employers assess the qualification of the graduates of the programme as good or very good.

6. Programme management

Responsibilities for decisions and monitoring of the implementation of the programme are clearly allocated. The study programme is managed by the Study Programme Committee, which is formed from the staff of the Faculty of Physics, the students recommended by Students' Representation Office, department Faculty of Physics and the representatives of social partners. The head of the Study Programme Committee is elected from the Committee members by the majority of votes and approved by the department proposal in the Physics Faculty Council. The Study Programme Committee confirms course unit descriptions approved in the department meetings, proposes to the Faculty Council to approve the changes in the programme or changes in the admission procedures. The heads of the department inform the Study Programme Committee about the shortcomings in the programme and possible ways of solution (the heads of departments are informed by teachers, Students' Representation Office and social partners). The head of the department is in charge of the quality of course units related to the profile of the department and the study course of these course units. The course of the study programme is administered by the dean's office, i.e. the dean and the vice-dean for academic issues. Programme administration issues are discussed in weekly meetings in the dean's office.

The outcomes of internal and external evaluations of the programme are used for the improvement of the programme. While analyzing the received data the *Laser Physics and Optical Technologies* Study Programme Committee and the faculty administration try to find out what causes non-satisfaction with the studies during the meetings with students. If need arises, the amount of hours given for the course unit is corrected, the course content is improved, the teaching laboratories are modernized, young employees who recently came back from abroad or holders of university doctoral degree are involved in the teaching activities. In brief, the evaluation and improvement processes clearly involve stakeholders.

The internal quality assurance of the programme has several right elements; however they do not come together in a well-established system. It is necessary that the programme management adapt a functioning quality assurance method in the near future.

III. RECOMMENDATIONS

1. The programme managers should make efforts to enhance the mobility and staff exchange, in particular for students. Various available instruments can be used for this purpose, for example, ERASMUS grants, project research grants, bilateral agreements between institutions, etc.
2. The programme managers should continue and strengthen their efforts in providing courses in English. This should be the case if the students' group involves some foreign students. In this regard, the programme might be promoted as capable to offer lectures and practical courses in English. Equally, invitation of more guest lecturers and scientists is strongly encouraged. Finally, students should have a chance to give a seminar or conference presentation in English.
3. The internal quality assurance of the programme is one of the most important prerequisite to maintain its sustainability. Therefore it is recommended that the programme management builds up a closed and detailed system of quality assurance and quality control. It should include all aspects of curriculum development, staff renewal and further training of the members, the review of material resources and all other aspects of the study process. This quality assurance system should interlock in those of the Faculty of Physics and of the Vilnius University.
4. The programme aims and learning outcomes could be better structured and presented in the form of a table as in the case of other programmes. This will facilitate review and course identification process in the expected logics “aims”-“learning outcomes” - “courses”.

IV. SUMMARY

The *Laser Physics and Optical Technologies* study programme is an important, needed and by the job market supported member of the second cycle programme family at the Faculty of Physics of Vilnius University.

The study programme gives an excellent knowledge in master level physics and clearly justifies the foundation of the Master of Physics degree. The structure of the study programme is healthy and it is on up-to-date international scientific level.

The laboratories for the *Laser Physics and Optical Technologies* had a substantial and positive development in the past decade, especially in the last years. They are on a very high level, even when compared to international practice. The teaching staff of this master degree programme is very much competent and motivated. The curriculum design can be appreciated; there is no obvious overlapping or other drawbacks. It is well arranged that the courses are organized during two days of a week, allowing the students to work on their thesis in the other days. The students are all committed persons; they are knowledgeable and able to work in research groups.

The teaching materials are in all cases available in Lithuanian and English, as well.

The final thesis works documents are in most cases of appropriate scientific level, sometimes they are very good. Even the structure of the thesis documents show features, which well correspond to the best international edition standards.

The Expert Team, besides the appreciation has several recommendations to the management of the *Laser Physics and Optical Technologies* second cycle program.

The program should make efforts to facilitate and increase the mobility of students and staff exchange. This mobility remains low. Various available instruments can be used for the purpose to change this unfortunate fact, like ERASMUS scholarships, project research grants, or bilateral agreements between institutions. The programme management should study possible other reasons and measures in order to enhance the mobility.

The programme management should continue and strengthen their efforts in providing courses in English. This should be the case if the students' group involves some foreign students. In this regard, the programme might be promoted as capable to offer lectures and practical courses in English. Equally, invitation of more guest lecturers and scientists is strongly encouraged. Finally, students should have a chance to give a seminar or conference presentation in English.

The internal quality assurance of the programme is one of the most important prerequisite to maintain sustainability. Therefore it is recommended that the programme management of *Laser Physics and Optical Technologies* should build up a closed and detailed system of quality assurance. The programme managers have good contacts to the stakeholders, however they do not seem to be involved enough in shaping the programme. The quality assurance system should include all aspects of curriculum development, staff renewal and further training of the members, the material resources and all aspects of the study process. This quality assurance system should interlock in those of the Faculty of Physics and of the Vilnius University.

V. GENERAL ASSESSMENT

The study programme *Laser Physics and Optical Technologies* (state code – 621F30002) at Vilnius University is given **positive** evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	4
2.	Curriculum design	4
3.	Staff	4
4.	Material resources	4
5.	Study process and assessment (student admission, study process student support, achievement assessment)	4
6.	Programme management (programme administration, internal quality assurance)	3
	Total:	23

*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.

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V. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus universiteto studijų programa *Lazerinė fizika ir optinės technologijos* (valstybinis kodas – 621F30002) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	4
2.	Programos sandara	4
3.	Personalas	4
4.	Materialieji ištekliai	4
5.	Studijų eiga ir jos vertinimas	4
6.	Programos vadyba	3
	Iš viso:	23

* 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

Lazerinės fizikos ir optinių technologijų studijų programa yra viena iš svarbių, reikalingų ir darbo rinkos remiamų Vilniaus universiteto Fizikos fakulteto antrosios pakopos studijų programų.

Ši studijų programa suteikia išsamių magistrinio lygio fizikos žinių ir akivaizdžiai pateisina fizikos magistro laipsnio suteikimą. Studijų programos sandara yra gerai apgalvota, programa atitinka aukštą tarptautinį mokslo lygį.

Lazerinės fizikos ir optinių technologijų programai įgyvendinti skirtos laboratorijos dešimties metų laikotarpiu, ypač paskutiniaisiais metais, buvo iš esmės tobulinamos. Jos yra labai aukšto lygio netgi palyginus su tarptautine praktika. Šią magistrantūros programą įgyvendinantis akademinis personalas yra labai kompetentingas ir motyvuotas. Programos sandara vertinama labai gerai; dalykai iš esmės nesikartoja ir nėra kitų aiškiai pastebimų trūkumų. Paskaitos gerai organizuotos – jos vyksta du kartus per savaitę, taigi kitomis dienomis studentai turi galimybę rašyti baigiamąjį darbą. Visi studentai yra stropūs, gerai nusimanantys ir gebantys dirbti mokslinių tyrimų grupėse.

Visa mokomoji medžiaga yra prieinama lietuvių, taip pat ir anglų kalba.

Baigiamieji darbai dažniausiai yra tinkamo mokslinio lygio, kartais labai geri. Netgi šių dokumentų struktūra rodo savybes, kurios gerai atitinka geriausius tarptautinės leidybos standartus.

Ekspertų grupė, nepaisant palankaus *Lazerinės fizikos ir optinių technologijų* antrosios pakopos programos vertinimo, jos vadovams pateikia keletą rekomendacijų.

Įgyvendinant šią programą, reikėtų pasistengti padidinti studentų judumą ir apsikeitimą dėstytojais. Judumas vis dar mažas. Yra įvairių priemonių šiai problemai išspręsti, pavyzdžiui, ERASMUS stipendijos, mokslinių tyrimų projektams skirtos lėšos ir institucijų dvišaliai susitarimai. Programos vadovai turėtų ištirti visas kitas galimas mažo judumo priežastis ir priemones judumui padidinti.

Programos vadovai turėtų ir toliau stengtis dėstyti dalykus anglų kalba. Tai turėtų būti daroma, kai studentų grupėje yra keletas užsieniečių. Šiuo atžvilgiu programa galėtų būti reklamuojama kaip galinti pasiūlyti paskaitas ir praktinį kursą anglų kalba. Be to, primygtinai raginama pasikviesti daugiau atvykstančiųjų dėstytojų ir mokslininkų. Pagaliau ir studentams turėtų būti suteikta galimybė pristatyti seminarą ar konferenciją anglų kalba

Viena iš svarbiausių programos tvarumo išsaugojimo prielaidų yra jos vidinis kokybės užtikrinimas. Todėl rekomenduojama, kad *Lazerinės fizikos ir optinių technologijų* studijų programos vadovai sukurtų uždara ir išsamią kokybės užtikrinimo ir kokybės kontrolės sistemą. Programos vadovai palaiko tamprus ryšius su socialiniais dalininkais, tačiau nepanašu, kad šie dalyvautų kuriant programą. Kokybės užtikrinimo sistema turėtų apimti visus programos tobulinimo, personalo atnaujinimo ir tolesnio jų mokymo klausimus, materialiuosius išteklius ir visus kitus studijų proceso aspektus. Ši kokybės užtikrinimo sistema turėtų būti sujungta su Fizikos fakulteto ir Vilniaus universiteto sistemomis.

<...>

III. REKOMENDACIJOS

1. Šios programos vadovai turėtų pasistengti padidinti judumą ir apkeitimą darbuotojais ir ypač studentais. Šiam tikslui galima pasinaudoti įvairiomis priemonėmis, pavyzdžiui, ERASMUS stipendijomis, mokslinių tyrimų projektams skiriamomis lėšomis, dvišaliais institucijų susitarimais ir t. t.
2. Įgyvendinant šią programą turėtų būti ir toliau didinamos pastangos dėstyti dalykus anglų kalba. Tai turėtų būti daroma, kai studentų grupėje yra užsieniečių. Šiuo atžvilgiu programa galėtų būti reklamuojama kaip galinti pasiūlyti paskaitas ir praktinį kursą anglų kalba. Be to, primygtinai raginama pasikviesti daugiau atvykstančiųjų dėstytojų ir mokslininkų. Pagaliau ir studentams turėtų būti suteikta galimybė pristatyti seminarą ar konferenciją anglų kalba.
3. Viena iš svarbiausių programos tvarumo išsaugojimo prielaidų yra jos vidinis kokybės užtikrinimas. Todėl rekomenduojama, kad programos vadovai sukurtų uždara ir išsamią kokybės užtikrinimo ir kokybės kontrolės sistemą. Ji turėtų apimti visus programos tobulinimo, personalo atnaujinimo ir tolesnio jų mokymo klausimus, materialiujų išteklių peržiūrą ir visus kitus studijų proceso aspektus. Ši kokybės užtikrinimo sistema turėtų būti sujungta su Fizikos fakulteto ir Vilniaus universiteto sistemomis.
4. Programos tikslai ir numatomi studijų rezultatai galėtų būti labiau struktūruoti ir pateikti lentelės forma kaip ir kitų programų. Tai palengvintų peržiūrą ir dalyko identifikavimo procesą pagal numatytą loginę seką „tikslai“ – „numatomi studijų rezultatai“ – „dalykai“.

<...>