



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO
STUDIJŲ PROGRAMOS *APLINKOS APSAUGOS INŽINERIJA*
(*valstybinis kodas – 612H17006*)
VERTINIMO IŠVADOS**

**EVALUATION REPORT
of STUDY PROGRAMME *ENVIRONMENTAL PROTECTION
ENGINEERING (state code – 612H17006)*
STUDY PROGRAMME
at VILNIUS GEDIMINAS TECHNICAL UNIVERSITY**

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Išvados parengtos anglų kalba
Report language – English

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

| | |
|--|-------------------------------------|
| Studijų programos pavadinimas | <i>Aplinkos apsaugos inžinerija</i> |
| Valstybinis kodas | 612H17006 |
| Studijų sritis | Technologijos mokslai |
| Studijų kryptis | Bendroji inžinerija |
| Studijų programos rūšis | Universitetinės studijos |
| Studijų pakopa | Pirmoji |
| Studijų forma (trukmė metais) | nuolatinė (4), iššęstinė (6) |
| Studijų programos apimtis kreditais | 240 |
| Suteikiamas laipsnis ir (ar) profesinė kvalifikacija | Aplinkos inžinerijos bakalauras |
| Studijų programos įregistravimo data | 2011-12-27 |

INFORMATION ON EVALUATED STUDY PROGRAMME

| | |
|---|---|
| Title of the study programme | <i>Environmental Protection Engineering</i> |
| State code | 612H17006 |
| Study area | Technological Sciences |
| Study field | General Engineering |
| Type of the study programme | University studies |
| Study cycle | First |
| Study mode (length in years) | Full-time (4), Part-time (6) |
| Volume of the study programme in credits | 240 |
| Degree and (or) professional qualifications awarded | Bachelor of Environmental Engineering |
| Date of registration of the study programme | 27-12-2011 |

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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 | Supplement of the Self-Evaluation Report 2015 |

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

The basis for the evaluation of the study programme is the Self-Evaluation Report (hereafter, SER), prepared in 2015, its annexes and the results of site visit of the expert team to the VGTU on 6 May 2016. The visit incorporated all required meetings with different groups: the administrative staff of the VGTU and the Faculty of Environmental Engineering, staff responsible

for preparing the self-evaluation documents, teaching staff, students of all years of study, and employers. The expert group evaluated various support services (classrooms, laboratories, library, computer facilities), and various other materials. After the expert group discussions and additional preparations of conclusions and remarks, introductory general conclusions of the visit were presented. After the visit, the group met to discuss and agree the content of the report, which represents the expert team consensual views.

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 6th May 2016.

- 1. Prof. dr. Olav Aarna (team leader)**, *International expert for quality assessment in HE, Adviser to the Managerial Board of Estonian Qualification Authority Kutsekoda, Vice-Rector for Research and Development, Estonian Business School, Estonia.*
- 2. Prof dr. Judit Padisák**, *Director of Institute of Environmental Sciences, University of Pannonia, Hungary.*
- 3. Prof. dr. Soon-Thiam Khu**, *Professor of Urban Water System Engineering, Head of Civil Engineering Department, School of Engineering, Monash University, Australia.*
- 4. Ms. Lina Šleinotaitė-Budrienė**, *expert for environment protection, director of JSC "Ekokonsultacijos", Lithuania.*
- 5. Ms. Inga Bačelytė**, *Master student of study programme "Applied ecology", Aleksandras Stulginskis University, Lithuania.*

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

The aim of the Programme is: “To train a Bachelor of Environmental Protection Engineering with the first-cycle university education having knowledge of fundamental, social sciences and environmental protection engineering; capable to critically observe and assess the problems of environmental pollution; to plan and implement engineering measures for preventing environmental pollution and stabilising environmental quality status; to design modern environmental protection facilities designated for improving the quality of the environment and human life; to be interested in the innovations of technological sciences and to apply them in various circumstances; to relate one's professional abilities with business and management fundamentals; to maintain one's professional competence by learning all one's life” (SER, p. 4). The graduates shall be awarded Bachelor's degree in Environmental Engineering.

In general, the aim is achievable, compatible with the qualification awarded, up-to-date, and ambitious enough. Particularly, the aim is ambitious with respect to the expected capability of graduates “to design modern environmental protection facilities”. The survey conducted in 2011 rather indicated increasing demand for specialists who are able to conduct technological analysis of existing systems, and to install, maintain and manage environmental protection systems (see also p. 2.5). On the other hand, just “to be interested in the innovations of technological sciences” is not an aim *per se*.

The Programme aim meets general requirements for studies in Environment Protection Engineering and is publicly available at the VGTU website (<https://medeine.vgtu.lt/programos/programa.jsp?fak=3&prog=158&sid=F&rus=U&klb=en>). This allows potential students get a clear overview of the Programme structure and content.

The Programme aim and learning outcomes (LOs) are consistent with the type and level of studies and the qualification offered. The SER and its Supplement are quite detailed in describing the correspondence of the LOs to the Lithuanian legal requirements and different EU directives. Following the requirements of *General Regulation of Technological Sciences (Engineering) Study Field* the programme LOs are grouped into six categories: Knowledge, Research skills, Engineering analysis, Engineering design, Abilities of engineering activity, Personal and social abilities, compatible with the EUR-ACE structure.

The Programme fulfils relevant academic and professional requirements. As revealed from the survey on the market needs and employability of graduates conducted by the SER team, and from the interviews with the students and the social partners, the Programme meets the labour market needs. Also, the name of the Programme, its LOs, the content and the qualifications offered

are compatible with each other. The Programme graduates may either start their career according to the obtained qualification or continue their studies on Master's level.

From 2016 onwards the Programme has three specialisations: Environmental Protection Technologies, Water Management, and Environmental Public Administration, while the specialisation in Environment Protection Management has been cancelled. These specialisations are in line with the needs of the labour market. However, largely as a consequence of the high dropout rate, especially at the beginning of the studies, the threshold limit of seven students that is needed to open a specialisation is not achieved in every year. As a result, the students' options to select a specialisation might be much more limited than promised. The expert team recommends to reconsider the need for specialisations or the threshold number of students necessary to open a specialisation, enabling the free choice for students.

An important aspect needing revision is linking the Programme LOs with subjects. Annex 3 of the Supplement describes how the Programme LOs are covered by subject courses (for details see p. 2.2). These descriptions follow the specialisations structure. The tendency is to cover all the Programme LOs with maximum number of subjects, while having forgotten that all these LOs need to be assessed properly. In the subject descriptions LOs are listed in detail, but teaching and assessment methods are almost or exactly the same for different LOs. This indicates that the LOs are not incorporated intrinsically at subject level. For example, the course Sustainable Urban Development has six LOs, while the study methods ("Fixing of knowledge through problematic practice examples during the lectures, using interactive teaching media") and assessment methods ("test, examination questions with short answers, questions to answer using literature") are just the same independent of the content of the LO (for details see p. 2.5).

The above observation is particularly valid for courses related to preparing the Bachelor's thesis (Graduation Thesis 1, Graduation Thesis 2, and Graduation Thesis 3). While it is a good practice to follow progressing towards the final thesis, the consecutive modules define the same study and assessment methods. Final thesis assessment is certainly irrelevant for Graduation Thesis 1, Graduation Thesis 2. Additionally, it is difficult to imagine how to develop and assess the students' ability to communicate in at least one basic foreign language, and teamwork skills in the framework of these courses.

The above observation was also supported during the interviews with students: they have not heard the term "learning outcome" and did not understand its meaning.

The interrelation of the Programme LOs with the subject LOs as well as the students' assessment methods are presented in the subject descriptions (SER Annex 2). Unfortunately, the assessment criteria used are not contextualised, i.e. it is not explained, what a particular grade

means in the context of the subject course (for details see p. 2.5). The expert team recommends being more consistent and critical in implementing the constructive alignment of the Programme aim, LOs, subject LOs, teaching and learning, and student assessment.

2.2. Curriculum design

The curriculum design is adjusted to the needs of full-time and part-time students. The duration of the Programme is four years for full-time students and six years for part-time students. The workload is distributed proportionally throughout semesters. Total volume of the Programme is 240 credits, with distribution between the modules (general university subjects, general engineering basics subjects, general study direction subjects, specialisation subjects; final thesis preparation and defence) meeting the requirements of *Guidelines for Structure of the First Cycle Study Programmes*, approved by a decree of VGTU Senate Nr. 57-1.8 of 29 May 2012.

The curriculum was revised in the first half of 2016 with an aim to increase the share of students' individual work and optimise the number of specialisations (see Supplement to the SER, p. 2). Although the number of specialisations was reduced from four to three, the expert team suggests reconsidering this issue after experience on admissions and free choice of students will be gained (see p. 2.1).

The expert team acknowledges the Programme team with introducing standardised three credit units as building blocks for curriculum design.

The expert team draws attention to inappropriate use of the term “module” in the SER (instead of “subject”). According to the *General Requirements for the First Degree and Integrated Study Programmes*, module is an integrated unit of interrelated subjects with minimum volume of 10 credits. The expert team understands that the term “module” in this given context refers to the traditional professional meaning of the term „subject“.

The subject descriptions are presented (SER Annex 2), grouped by semester and labelled with the internal code as a file name, which makes it very difficult to get a holistic picture. The content of subjects is consistent with the type and level of studies. However, international readings are missing in most of the subjects. Although the Programme team claims that: “When updating and reorganizing study subjects' syllabus and study subjects' cards, also lists of recommended readings indicating not only the latest study literature in Lithuanian but also the manuals of scientists/practitioners from other countries were updated”, the expert team didn't find any evidence of this. As a consequence, the content of the subjects largely depends only on the quality of textbooks in Lithuanian. The interviews with teaching staff and students proved that content of the Programme

also needs better harmonisation between subject courses and interdisciplinary approach, which is the key in the environmental protection science. The expert team strongly recommends revising the curriculum strengthening the interdisciplinary links, particularly introducing complex/interdisciplinary projects.

The scope of the Programme, its content and methods of delivery are appropriate for the achievement of the intended LOs. However, in order to improve the students' motivation and decrease the drop-out rate, especially at the beginning of their studies, the expert team recommends to include motivation courses and more environment related subjects in the first semesters' curriculum. The expert team acknowledges including a subject course in Sustainable Environment (Introduction to Speciality) into the first semester curriculum starting from 1 September 2016.

2.3. Teaching staff

Altogether 45 members of teaching staff are involved in delivering the Programme. Their number, qualification and previous practical experience meet the legal requirements for this study type and allow achieving the Programme LOs. The teaching staff age structure and turnover are beneficial for the Programme's long-term sustainability. Interviews with teachers as well as descriptions of teaching and assessment methods at the individual subjects reveal that teachers are not familiar with the LOs based approach, and do not use it for students' assessment.

The SER states: "The professional activity of the lecturers <...> is directly related to the subject taught" (page 12, p. 63). The expert team draws attention to the fact that using young lecturers delivering large number of diverse subjects is harmful for the Programme quality and for the professional development of these teachers. For example, a doctoral student who got MSc degree only in 2012 is involved in teaching 11 diverse subjects (Atmosphere Protection, Complex Project - Dispersion of Pollutants in the Atmosphere and their Impact on Buildings, Complex Project - Environmental Project Management with Employment of Cost-Benefit Analysis, Environment Impact on Buildings and Sustainable Nature Resources Management, Environmental Management, Environmental Monitoring and Physical Pollution, Environmental Physics, Environmental Economics and Law, Landscape Management, Prevention of Environmental Pollution, Soil and Ecosystems Protection) at BSc level while being an author of only two research papers, both in Lithuanian.

In general, the teaching staff's research activity is sufficient for a Bachelor's level programme, but with substantial individual differences. Some teachers regularly publish in high ranking internationally journals, while others act only as co-authors and/or publish in local journals.

Publishing only in local journals (especially in Lithuanian) is welcome if it concerns local problems, but does not enhance internationalisation, and limits professional development and mobility of teachers.

The VGTU have established a programme to promote the teaching staff mobility, incl. internships of staff members in other research institutions and receiving guest researchers from abroad. Nevertheless, mobility of the teaching staff has been quite low so far. The average number of visiting researchers is even less. The consequence is that the teachers cannot familiarise with new teaching methods or other good practices applied at other universities and limits opportunities for international collaborations.

At the moment, departments directly involved in delivering of the Programme have no new ambitious research projects related to the Programme content. The expert team insistently invites the Faculty and departments' management for efficient action in promoting research activities supporting the Programme and developing its content.

Given the high reputation of the VGTU in the society, the expert team was quite surprised with low proficiency of most of the teaching staff using English as working language. The foreign language problem has a cascading effect to several other fields of activity or issues:

- low mobility of the teaching staff (both in and out);
- supplying students with relevant international literature as seen both from recommended literature at different subject descriptions (see also p. 2.2) and may influence the reference lists of final theses, thus preventing academic development of talented and motivated students;
- low participation rate in international events and projects;
- decreasing competitiveness of the VGTU in international projects;
- limited provision on adjusting the research activity to international trends.

Last but not least, the limited foreign language skills will jeopardise the VGTU achieving its strategic aim – becoming the leading technical university in the Baltic Region by 2020.

The expert team recommends taking urgent measures to improve the teachers' English language skills. Intensive internal language courses and changing teachers' evaluation criteria might be useful tools.

2.4. Facilities and learning resources

Premises of the Faculty of Environmental Engineering are adequate in their size and quality. Classrooms, labs for practices, research labs, equipment, library facilities, computers and software

are adequate and sufficient to deliver the Environmental Protection Engineering Programme content for all three basic environment components protected: water, soil and air.

The Department of Environmental Protection has five student and/or research laboratories established in the period 1992-2011. The laboratories are fully equipped with computers, while each student laboratory has 17 workplaces. The Department of Water Management Engineering has three laboratories with different capacity (from 8 to 25 workplaces). The Programme students can use the following system modelling software: WaterCad, SewerCad, StormCad, Hammer, Darwin Calibrator, Belebrungs-Expert, Waterpro, Epanet, Flyps, WinCaps. Since 2011, the students can also use a mobile laboratory equipped with automatic air pollution measurement devices, and the opportunities of the Laboratory of Environmental Technologies at Sunrise Valley Science and Technology Park in the VGTU neighbourhood.

However, modernisation of the laboratory equipment is mostly funded from the R&D projects, and relies on the teaching staff's initiative. In this respect, the expert team has some concerns as detailed in p. 2.3 (lack of new ambitious research projects). According to students' opinion, improvement should focus on getting more new equipment and software. Practical placements are well organised: students have the necessary freedom to select the place for practice and get help from the university based on its extended network of social partners. A positive practice is the organisation of visits to different organisations involved in environmental engineering.

The VGTU provides students with adequate and accessible teaching materials (textbooks, scientific periodicals, databases etc.). Teachers of the Programme have prepared methodical support materials for all the main subjects. Electronic publications (textbooks, methodical and laboratory work instructions, etc.) can be downloaded from the VGTU Press website. A part of study materials is available in the Moodle based virtual teaching/learning platform <http://moodle.vgtu.lt/> or in the teachers' personal sites on the university website. VGTU community has access to 26 databases, 22 851 e-journals and 294 778 titles e-books.

VGTU library accumulates specialised information sources in both traditional and digital forms. The library software ALEPH provides a possibility to order books via internet and assists the reader in finding a wider variety of literary resources. The library has 446 workplaces for visitors in 12 reading rooms, one of which works 24 hours a day. Organisation of the library facilitates distance learning, which is beneficial for both full-time and part-time students.

2.5. Study process and students' performance assessment

The student admission procedure is well formulated, publicly available and follows legal regulations. The number of students admitted has decreased in the past several years, which is in line with the general demographic trends and therefore is not particular to this university. The drop-out rate from the Programme has been very high, especially in the first two semesters of studies. Reasons are manifold including the concentration of the hard-core subjects to the first semesters of the study, "bad choice" by the newly admitted students, but also the structure of the studies. Students deciding for this Programme have an intrinsic interest towards environmental issues, while hardly any subject at the beginning of their studies touches environment. This may lead to loss of interest, thus contributing in some way to drop-out. In this context inclusion of an introductory course into the first semester syllabus is a step in the right direction (see also p. 2.2).

Annually, the national conference of young scientists *Science – the Future of Lithuania* is held. The departments responsible for the Programme are mentors of respective sections of the conference, which provides opportunities for academically talented students to present their research results.

Complex project is an important element of the curriculum. Unfortunately, the topics proposed for the project are not broad and interdisciplinary enough. Therefore, the expert team recommends to critically revise the concept of complex project.

The preparation of the final thesis starts in the seventh semester and is carried out in three stages until the end of the eighth semester. The expert team supports this approach, emphasising systematic development of the final thesis. The aim of final theses is to develop student's individual work abilities, foster creative thinking, abilities to analyse, assess, design and make responsible decisions in the studied area. In the final thesis students have to demonstrate their creativity, knowledge of social and commercial environment, legal acts and financial opportunities, search and analysis of information sources, in-depth understanding of the analysed topic, ability to solve topical tasks, the acquired technical knowledge and skills, application of information technologies and communication skills in writing, correct language skills, the ability to formulate conclusions. Again, the question being, to what extent all these competences listed as an aim, but also as LOs of the final thesis, are actually assessed (see also p. 2.1).

The student assessment system is clearly defined and compliant with the VGTU general regulations. The assessment system is a ten-point criterial one. The LOs are assessed by cumulative scores, thus promoting consistent student's work during a semester. Each student has individual access to his/her current score. At the beginning of each subject course the teacher introduces students the expected LOs, the assessment methods and criteria. However, from the SER it is

evident, that the process is targeted on assessing only the students' knowledge. This does not allow to assess either the subject course LOs or the Programme LOs, because these are concentrating on competences – demonstrating the ability to perform something. Moreover, the grading of subjects, incl. final thesis, is not contextualised, i.e. the assessment criteria do not define what a particular grade means in the context of a subject assessed. Interviews with the students revealed, that they also are not familiar with the concept of LOs, and how it applies to their assessment.

The expert team recommends to contextualise the assessment criteria. In all subject descriptions assessment criteria need to be formulated using the subject LOs and defining what level of performance is expected at get certain grade. This also assumes clear definition, what level of academic achievement (threshold, average or excellent) the Programme and subject LOs actually describe (see *General Regulation of Technological Sciences (Engineering) Study Field*). Summing up, the whole Programme design needs critical revision applying constructive alignment of the Programme aims, LOs, curriculum design, teaching, learning and students' assessment (see also p. 2.1 and 2.2). This understanding has to be conveyed to all members of teaching staff, students, and stakeholders.

The Faculty of Environmental Engineering has more than 80 Erasmus+ contracts. Nevertheless, the students claim for more international mobility opportunities, especially internships abroad. Apparently, neither the number of contracts nor the students' ability to use English as working language lay behind this problem. The expert team urges the Programme Committee to find the roots of this controversy.

The VGTU has developed versatile academic and social support system for their students. The Programme does not yet have any graduates. The students interviewed were very positive concerning their prospects in the labour market and job opportunities. The survey conducted in 2011 indicated, that the demand for specialists who are able to install and maintain the environmental protection systems; manage the environmental protection projects; conduct technological analysis of existing systems, and are able to maintain environmental protection equipment is increasing.

2.6. Programme management

The internal quality assurance system at the VGTU follows the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) and the guidelines of ISO 9001:2008. Responsibilities for decisions and monitoring of the implementation of the Programme are clearly allocated at VGTU. Each faculty has a study committee to address issues related to studies. The Study Committee approves newly developed or improved curricula and their subject

syllabi. The Programme design and development, as well as monitoring the Programme implementation are carried out by the Programme Committee. Membership of the Programme Committee includes representatives of students and social partners. The head of the department supervising the Programme is usually appointed as chairperson of the committee. The expert team recommends separating the roles of head of department and chairperson of Programme Committee since these functions involve different tasks and responsibilities.

Information and data on the implementation of the Programme are regularly collected from teaching staff and students, alumni and social partners and analysed by the respective bodies.

Although the Programme Committee is established following international practice, it has not assumed proper leadership and clear ownership of the Programme. Most of the problems encountered in this report with respect to the Programme aim and LOs, curriculum design, Programme delivery, and students' assessment are caused by the fact that the implementation of the LOs approach does not follow the constructive alignment paradigm (see p. 2.1, 2.2 and 2.5). Therefore, the expert team recommends:

- the VGTU management to organise university-wide systematic training and support of teaching staff in implementing the constructive alignment approach in programme design and delivery;
- the Programme Committee take leading role in implementing the constructive alignment approach in the Programme design and implementation, and develop students' and other stakeholders' understanding of LOs based approach.

The outcomes of internal evaluations of the Programme are used for the improvement of the Programme, particularly through the self-evaluation process. Each chapter of the SER ends with a table listing the strengths, the weaknesses, and the areas for improvement for the Programme. Of all the weakness encountered, 40% are owed to students, 20% to external circumstances, and only 40% to the internal circumstances and parties involved (teachers, governing bodies, curriculum design, and university level regulations). The expert team invites the Programme team for more self-criticism.

The employers' involvement in the Programme management and implementation is versatile. They are offering places for practical placement, take part in final thesis defences, regularly discuss the Programme development and implementation issues with the Programme Committee, and give guest lectures in their specific field of expertise. The employers are satisfied with the students of the Programme, especially with the students' final theses from predecessors of this Programme.

III. RECOMMENDATIONS

1. The VGTU management to organise university-wide systematic training and support of teaching staff in implementing the constructive alignment approach in programme design and delivery.
2. The Programme Committee to take leading role in implementing the constructive alignment approach in the Programme design and implementation, and develop teachers' students' and social partners' understanding of learning outcomes based approach.
3. Relate closely LOs, teaching and assessment methods at subject course level.
4. Restructure the curriculum incorporating motivation courses, more environment related subjects in the first semesters as well as introduce complex/ interdisciplinary projects.
5. Reconsider the need for specialisations or the threshold number of students necessary to open a specialisation, enabling the free choice for students.
6. Relate the allocation of subject courses more tightly to the qualification and the research/professional expertise of teachers.
7. Take measures to improve the teachers' English language competence.
8. Intensify international mobility of teachers and students.
9. Introduce system to motivate wider use of international literature in the Programme by teaching staff and students.

IV. SUMMARY

The VGTU Environmental Protection Engineering Programme has a number of positive features that include: established management system with well defined responsibilities; wide network and close cooperation with social partners; motivated students with good command of English as working language; social partners' satisfaction with the students' practical skills and engineering contents of the final theses in progress; coherence of the market needs and the future graduate's qualification; well compiled feedback questionnaires; standardised units for curriculum design. The Programme content expands to all three environmental spheres: air, soil (Earth's surface) and water. The Reputation of this Programme is high in the Lithuanian society. Practical placements are well organized. Laboratory facilities are sufficient for the Programme but their continuous modernisation needs attention.

The most important areas of improvement concern: implementing the learning outcomes (LOs) based approach at all relevant levels (definition of the Programme aims and LOs, description of subjects, teaching methods, students' assessment system) with involvement of students and stakeholders; reconsidering the number of specialisations and/or the minimum number of students needed to open a specialisation; contextualisation of the assessment criteria in agreement with the LOs; inclusion of environmental engineering related subjects in the first semesters curriculum in order to decrease the drop-out rate and to preserve the motivation of students; widening the scope of the complex project to become more inter- or even transdisciplinary. Recommended literature for each subject must include international textbooks/literature. Correspondence between professional profile of teachers and the taught subjects needs to be carefully considered. The present situation, especially in case of young teachers, may jeopardize professional development. Teachers' insufficient ability using English as working language has cascading effect to a number of fields that need improvement: international mobility in both directions, competitiveness and participation in international projects, students' involvement in research and their academic development, vision on research opportunities.

The large number of Erasmus+ contracts and the students' need for more international study opportunities are contradicting and need attention. More activity is needed to get externally financed research projects supporting the Programme and widening possibilities for involving students in research. A more analytical and self-critical approach to the self-evaluation process would support the international accreditation.

V. GENERAL ASSESSMENT

The study programme *Environmental Protection Engineering* (state code – 612H17006) at Vilnius Gediminas Technical 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 | 2 |
| 2. | Curriculum design | 2 |
| 3. | Teaching staff | 2 |
| 4. | Facilities and learning resources | 3 |
| 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:

Prof. dr. Olav Aarna

Grupės nariai:

Team members:

Prof. dr. Judit Padisák

Prof. dr. Soon-Thiam Khu

Ms. Lina Šleinotaitė-Budrienė

Ms. Inga Bačelytė

**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO PIRMOSIOS PAKOPOS
STUDIJŲ PROGRAMOS *APLINKOS APSAUGOS INŽINERIJA* (VALSTYBINIS KODAS –
612H17006) 2016-09-21 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-206 IŠRAŠAS**

<...>

V. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus Gedimino technikos universiteto studijų programa *Aplinkos apsaugos inžinerija* (valstybinis kodas – 612H17006) vertinama **teigiamai**.

| Eil. Nr. | Vertinimo sritis | Srities įvertinimas, balais* |
|-------------|--|------------------------------------|
| 1. | Programos tikslai ir numatomi studijų rezultatai | 2 |
| 2. | Programos sandara | 2 |
| 3. | Personalas | 2 |
| 4. | Materialieji ištekliai | 3 |
| 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

VGTU vykdoma studijų programa *Aplinkos apsaugos inžinerija* turi nemažai teigiamų savybių: sukurta vadybos sistema su apibrėžta atsakomybe; sukurtas platus socialinių partnerių tinklas, ir su jais glaudžiai bendradarbiaujama; studentai motyvuoti, gerai moka anglų kalbą, kurią naudoja kaip darbinę; socialiniai partneriai yra patenkinti studentų praktiniais gebėjimais ir didėjančiu baigiamųjų darbų inžineriniu turiniu, rinkos poreikių ir būsimų absolventų kvalifikacijos darna; tinkamai sudaryti grįžtamojo ryšio klausimynai; standartizuotos programos sandaros dalys. Šios studijų programos turinys apima visas tris aplinkos sferas – orą, dirvožemį ir vandenį. Ši programa turi gerą vardą Lietuvos visuomenėje. Gerai organizuota praktika. Laboratorinės įrangos programai įgyvendinti pakanka, bet ją reikia nuolat atnaujinti.

Svarbiausios tobulintinos sritys: numatomais studijų rezultatais pagrįsto metodo įgyvendinimas visais reikiamais lygiais (šios studijų programos tikslų ir numatomų studijų rezultatų apibūdinimas, dalykų aprašas, mokymo metodai, studentų vertinimo sistema) įtraukiant studentus ir

socialinius dalininkus; specializacijų ir (arba) mažiausio studentų skaičiaus, būtino norint įvesti specializaciją, persvarstymas; vertinimo kriterijų derinimas su numatomais studijų rezultatais; aplinkosaugos inžinerijos dalykų įtraukimas į pirmųjų semestrų programą siekiant sumažinti studentų nubyrėjimo lygį ir išsaugoti studentų motyvaciją; kompleksinio projekto apimties didinimas, kad jis taptų labiau tarp- ar net transdisciplininis (*interdisciplinary, transdisciplinary*). Į kiekvieno dalyko rekomenduojamos literatūros sąrašus būtina įtraukti tarptautinius vadovėlius ir (arba) tarptautinę literatūrą. Dėstytojų profesinė veikla turi būti susijusi su dėstomais dalykais. Dabartinė padėtis, ypač jaunų dėstytojų, gali trukdyti profesiniam tobulėjimui. Tai, kad dėstytojai nepakankamai moka anglų kalbą, jog galėtų naudoti ją kaip darbinę, turi grandininį poveikį daugeliui sričių, kurias reikia tobulinti: tarptautiniam abiejų krypčių judumui, konkurencingumui ir dalyvavimui tarptautiniuose projektuose, studentų dalyvavimui moksliniuose tyrimuose ir jų akademiniam lavinimui, mokslinių tyrimų galimybių vizijai.

Didelis *Erasmus+* sutarčių skaičius ir studentų poreikis turėti daugiau tarptautinių studijų galimybių prieštarauja vienas kitam ir reikalauja dėmesio. Reikia dėti daugiau pastangų siekiant gauti iš išorės finansuojamus mokslinių tyrimų projektus, sustiprinančius šią programą ir papildinsiančius galimybę įtraukti studentus į tyrimus. Labiau analitinis ir savikritiškas požiūris į savianalizės procesą palengvintų tarptautinį akreditavimą.

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III. REKOMENDACIJOS

1. Vilniaus Gedimino technikos Universiteto (VGTU) vadovybė turi universiteto mastu organizuoti sisteminių dėstytojų mokymą ir teikti jiems pagalbą, susijusią su darnaus išdėstymo metodo (*constructive alignment approach*) taikymu rengiant bei įgyvendinant programą.
2. Studijų programos komitetas turi imtis vadovaujančio vaidmens įgyvendinant darnaus išdėstymo metodą, taikomą rengiant ir vykdant šią programą, ir formuoti studentų bei kitų socialinių dalininkų supratimą apie studijų rezultatais pagrįstą požiūrį.
3. Glaudžiai susieti numatomus studijų rezultatus, mokymo ir vertinimo metodus dalykų lygmeniu.
4. Pertvarkyti studijų turinį, per pirmuosius semestrus įtraukiant į jį motyvuojančius dalykus, daugiau aplinkosaugos dalykų, taip pat įtraukti kompleksinius / tarpdalykinius projektus.
5. Persvarstyti specializacijų arba ribinio studentų skaičiaus, reikalingo norint įvesti specializaciją, būtinybę taip užtikrinant laisvą studentų pasirinkimą.

6. Glaudžiau susieti dalykų paskirstymą su dėstytojų kvalifikacija ir moksline ir (arba) profesine patirtimi.
7. Imtis priemonių, skirtų pagerinti dėstytojų anglų kalbos žinias.
8. Stiprinti dėstytojų ir studentų tarptautinį judumą.
9. Įdiegti sistemą, skirtą paskatinti dėstytojus ir studentus daugiau naudotis tarptautine literatūra įgyvendinant šią programą.

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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)