STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

# ALEKSANDRO STULGINSKIO UNIVERSITETO AGROENERGETIKOS INŽINERIJOS PROGRAMOS (621E33001) VERTINIMO IŠVADOS

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# EVALUATION REPORT OF ENGINEERING OF AGROENERGETICS (621E33001) STUDY PROGRAMME AT ALEKSANDRAS STULGINSKIS UNIVERSITY


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| Grupės vadovas:<br>Team Leader: | Prof. Dr. Manfred Josef Hampe |
| Grupės nariai:<br>Team members: | Prof. Dr. Zbigniew Hanzelka |
| | Dr. Rolandas Urbonas |
| | Šarūnas Venslavas |


Išvados parengtos anglų kalba
Report language - English


Vilnius
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## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

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|---|---|
| Studijų programos pavadinimas | Agroenergetikos inžinerija |
| Valstybinis kodas | 621E33001 |
| Studijų sritis | Technologijos mokslų studijų sritis |
| Studijų kryptis | Energijos inžinerija |
| Studijų programos rūšis | Universitetinė |
| Studijų pakopa | antroji |
| Studijų forma (trukmė metais) | Nuolatinė (2), neakivaizdinė (3) |
| Studijų programos apimtis kreditais[1] | 120 |
| Suteikiamas laipsnis ir (ar) profesinė kvalifikacija | Atsinaujinančiosios energijos inžinerijos magistras |
| Studijų programos įregistravimo data | 1997 05 16 |

[1] – vienas kreditas laikomas lygiu 40 studento darbo valandų

## INFORMATION ON ASSESSED STUDY PROGRAMME

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| Name of the study programme | Engineering of Agroenergetics |
| State code | 621E33001 |
| Study area | Technological Sciences |
| Study field | Energy engineering |
| Kind of the study programme | University studies |
| Level of studies | second |
| Study mode (length in years) | Full-time (2), part-time (3) |
| Scope of the study programme in national credits | 120 |
| Degree and (or) professional qualifications awarded | Master of Renewable Energy Engineering |
| Date of registration of the study programme | May 16, 1997 |

# CONTENTS

I. INTRODUCTION

The assessment is based on the analysis of documents prepared by the self-assessment group of experts of the ALEKSANDRAS STULGINSKIS UNIVERSITY headed by Prof. Navickas of October 2011 and the information obtained from the representatives of the assessed institution during the visit of the peer team at the university on 2012-03-27.

The basis for the assessment was requirements set forth in:

1. METHODOLOGY FOR EVALUATION OF HIGHER EDUCATION STUDY PROGRAMS (Approved by Order No 1-01-162 of 20 December 2010 of the Director of the Centre for Quality Assessment in Higher Education)
2. EXTRACTS FROM THE DESCRIPTION OF THE EVALUATION PROCESS FOR STUDY PROGRAMMES AND METHODOLOGICAL GUIDELINES
3. Financing system of higher education Institutions (HEI) in Lithuania
4. HIGHER EDUCATION SYSTEM IN LITHUANIA – SHORT INTRODUCTION
5. A Framework for Qualifications of The European Higher Education Area (QF-EHEA), http://www.bologna-bergen2005.no/Docs/00-Main_doc/050218_QF_EHEA.pdf
6. A Tuning Guide to Formulating Degree Programme Profiles Including Programme Competences and Programme Learning Outcomes, http://core-project.eu/documents/Tuning%20G%20Formulating%20Degree%20PR4.pdf

Schedule for the visit:

The members of the peer team have acquainted themselves with and provisionally assessed the documentation and annexes provided by the Centre. The following schedule for the visit has been prepared and executed:

| **Tuesday, 27 March** | |
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| 10.00 – 10.45 | Meeting faculty administration |
| 10.45 – 11.45 | Meeting self-evaluation teams |
| 11.45 – 11.55 | *Short break* |
| 11.55 – 12.55 | Meeting teaching staff |
| 12.55 - 13.55 | *Lunch* |
| 13.55 – 14.45 | Visiting auditoriums, libraries, laboratories, other facilities |
| 14.45 – 15.30 | Review of students' course and final papers, examination tasks, other material requested by expert team |
| 15.30 – 16.10 | Meeting students |
| 16.10 – 16.45 | Meeting graduates |
| 16.45 – 17.20 | Meeting employers |
| 17.20 – 18.00 | Team meeting, preparation of presentation of preliminary findings |
| 18.00 – 18.20 | Presentation of preliminary findings to University community |

Aleksandras Stulginskis University (ASU) is an institution of higher education devoted to education and research in the field of agriculture. The university has clearly defined its mission in the Lithuanian society. Besides agriculture, mission objectives are rural development and the sustainable use of natural resources. Building upon a four-year undergraduate education ASU has designed a graduate degree programme "Engineering of Agroenergetics" that intends to

educate engineers who are enabled to conduct autonomous research in the field of sustainable use of natural resources for power generation.

## II. PROGRAMME ANALYSIS

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

The university defines the aims of the second cycle degree programme as

1) to deepen the knowledge of the first cycle graduates required
   a) to operate in the global economy
   b) to implement new technologies in the field of energy engineering
2) to take into account renewable energy production based on agricultural products.

The intended learning outcomes on the master's level differ from those on the bachelor's level by emphasising on research abilities of the graduates. Thus, analytical skills are considered to be important as well as the ability to assess different designs in order to solve engineering problems. The university describes learning outcomes as knowledge and awareness, research abilities, and special abilities. The university linked the intended learning outcomes to the courses that are supposed to deliver the knowledge and the abilities.

The university explicitly refers to the Dublin descriptors for the abilities and competences of the graduates and on Bloom's taxonomy for writing the learning outcomes of the educational component.

However, the university did not apply a taxonomy of learning in order to indicate the level at which the learning process proceeds. Some common mistakes in writing learning outcomes can be found in the self-evaluation report: e. g., an expression like "deeper knowledge" is not very helpful for the learner because the learner has no idea how deep "deeper" is. Likewise, "knowledge" does not indicate the level of learning.

The peer team recommends to consequently apply an internationally accepted method of writing learning outcomes, both on the programme level and on the level of the educational components.

The information on the aims, objectives and learning outcomes of the degree programme and its educational components can be accesses on the internet in Lithuanian language. The same information is necessary in English.

From the discussion with the graduates of the programme and the employers of the graduates the members of the peer team conclude that the aims and the learning outcomes of the programme meet the needs of the Lithuanian society and industry. The peer team moreover attests the compliancy of the aims and the learning outcomes to the needs of the European labour market.

The graduate programme prepares the graduates for continuing their studies on the doctorate level. Thus, it meets the requirements for a degree programme on level 7 of the QF-EHEA.

Two different English names for the degree programme have been found. One name is "Engineering of Agroenergetics" (in self-assessment report), while the other name is "Agricultural Power Engineering" (in AIKOS database). Using two different English names for one degree programme is misleading and not acceptable. The peer team recommends using only one English denomination of the programme.

The Lithuanian name of the programme corresponds to the content and the outcomes (which have to be explicitly defined, see above) of the programme.

***Main strengths and weaknesses***

**Strength** of the programme is that it meets the contemporary needs of the Lithuanian society and that it is compliant with the concept of the European Union for a sustainable development of the agricultural sector and the development of a European knowledge society.

**Weakness** of the programme is that the aims, objectives, and learning outcomes are not well defined.

***2. Curriculum design***

The graduate programme takes two years to completion. The programme comprises 120 ECTS credits, and thus meets the Lithuanian legal requirements of not less than 90 and not more than 120 ECTS credits.

The university has subdivided the degree programme into educational components of same size. The size of each educational component is 6 ECTS credits while the master's thesis earns 30 credits.

There are 9 courses that are mandatory for all participants in the master's programme. A strong emphasis is on mathematics and mathematical methods, which is important because modelling and simulation of technical systems will become increasingly important. The topics of the mandatory courses are very modern, e. g. one of the courses addresses "life cycle assessment of renewable energy". Another modern and extremely important topic is "reliability of mechanical and energy systems". According to the character of a graduate programme, an introduction into the methodology of scientific research is offered.

The students may choose between 10 elective courses of 6 ECTS credits each, thus, specialising either in conventional energy systems, wind and solar systems, and biomass based systems. Such a division makes perfectly sense.

There is ample room for conducting individual research projects. Students have to perform on three different research projects of 6 ECTS credits each.

The peer team misses team activities and other activating forms of learning and teaching. It is important to train team competencies at the university. Being able to participate in teams and to lead teams is part of the competencies that the European qualifications framework for higher education requires for graduates on the master's level. It would be easy to transform the individual research projects into courses with problem based learning and teamwork. Moreover, experience with problem based learning shows that the industry can be easily motivated to provide real world problems for the students to solve. These real world problems are often highly complex and ill defined so that students actually learn to cope with incomplete and complex problems.

The faculty has concentrated on few and important topics of energy research and has omitted others. E. g. sequestration of carbon dioxide is not covered at all, but this is fully acceptable. Students are well prepared for life-long learning.
Taking student exchange into account, the programme has sufficient potential to attract motivated students from European universities. Incoming students will easily find courses for which credits and grades can be transferred. The peer team recommends to allow outgoing students to substitute mandatory courses of the degree programme with courses from other universities even if they differ thematically.

The educational components appear to be well designed. Courses are revised by the faculty each year, so that new material can be incorporated and outdated material eliminated.

***Strengths and weaknesses***

**Strength** of the programme is that it is very modern and well designed. The programme addresses important aspects of energy science and prepares the students for life-long learning.

**Weakness** of the programme is that it does not yet make use of activating forms of teaching and learning.

***3. Staff***

The legal requirement that more than one half of the subjects of the study field is taught by scientists is fulfilled.

The teaching staff in this programme consists of 15 professors, associated professors and academic lecturers holding doctoral degrees. The qualification of the teaching staff complies with the legal requirements and is adequate to ensure the proper conduct of the programme.

The number of first year students was around 15 in the past years. On the average 30 students are simultaneously enrolled in the two-year programme. Thus, the ratio of students to academic teachers is 2.0 for the whole degree programme. The peer team has gained the impression that the capacity of the university for student intake into this degree programme is not yet at its limit.

The age distribution of the academic teachers of the programme requires a rapid replacement of professors within the forthcoming years. This is a chance to attract young academics with new ideas for teaching and learning to the university.

Upon questioning the teaching staff on possibilities of professional advancement of their didactic skills, the peer team won the impression that there exists some potential for improvement. For instance, professors should have the opportunity to spend a sabbatical at a university abroad in order to exchange ideas on modern didactic methods as well as on research. The didactic abilities of the academic teachers need constant training and improvement. If a didactic centre were available either at the university or centrally at Lithuania, the academic teachers should be sent there regularly for refreshing their didactic skills and to learn about new didactic principles. A valuable source of information that obviously is not yet used by the university and their academic teachers are the annual conferences of organizations dealing with engineering education, e.g. SEFI (European Society for Engineering Education) and ASEE (American Society for Engineering Education).

Some academic teachers are active in academic research. Active professors have 1 to 3 doctoral candidates to supervise. From the list in Annex 2 the peer team concludes that the various subjects of the degree programme are taught by specialists in their respective fields, i.e. mathematics is taught by mathematicians, whose research field is mathematics. Corresponding findings pertain to other courses.

**Strength** of the programme is the high competence of the academic staff and their dedication to scientific research.

**Weakness** of the programme is the lack of new didactic methods and opportunities for the self-improvement. The instrument of a sabbatical leave seems not to be widely known.

### *4. Facilities and learning resources*

The university campus is a wide area of land with scattered buildings and ample meadows between. Some of the buildings have recently been renovated and are in good shape. Others are old and need renovation. A new laboratory building is under construction in the campus. Sanitary installation in the buildings visited by the peer team was old, mostly clean, and functioning. A sufficient number of lecture halls and student classrooms is available. They are equipped with the necessary furniture and basic didactic material. Projectors and computers for multimedia based instruction are available. Very modern didactic equipment like digital whiteboards or smartboards is yet missing.

The university uses the public domain software bundle Moodle as a modern eLearning tool. All students reported upon questioning to have access to the university servers from their private computers.

While in the self assessment report the campus wide availability of wireless internet access and even EDUROAM access was explicitly stated, the peer team was unable to find a wireless net in one of the central buildings. In the university library the EDUROAM net was available but could not be accessed by the peer team due to restrictions imposed by the local security officers for visitors from other universities. The peer team points out that the idea behind EDUROAM is to grant visiting scholars and administrators world-wide access to the internet without restrictions.

The laboratories visited by the peer team were in general in good condition and adequately equipped. No violations of safety requirements were observed during the visits. Some of the equipment is rather old and outdated; it will have to be replaced by modern equipment in the near future. However, some of the equipment, e. g. in the biotechnology labs, is very new and meets modern standards. The experiments are well designed and build onto each other, thus enabling the students to learn about consecutive steps of the biomass production chain. Some of the equipment, e. g. a biogas reactor, has been designed and constructed by the university itself. The peer team welcomes such best practice emphatically and encourages professors and staff to continue with these exemplary activities. The peer team gained the impression that the university uses its resources efficiently. However, the resources are limited and need to be enhanced in order to become more competitive on a European level.

The peer team visited the university library. The library is equipped with a sufficient number of computer work places with internet access. The university has bought online access to some of the journals, books and textbooks of leading publishers via Lithuanian Research Library Consortium. However, some of the often required literature is not available online. Some of the main textbooks, defined as key-books for the courses are not available from the library. An example is the „VDI heat atlas“, which is considered to be a standard reference book in the field of heat transfer, a core subject of the degree programme. Only the headlines of the individual chapters of the VDI heat atlas can be accessed, the content of the chapters cannot be accessed online. Conventional access to literature, i.e. walking to the library, lending printed books or journals, or ordering missing literature from other university libraries, is possible and often practised.

**Strength** is the momentum of the modernisation of buildings and laboratory equipment.

**Weakness** is a lack of sufficient access to the international literature (especially e-books) and some of the outdated laboratory equipment.

### *5. Study process and student assessment*

Admission to the master programme requires the successfully completed bachelor degree education. The accession limits for the state financed programme to the Master degree programme depends on the academic (i.e. ISI publications) merits of the university academic staff. Master students may receive 130 LTL scholarships. 100 % of students' tuition fees are covered by the state. In the past there were students who have paid for their studies

The study programme is divided into 4 semesters. The student work load is24 ECTS credits per semester. The sequence of the educational components of the study programme is logically arranged. From semester 1 to semester 3 the students have 4 written exams; this number of exams is perfectly acceptable and internationally comparable. The exams should be designed in such a form that they assess the intended learning outcomes of the educational component. It is important that the learning outcomes are properly written and address the whole spectrum of levels of the learning process, not just knowledge, understanding and application but also analytical abilities, synthesis and evaluation. If these principles are applied, students can complete their studies within the standard period of 4 semesters.

Student mobility in this study programme can be improved. In the past, only one student was internationally mobile. Thus, credits and marks can be easily transferred between the institutions. For mobile students Erasmus stipends of about 450 EUR per month are available, thus covering a huge part of living costs abroad. Student exchange can be individual ("free movers") or institutionalised between partner universities. The latter requires partnering with other universities. In order that these partnerships are sustainable, it is important that equal partners form partnerships. The peer team recommends to the university to form such institutional partnerships and to send both students and academic teachers abroad.

The learning outcomes of all educational components are publicly available in Lithuanian and limited in English. The students ascertained during their conversation with the peer team that their teachers inform them at the beginning of each educational unit on the intended learning outcomes of the course.
The graduates of the degree programme and the employers of the graduates spoke very highly about the qualifications gained during the undergraduate course.

The university maintains an internet page giving all the necessary information concerning the MA programme. The organisation of an open day increases the interest of new students in the MA study programme. Judging from the results reported during the onsite visit these efforts are judged to be quite efficient. According to the self-evaluation report the schedule of the study classes are well distributed during a week and a semester. The sequence of the different courses follows a consistent and well elaborated scheme. The examination sessions are carefully planned and fit well into the study programmes. However, the beginning of the classes in the afternoon limits the flexibility severely. The student academic performance is well monitored. The drop-out rate is very low. Due to the limited research activities of the teaching staff there is a considerable lack of possibilities for students to actively participate in research.

There are several co-operations with universities and technical colleges outside Lithuania. Some of the teachers make use of the exchange programme but the number of actual exchanges is rather small. The mobility of students is very low. The main reason against mobility given by students is their necessity to work for covering the costs of living. The missing mobility of the students decreases their chances to be successful within the European labour market. The information provided by all institutional entities at ASU for students is very good. ASU pays

much attention to familiarize the students with career possibilities. The students have close contacts to the teaching staff with respect to study issues and career possibilities. Personal interests of the students are taken into consideration as far as the free and elective studies are concerned.

Scholarships are available for indigent students. However, the MA students stated that they have to work in order to earn their costs of living. This has detrimental effects on the efficiency of the MA studies. The assessment criteria correlate very well with the intended learning outcomes. They are well publicised. There is no ambiguity on the side of the students with respect to the required criteria. The composition of the assessment grade is well and rationally defined. The assessment results are well communicated with the students. In most cases this is done within personal communications. In some cases the feedback is given via internet or email.

The final thesis assessment requirements are well defined and follow a fixed procedure. The MA students have to publish the main results of their MA thesis in a national or international publication and to present them in a national or international conference. All of graduates are able to find a job corresponding to their qualifications. There are some who get employment with companies less in the focus of their respective specialisation.

**Strength** of the programme is a clear and well-designed curriculum. Students are able to complete the programme without delay and within the standard period of studies. The dropout rate is very low, compared to similar degree programmes in other countries. Students are able to complete the programme without delay. They can discuss the exams with the teacher and improve their marks with an additional oral part.

**Weaknesses** of the degree programme are the low number of students within the programme and the low international mobility of students and staff. The mobility of outgoing students is low to satisfactory, but there seems to be a too small number of students arriving, in some years actually zero.

### *6. Programme management*

The peer team discussed with the dean and staff as well as with the academic teachers the implementation procedures of the programme. The students not regularly assess the educational components at the end of a semester. The dean's office collects and evaluates the results. The peer team observed that in most, if not in all cases a summative evaluation took place. Summative evaluations are nice to have but hardly deliver more than "comfort sheets". In particular, they do not easily lead to changes in the educational process. Contrary to summative evaluations are formative evaluations. Formative evaluations require more effort and often need the participation of third parties, e. g. from the didactic centre of the university or another institution. If the university or the faculty is inexperienced in formative assessments, external counsel from institutions with the required experience might be necessary.

Stakeholders in the degree programme are the students to be educated, their parents and the society who have to provide tuition fees, the academic teachers who deliver the educational components and the employers from the industry or research institutes who receive the graduates. When asking the stakeholders for their advice it should be kept in mind that stakeholders hardly argue altruistically and that their advice might be biased. Eventually, the university and the faculty are the only ones to take responsibility for the degree programme and its curriculum.

## III. RECOMMENDATIONS

3.1. The academic teachers should carefully rewrite the aims, objectives, and learning outcomes of the degree programme and its educational components.

3.2. The faculty should consider incorporating elements of problem based learning into the degree programme. In order to do so, the peer team recommend external counselling.

3.3. The university and the faculty should look for equal partners for student and teacher exchange and increase the incoming and outgoing mobility of both students and academic staff.

3.4. The university and the faculty should reconsider the evaluation of the educational components. The peer team recommend the transition from the traditional summative evaluation to a modern formative evaluation.

## IV. SUMMARY

The master's degree programme "Engineering of Agroenergetics" meets the needs of the society and it is compliant with the concept of the European Union for a sustainable development of the agricultural sector The programme is very modern and well designed. The programme addresses important aspects of energy science and prepares the students for life-long learning.

The programme's aims, objectives and learning outcomes should be revisited and more completely defied. One and only one English name for the programme should be used. In the study programme activating forms of teaching and learning should be introduced.

High competence of the academic staff provides for the strength to the programme. However, lack of new didactic methods and opportunities for the self-improvement are the obstacles to improve the programme. The age distribution of the academic teachers of the programme requires a rapid replacement of professors within the forthcoming years. This is a chance to attract young academics with new ideas for teaching and learning to the university.

The modernisation of buildings and laboratory equipment is visible, however, university and faculty should put all attention not to lose the momentum.

A clear and well-designed curriculum of the programme enables students to complete the programme without delay and within the standard period of studies. They can discuss the exams with the teacher and improve their marks with an additional oral part. The dropout rate is very low, which seems to show high motivation of students. However, the low number of students within the programme may lead to non-sustainability of the programme. The incoming and outgoing mobility of both students and academic staff is too low and needs to be increased.

The results of the evaluation of the courses should be more thoroughly analysed and discussed with the students. Students are one of the key stakeholders, thus, open communication to them is a very important element.

V. GENERAL ASSESSMENT

The study programme Engineering of Agroenergetics (state code – 621E33001) is given **positive** evaluation.

*Study programme assessment in points by fields of assessment*.

| No. | Evaluation Area | Evaluation Area in Points* |
|---|---|---|
| 1. | Programme aims and learning outcomes | 3 |
| 2. | Curriculum design | 3 |
| 3. | Staff | 3 |
| 4. | Material resources | 2 |
| 5. | Study process and assessment (student admission, study process student support, achievement assessment) | 3 |
| 6. | Programme management (programme administration, internal quality assurance) | 2 |
| | **Total:** | **16** |

*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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