



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Kauno technologijos universiteto
***SPORTO INŽINERIJOS PROGRAMOS (612H15001,
61209T120)***
VERTINIMO IŠVADOS

**EVALUATION REPORT
OF *SPORTS ENGINEERING* (612H15001, 61209T120)
STUDY PROGRAMME**

At Kaunas University of Technology

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

| | |
|--|---------------------------------------|
| Studijų programos pavadinimas | <i>Sporto inžinerija</i> |
| Valstybinis kodas | 612H15001, 61209T120 |
| Studijų sritis | technologijos mokslai |
| Studijų kryptis | bendroji inžinerija |
| Studijų programos rūšis | universitetinės studijos |
| Studijų pakopa | pirmoji pakopa |
| Studijų forma (trukmė metais) | dieninės studijos (4), iššęstinės (6) |
| Studijų programos apimtis kreditais | 240 ECTS |
| Suteikiamas laipsnis ir (ar) profesinė kvalifikacija | biomechanikos inžinerijos bakalauras |
| Studijų programos įregistravimo data | 2003 gegužės 29 d. |

INFORMATION ON EVALUATED STUDY PROGRAMME

| | |
|---|---------------------------------------|
| Title of the study programme | <i>Sports Engineering</i> |
| State code | 612H15001, 61209T120 |
| Study area | Technological Sciences |
| Study field | General Engineering |
| Kind of the study programme | university studies |
| Cycle of studies | first |
| Study mode (length in years) | full time (4), part-time (6) |
| Scope of the study programme in credits | 240 ECTS |
| Degree and (or) professional qualifications awarded | Bachelor of Biomechanical Engineering |
| Date of registration of the study programme | May 29, 2003 |

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The Centre for Quality Assessment in Higher Education

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I. INTRODUCTION

This written evaluation is based on the content of self-assessment report made by the self-assessment team of the bachelor programme in Sports Engineering (SpE), and on the observations of the discussion carried out during the visit at Kaunas University of Technology (KTU) on March 20, 2012.

The study programme is carried out mainly by the department of Engineering Mechanics of the Faculty of Mechanical Engineering and Mechatronics. The Self-Assessment of study programme has been carried out during 2011 and the self-assessment report is dated to October 2011.

It is necessary to point out that previous external assessment of the SpE study programme in 2009 was carried out by the Centre for Quality Assessment in Higher Education (hereinafter – CQAHE) and received positive evaluation. The experts' team, which carried out the evaluation, gave a recommendation to accredit the SpE study programme without conditions, but in their final conclusion it was stated that the programme does not fully comply with formal requirements of Annex 13 (Mechanical Engineering) of General regulations for Technological Science (Engineering) Studies. On this background, the Expert Council for Studies Assessment accredited the programme conditionally (for 3 years). Today, study programme of SpE is currently assigned to the field of General Engineering and graduates are awarded the bachelor degree of Biomechanical engineering.

All decisions concerning the final evaluation report have been taken unanimously by the entire team.

This report synthesizes the specific observations and recommendations for the EE programme at Kaunas University of Technology. The reader is also kindly asked to consult the global report – the summary of several engineering programmes, evaluated in March, 2012, to get acquainted with the global remarks and recommendations addressed to all curricula evaluated during the visit.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

Aims of the programme

Kaunas University of Technology (KTU) Bachelor programme in Sports Engineering (SpE) is quite unique and exceptional. This undergraduate programme of SpE at KTU is the first of its kind in the Lithuanian higher-education system. The SpE programme was developed and carried out in cooperation with the Lithuanian Academy of Physical Education. According to the agreement of cooperation, the staff and learning facilities of the Academy are used for maintaining the programme.

The SpE programme belongs to the study field of general engineering therefore it is multidisciplinary programme. This undergraduate study programme of SpE covers two study areas – areas of Technological (group – Engineering) and Biomedical Sciences. In the Engineering part of study programme, the basic group of subjects belong to mechanical engineering. Additionally Electronics, Informatics and Control Theory are included. The Biomedical area is represented by several subjects: Human Anatomy, Motion of Biomechanical Systems, Motor Control and Learning.

The aims of the programme of SpE are defined in the Self-Assessment report. There are mentioned that the aim of the programme is to train students with sufficient knowledge and skills to design and investigate mechanical and biomechanical systems. Graduates must be able to develop products and their components for sports and monitoring of sports results, illness prevention, lost function restoration and leisure needs. The content of the expected skills and competences are defined shortly but quite comprehensively.

The content of key learning outcomes is presented in the modern way in of the self-assessment report. They are described and categorized into four sections: Knowledge and understanding (A), Intellectual abilities (B), Practical skills (C) and Transferable skills (D). The links between the learning outcomes and the study subjects of the SpE programme described in the matrix in the report could be clearly evaluated. However, a few of them raises more doubts than explains. For example, learning outcomes B1 (apply professional knowledge for solving qualitative and quantitative problems including cases of limited and conflicting information) and D4 (be able to solve the problems related to qualitative and quantitative information including such situations when available information is limited) are very similar. Nevertheless B1 is applied for many subjects contrary to D4 which is applied only for two. Also question is why B1 is applied to subjects such as Engineering Graphics, Statics, Computer Drawing, Engineering Materials, Machine Elements and others which, by our opinion, are not related with limited information. According to our opinion, the information presented in SER (Table 2.2) must be more correctly and precisely elaborated.

Self-assessment report did not provide information about the professional achievements of the alumni person therefore external observer cannot evaluate how the ambitious aims of SpE programme match reality.

SpE study program and its coincidence with labour market

According to the Lithuanian Labor market forecasts – three out of four job places will be for skilled workers and professionals. During the world crisis and emigration in Lithuania, when unemployment rates were rising. The companies now are trying to keep highly skilled workers therefore their risk of unemployment is much lower. Sports equipment is manufactured by dozens Lithuanian firms, there are also few firms producing utility devices for handicap people, therefore graduates of the Study program of SpE have good opportunity to be active in the labor market.

There seems to be no danger that the SpE programme might turn out to be inadequate to public need or labor market in the next decade. An important strength of the programme is its national positioning which enhances its visibility in the national media and attractiveness to national employers.

The area of sports engineering is not widely developed in Lithuania and there is no great demand of specialists in the industry and research areas. But this is the matter of time. Also, if there are no opportunities to be employed in the area of sports engineering, the deep knowledge in mechanical engineering allows for graduates to work as mechanical engineers.

Consistence of study programme of SpE with the level of studies

SpE study programme is highly complex. Beside the subjects in mechanical engineering, which occupies the largest part of the curricula, students have to acquire subjects in biophysics (Human Anatomy, Biomechanics, Motor Control and Learning, Modeling of Biomechanical Systems), and electronics (Electrical and Electronic Circuits, Applied Electrical Engineering).

This is a reason why most European universities offer SpE study programme for the Master level, for example, Sheffield university.

The name of the programme is compatible with its content and learning outcomes

The name of SpE programme is straightforward. However, other European and World universities, which offer studies in SpE, use different content of the programme. For example, Griffith University in Australia offering studies in Sport and Biomedical Engineering focuses the curricula not on the subjects of mechanical engineering, as KTU, but on electronics and informatics. So, the name of SpE programme being clearly determined in fact has a large flexibility of the content and learning outcomes of the programme.

2. Curriculum design

Curriculum design and legal requirements

The curriculum design of the programme complies with the requirements for the First cycle studies, set by the Ministry of Education and Science and with the requirements of General Regulations for Technological Science (Engineering) Studies, particularly the requirements for Engineering study field group. The programme consists of three objective parts: *general university studies* (18 credits), *subjects of study field* (102 credits), and *special subjects of study field* (120 credits). The share of general university studies (subjects of humanities and communication) comprises 7.7 % of the study programme volume, subjects of mathematics, physics, chemistry – 42 credits, core subjects of engineering – 48 credits, practical placements – 15 credits, for the preparation and defence of the Final Degree Project - 12 credits, free elective subjects - 12 credits . The number of subjects per semester do not exceed 7.

Links between study subjects

Interlinks of study subjects are well explained and placed in Self evaluation report, the overall scheme appears logical and well structured.

Consistence of the subjects with the level of studies

Study subjects meet the European standards for the first university level. However it is necessary to point out that majority of European Universities prefer to offer studies in SpE at the Master level. This lets to avoid the overload of bachelor programme by the large variety of subjects in the different fields of science.

Appropriate methods

The content of the subjects is at the level appropriate for a Bachelors programme.

The programme shows the institution's innovative coursework with complex research and hands-on experience in the school's state-of-the-art laboratories. Students of the programme were provided with real-world practice and the possibility of future employment opportunities in the fields of the development of facilities and technologies for sportsmen as well as in the rehabilitation of the disabled and patients. Therefore, a proportional combination of lectures, seminars and practical work is used in delivering the modules.

However, team working elements are not disclosed in the report. Also learning process of students is mostly based on intensive guidance by teaching staff what is normal in the first part of the studies. Contrary to that, implementation of self-motivated learning in the final part of studies is not observable in the curricula.

The scope of the programme

The overall scope of the programme, presented in the self-evaluation report, demonstrates good understanding of the content and excellent design of the SpE programme. The scope of SpE programme is sufficient to ensure learning outcomes.

Latest achievements in science

Looking in the description of the modules, it should be more clearly seen how the latest achievements in science are reflected in the curricula.

3. Teaching staff

The teaching staff is adequate to ensure implementation of the learning outcomes of the programme. Without any doubt, the teaching staff provides a high level of competence in the field of mechanical engineering which covers majority core subjects in the SpE programme. Beside them, teaching staff of other multidisciplinary subjects (Anatomy, Biophysics, Electronics, Control Theory) demonstrate adequate readiness for high quality teaching. Methodical publications published by the multidisciplinary group of lecturers are numerous and helpful not only for students in SpE but for teachers and students from other Lithuanian universities as well.

The research activity of the teaching staff is inhomogeneous and divided into a few groups doing research on international level. As a result there are low overall publication rates especially in the field of sports engineering.

Careful planning of the replacement of Senior-teachers (older than 65), which will retire in the next years, is not discussed in the Self-assessment report. The number of PhD students and postdocs studying in the top notch international universities famous in the study field of sports engineering is rather low.

The progressive internationalization of teaching staff would be welcome which could implement competitiveness and open possibility to renew and enhance the teaching staff. Lithuanian law on the restriction of other teaching languages beside Lithuanian at the national universities probably play negative role in the process of internationalization.

Gender problems are not included in the self-assessment report, which means that gender equality still need more attention.

4. Facilities and learning resources

The facilities comply with the requirements and needs for the study process. There is a large and modern university library with an extensive capability for studying, which is situated not far from faculty. At the faculty there is a specialized library as well.

Multidisciplinary study programmes, good example of which is SpE, sets the need to search for effective study methods in the time and volume-limited study process. Success of the SpE study programme is achieved by the sufficient number and quality premises - lecture rooms and laboratories. Biomechanics laboratory in the Mechatronics Center for Research and Sports and Movements Research Center of Lithuanian Academy of Physical Education are most important specialized units for students' practical work. Well instrumented laboratories of other Faculties of KTU also are used during studies of core subjects of engineering: Chemistry, Physics, Human Safety, Electrical and Electronic Circuits, Applied Electronics, Control Theory.

The equipment used in the study process is generally very modest. There is no middle or long-term strategy to modernize the laboratory equipment. Financial possibilities for this also are not disclosed in the report.

The number of books is sufficient, laboratory tutorials are well prepared and sufficient for subjects in basic disciplines of mechanical engineering. The lecturing personnel provide students with reasonable material, however there are not enough books for new and modern subjects such as Modeling of Biomechanical Systems, Motion of Biomechanical Systems, etc.

The University provides possibilities for practical training at industrial and research sites. However, during onsite visit students requested for more practical training to obtain more visits to the industry companies and research institutions.

KTU as well as other Universities in Lithuania has an access to the main science databases. However there is lack of world wide known journals in biomedical sciences.

5. Study process and students' performance assessment

The admission procedure is in general as in other national universities.

The SpE programme is popular among the applicants. Nevertheless according to self-evaluation report only 15 of all 284 state financed applicants in 2010 are enrolled.

According to the report the best admitted students to the SpE programme are good. However, the large drop-out rate requires the revision of the admission procedure. There is no fixed minimal admission competitive score for admission to the engineering programmes. Maybe it is the reason why some of those who entered are not fully prepared for university studies and the drop-out rate is high.

Overall number of students in the SpE programme is too small for efficient study process. All part time students left university in the first semester. Only a few of them changed their studies in full-time mode.

The teachers of the department of Engineering Mechanics take part in open doors days organized by the University encouraging schoolchildren to choose engineering as well the as the SpE programme. To attract more students, it is planned to arrange presentations of SpE programme in national schools. As technological sciences due to difficulty of studies are not popular this activities might be useful to attract more students.

The department's teachers motivate new students by giving examples about successful students and graduates working in the field of sports engineering.

The duration of study semesters (both autumn and spring) is 20 weeks, 4 weeks of them are assigned for examination. The time table is designed taking into account that full-time student should work 40 conventional weekly classroom hours.

Classroom work (lectures, seminars, laboratory works) are evenly distributed – theoretical lectures are followed by practical classes and the other way round. Workload for students during the week is rationally distributed, there is classroom work almost every day, efforts are made to avoid long breaks between classes and it is attempted that classes of the same module would take place in the same day.

Examination time-tables are made in advance when students and teachers have agreed on suitable times. Students coordinating dates with teaches make the examination time-table design themselves and hand it in to vice-dean and later dean of the faculty approves it. Student's academic load during the examination is moderate, as more than 50 percent of mark value of examination in theoretical subjects is influenced by accumulative evaluation.

6. Programme management

The study process is organized by the following chain of responsibilities: the vice-rector for studies, administration body for studies, dean of the faculty, heads of departments, the

programme committee as well as study quality supervision group that gives accounts at department sittings. Administration body for studies coordinates the studies documents management. Study programme committees are formed to coordinate study programmes carried out at the university, select and certify study modules. Every study programme valid in KTU has a group of monitoring study programme quality.

The self-assessment document provides evidence of an effective programme management and describes the participation of different internal stakeholders. Hierarchical levels, and administrative responsibilities and tasks are delineated and an adequate organisation is in place. The appointment and promotion of teaching staff is monitored and defined: special committees are assigned to this task. In this sense, the conditions for effective management and monitoring of the programme are met.

However, solid national and international co-operation is not provided in terms of study programme development and management, except for internal self-assessment and external evaluation, which is proceeded in fixed terms.

To improve study quality assurance, internal assessment is performed. It includes questionnaire surveys of students of the programme and graduates about the study programme, continuous cooperation with employers and other social partners. By carrying out the questionnaire surveys it is aimed to learn about the opinion of students and graduates about the modernity of the programme, the sufficiency and accessibility of laboratories and learning materials, the relations between theoretical and practical teaching, the need of the new subjects. In order to get a feedback at the end of each semester the students are asked to assess the content and delivery quality of their study subjects. An electronic version of the questionnaire for the assessment of study subject is placed in students' workspace on the university website.

The decline of the number of students in the field of engineering must be put on the agenda of all levels of programme management. To promote engineering careers, initiatives and countermeasures such as revision of voucher policy, changes of academic fees for humanities, social sciences and engineering, promotion the profession of engineers in the media must be taken.

III. RECOMMENDATIONS

- 3.1. Continue further formulation and implementation of the learning outcomes.
- 3.2. Strengthen the research activities in the field of studies – sports engineering.
- 3.3. Revise the teaching load of faculty and improve the amount of time they can devote to research, seminars, international conferences abroad and sabbatical leave, as well as change management. Adjust the funding for these international tasks accordingly.
- 3.4. Determine the precise causes of the decline in student enrolment and implement a strategy to promote the career of engineer (at a local and national level).
- 3.5. Conduct anonymous satisfaction surveys for students, staff and alumni on the most 5-6 year basis.
- 3.6. Give attention to that a self-assessment report should contain more self-reflective and critical observations.

IV. SUMMARY

1. Programme aims and learning outcomes

Strengths

The main strength of Sport Engineering programme is that this bachelor programme is unique of its kind in the Lithuanian higher-education system. The organizers of this programme meet no competition from the other Lithuanian Universities. Also this programme is multidisciplinary – the content of the programme covers two fields of science: technology (engineering) and biomedicine. Beside mechanical engineering, which accumulates largest part of the subjects, technological side of the programme also includes electronics, control theory and measurements.

Weaknesses

Sport Engineering study programme is highly complicated and contains large workload therefore it is difficult for students to reach proper and deep understanding of the subjects from different fields of science. The study courses and corresponding to them learning outcomes are often not obvious and in a few cases exaggerated.

2. Curriculum design

Strengths

The main strength of the curriculum design is its efficiency in preparing nationally competitive graduates.

Weaknesses

The main weakness of the curriculum is overload of this bachelor programme by the large variety of subjects in different fields of science.

3. Teaching staff

Strengths

Main strength of the staffing is its readiness in preparing nationally competitive graduates which are able to design and investigate mechanical and biomechanical systems, to develop products and their components for sports and monitoring of sports results, illness prevention, lost function restoration and leisure needs.

Weaknesses

The main weakness of the teaching staff: professors, associate professors and lectures are their lack of scientific work in the field of Sports Engineering. Majority of teachers delivering core subjects of engineering are older and their scientific interests are not in the field of sports engineering. Others, who deliver lectures in special subjects of study field, are younger and do not have international experience in the field of sports engineering.

4. Facilities and learning resources

Strength

There are adequate lecture rooms, sufficient laboratories and library, also some good biomechanical devices and facilities suitable for sports engineering.

Weaknesses

The equipment used in the study process is generally very modest. There is no middle or long-term strategy to modernize the laboratory equipment.

5. Study process and student assessment

Strength

The student/professor ratio is very good, however due to the small number of students. The students are satisfied with Sport Engineering bachelor programme.

Weaknesses

The lack of minimum admission criterion is a general problem.

The university suffers a continuous decrease of admitted students.

There is no Master level programme in Sport Engineering at the University.

6. Programme management

Strength

There is a well organized programme management and there are some traces on the ongoing improvement process.

Weaknesses

The issues declared in the self-assessment report disagree with the opinion of the students obtained during meetings with them. Decline of the number of students is just stated by the administration but appropriate measures are not assumed and planned.

V. GENERAL ASSESSMENT

The study programme *Sports Engineering* (state code – 612H15001, 61209T120) of Kaunas University of Technology 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 | 3 |
| 2. | Curriculum design | 4 |
| 3. | Teaching staff | 3 |
| 4. | Facilities and learning resources | 3 |
| 5. | Study process and students' performance assessment | 3 |
| 6. | Programme management | 3 |
| | Total: | 19 |

*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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