



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Alytaus Kolegijos

***STATINIŲ INŽINERINIŲ SISTEMŲ***  
**(65302T109, 653H24002) STUDIJŲ PROGRAMOS**  
**VERTINIMO IŠVADOS**

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**EVALUATION REPORT**  
**OF *BUILDING ENGINEERING SYSTEMS***  
**(65302T109, 653H24002) STUDY PROGRAMME**

At Alytus College

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Išvados parengtos anglų kalba

Report language - English

## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	Statinių inžinerinės sistemos
Valstybinis kodas	65302T109, 653H24002
Studijų sritis	Technologijos mokslų
Studijų kryptis	Statybos inžinerija
Studijų programos rūšis	Koleginės studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė (3), iššęstinė (4)
Studijų programos apimtis kreditais	180
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Inžinierius, Statybos inžinerijos profesinis bakalauras, Statinių inžinerinių sistemų profesinis bakalauras
Studijų programos įregistravimo data	2008-03-17

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## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	Building engineering systems
State code	65302T109, 653H24002
Study area	Technological Sciences
Study field	Civil Engineering
Kind of the study programme	College studies
Cycle of studies	First
Study mode (length in years)	Full-time (3), part time (4)
Scope of the study programme in credits	180
Degree and (or) professional qualifications awarded	Engineer, Professional Bachelor of Civil Engineering, Professional Bachelor of Building Engineering Systems
Date of registration of the study programme	17-03-2008

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## I. INTRODUCTION

This report presents the findings of an evaluation of the programme *Statinių inžinerinės sistemos* (65302T109, 653H24002), referred to in English as the programme ‘Building Engineering Systems’. The report is based on an analysis of the document “Study Programme of Civil Engineering Study Field ‘Construction Engineering Systems’, Summary of Self-Assessment, Alytus 2012”, associated annexes and information gathered by the Review Team during a site visit to Alytus College on 25 October 2012.

The site visit included:

- discussions with senior faculty administration staff,
- discussions with staff responsible for preparation of Self-Assessment Reports (SAR),
- discussions with teaching staff,
- discussions with students,
- discussions with alumni,
- discussions with employers of recent graduates of the programme,
- inspection of student coursework including final year projects,
- inspection of teaching premises and equipment including library, laboratories, auditoria, and computing.

The programme in ‘Building Engineering Systems’ (also referred to in the self-assessment report as ‘Construction Engineering Systems’) was first proposed as part of an overall project Development of Alytus College through Implementation of Innovative Study Programmes and Improvement of Quality of Studies.

The programme was assessed by the Centre for Quality Assessment in Higher Education (SKVC) and several recommendations were made. These included:

- deeper analysis of specialist demand;
- development of systematic study plans (full-time and part-time study modes) in the context of the Study Regulation on General Technology Sciences (Engineering);
- provision of practical training on geodetic field works;
- revision to the content and volume of professional and final practical training;
- design of a course on Installation of Engineering Systems for two semesters and Engineering Graphics for two semesters;
- module descriptions were to include Methodological Recommendations for the New Study Programme Description Structure (Annex 10, p. 10.1);
- to document that teachers of the special (professional) part have practical work experience in the field of the taught course.

These issues were addressed and the programme was confirmed in 2008 by order of the Minister of Education and Science of Lithuania. The first cohort, of nine, graduated in 2011. The Expert Review Group members were aware of these earlier advisory comments, through the Self-Assessment Report, during their assessment.

## II. PROGRAMME ANALYSIS

### 1. Programme aims and learning outcomes

#### 1.1. *Clarity of programme aims and outcomes*

The declared aim of the programme is “to train engineers who are able to manage the installation work of construction engineering systems, to organize the maintenance of engineering systems and company activities related to engineering systems, and to design heating, ventilation and air conditioning or water supply and sewage disposal systems” (Summary of Self-Assessment: page 7, paragraph 14). The aim is centred on two study programme goals and eight outcomes, dedicated respectively to special and general skills areas. There are few outcomes for knowledge and understanding. The aims of the programme are well publicised on the College’s website but part of the information may be misleading. The Self-Assessment document as well as the website indicates that successful completion of the course may lead to qualification as an ‘engineer’. This needs to be clarified, in that there is a clear distinction between the learning outcomes and qualifications required for recognition as an ‘engineer’ and the learning outcomes / qualification offered on the programme. The significance of this in an international context is particularly important and prospective students need to be aware of this. It is necessary to clarify that graduates who aspire to international recognition as ‘engineers’ would be required to acquire additional qualifications after graduation. Thus the main programme aim is formulated incorrectly (not only in the self-analysis report but also on the website) in that it refers to the training of ‘engineers’.

#### 1.2. *Rationale of the need for the programme*

The final purpose of the programme is to produce Professional Bachelors Degree graduates in ‘Building Engineering Systems’ (also referred to in the self-assessment report as ‘Construction Engineering Systems’). The programme is dedicated to the sector of industry encompassed by ‘building services’, a vital component of the construction sector. The engineering services systems of buildings have shorter service lives than the buildings themselves. Therefore there is an ongoing need for suitably qualified personnel to design, construct and organise the maintenance of such systems for new buildings and, increasingly importantly, for retrofit schemes. There are benefits to the region of having such a course located in Alytus. The region has historical connections with the construction industry. The current economic downturn is depressing interest from school leavers in construction-related courses across Europe. This is compounding a general swing away from engineering-related courses in favour of those related to the financial services industries. Alytus can build on its past traditions to encourage current and future generations to take an interest in developing regional economic development through construction expertise, such as that provided by this programme. Employment growth is forecast in construction by national and regional labour exchanges.

#### 1.3. *Appropriateness of level of studies and the level of qualifications*

The aims and learning outcomes are informed by eight study outcomes which are consistent with European Qualification Framework Level 6.

#### ***1.4. Compatibility of programme outcomes, content and qualifications***

The programme name in some translations into English can be misleading, in respect of the scope of the course. The learning outcomes, content and qualifications are compatible with a course with a title such as ‘Building Services Engineering’ or ‘Building Systems Engineering’. Terms such as ‘construction engineering’ or ‘civil engineering’ give a misleading impression. This was reflected in the old title of ‘Professional Bachelor of Civil Engineering’. The new degree title of ‘Professional Bachelor of Building Engineering Systems’ is much more appropriate.

## **2. Curriculum design**

### ***2.1. Compatibility with legal requirements***

The programme totals 180 credits with 4800 hours for those registered for full time studies. The subjects of general higher education total 15 credits. According to the subjects classification, provided in the Self-Analysis Report Table 2, subjects in the study field could be deemed to reach the minimum threshold of 135 credits, depending on how subjects are classified. Other subjects include at least 30 credits of practice, free choice and other subjects recommended by the college.

Although the curriculum meets minimum legal requirements, concern must be expressed in respect of the volume and distribution of contact hours. Full-time students have 1937 contact hours (40.4%) while part-time students engage in a greater proportion of independent study and have 1028 contact hours (21.4%). These contact hours are low. Of even greater concern is the fact that the theoretical hours only amount to 5% for full-time students and 2.5% for part-time studies. This is inadequate. Some subjects are particularly challenging for the average academic ability student typically admitted to such programmes and they need proportionately more contact hours to assist their understanding.

The Review Group is satisfied that the curriculum can be deemed to meet the minimum legal requirements. However the programme could comfortably exceed the minimum requirements if certain subjects were substituted and this would improve the programme itself. This is commented on in more detail in Section 2.4.

### ***2.2. Consistency of the study programme layout***

The programme duration is three years, over 6 semesters, for full-time students. The sequence of modules is logical moving from fundamental knowledge (mathematics/physics/chemistry), through to the applied sciences (engineering mechanics/hydraulics/economics), through to development of design and project management skills in final year. The degree of independent study increases as the student progresses through the course. Part-time students study over 8 semesters in a four year period. The extent of individual study is about 50% for full-time students and 75% for part-time. This leads to a programme design whereby the part-time students are allocated half of the time for covering their theory, practical and consultation hours compared to the hours allocated for full-time students. These contact hours are very low, especially for theoretical subjects.

### ***2.3. Consistency of the subjects/modules with level of study***

A co-ordinated review of the programme aims, learning outcomes and curriculum should be undertaken to optimise graduate attributes for the targeted regional economy, while underpinning fundamental engineering principles in a strengthened curriculum and study process. Appropriate revisions should be made. The extent of these will be unclear until a review by the College itself is complete. The process should begin with a clear definition from employers of the role in industry of the average-ability graduate, so that the College may more specifically frame the programme aims. However due regard needs to be given to minimum theoretical knowledge appropriate to the qualification. These programme aims should be translated into a description of graduate attributes. These attributes should be framed in respect of knowledge and its application; research skills; special, social and personal abilities. A revision of the phrasing of learning outcomes should be conducted in modules, where required, to reflect the required graduate attributes under the five categories. All steps in the process should be guided by the ‘Description of Learning Outcomes of the First Study Cycle’ (Appendix 2, Descriptor of Study Cycles, Order of the Minister for Education and Science, No. 2212). Any collateral impact on the existing curriculum should then be addressed.

### ***2.4. Consistency of the subjects/modules with learning outcomes***

Although the graduates cannot meet the academic requirements for international recognition as ‘engineers’ without further study, a desired graduate output, as described by one of the social partners, is “engineering thinking”. For a programme at this level this requires student engagement with an appropriate balance of engineering fundamental knowledge, its typical application in the solution of engineering problems and exposure to engineering practice. The programme has a low percentage of hours devoted to theory (5% and 2.5% for full-time and part-time respectively). The percentage of hours devoted to theory is low and so every opportunity should be used to increase the students’ exposure to fundamental engineering principles during the course. The Review Group questions the priority of the following subjects at this level of qualification and specialisation when time required for engagement with an appropriate balance of engineering fundamental knowledge is at a premium: ‘Corporate Economics and Management’; ‘Marketing’; ‘Logistics’. It is recommended that mandatory subjects embracing fundamental engineering principles in the study field be increased by at least 5 credits, either through addition or substitution of some of the modules from other fields. This may involve increasing the total credit volume up to 210 ECTS credits.

### ***2.5. Scope of programme***

The scope of the programme is sufficient to ensure the achievement of learning outcomes for graduates who are likely to specialise in civil engineering systems (water supply and drainage) and mechanical engineering systems (heating, ventilation, air conditioning). It is less clear that they will have detailed knowledge of electrical systems.

### ***2.6. Currency of programme content***

The programme content is kept current through a survey of employers every second year, reflecting the close collaborations between the College and stakeholders in the region.

### **3. Staff**

#### ***3.1. Staffing and legal requirements***

The programme is staffed by 28 teachers, half of whom have over 20 years experience in the workplace. One staff member has a doctoral degree and this person's teaching accounts for 17% of the study field subjects. All other staff members have master's degrees. The self-evaluation report states that 50% of staff have at least 3 years practical experience matching the subjects that they teach but this is not evident from the data presented in Annex 3.2 of that report. The Review Group is satisfied that the summary table in the annex is inaccurate, due to misinterpretation of the category of experience, and that a review of staff CV's has confirmed that the staff, 75% of whom are part-time, have the required practical experience to meet the threshold.

#### ***3.2. Staff qualifications***

All of the teaching staff have at least a master's degrees. One person has a doctoral degree. All staff have good practical experience relevant to the programme. The staffing of the programme is distributed 75% among experts of the study field and 25% among teachers of other higher education courses. Many staff are members of relevant professional associations.

#### ***3.3. Adequacy of staff resources***

The student:teaching staff ratio is about 3:1. A staff member is not required to supervise more than 8 student projects. Student evaluation surveys comment favourably on the teaching. Thus it is clear that in many respects staff resources are good. However there is a significant issue regarding future development of the programme in a changing world. The programme is hosted by the Engineering Department in the Engineering Faculty. A shortcoming in the staff structure for this programme relates to the fact that other programmes in the Faculty are unrelated to construction. At present the programme is not led at the highest levels in the Department or Faculty by staff with extensive backgrounds in construction engineering practice and research. A staff development plan in this regard is required. This is further commented on in Section 6.

#### ***3.4. Staff turnover***

Staff turnover is satisfactory. The staff profile is such that the average age is 50 although 25% of the staff are aged over 60.

#### ***3.5. Staff professional development***

Staff qualification improvement is supported by the institution. Incentives for staff professional development are a good motivating force in maintaining strong interest in lifelong learning. There are many examples of international activity including collaborations through ERASMUS relationships and international conference attendance. Collaborations at local and regional level include agreements with social partners on staff attendance at training centres and internships for staff, which is a most commendable example of stakeholder support. Staff are recertified for teaching every 5 years.



### ***3.6. Research profile of staff***

The staff take part in applied research projects and some have been engaged in national development of standards documents. This is proactively encouraged by the College and research activity forms part of the workload model.

## **4. Facilities and learning resources**

### ***4.1. Premises***

The programme is hosted by the Department of Engineering using shared teaching facilities and laboratories. The total area used covers a significant 1165 m<sup>2</sup> including 534 m<sup>2</sup> of laboratory/practical teaching space. The programme is benefitting from significant national and EU investment in the institution under a national project “Creation of a Regional Technology Centre”, with funding of 4150,000 Lt. Construction of renewable energy research facilities is well advanced. These developments are excellent and will further contribute to the existing well-maintained and attractive facilities which create a very good working environment for the students. Attention to detail is evident in many aspects of the interior design of room equipment layout and ergonomic furniture design. Staff and students have justifiable pride in the facilities.

### ***4.2. Teaching and learning equipment***

There has been significant investment from national and EU funds, in teaching and learning equipment recently. These include, in particular, the Physics Laboratory and the Hydraulics and Thermal Engineering Laboratory. There are plans to upgrade the Electrical Engineering Laboratory in 2013, together with 6 other laboratories that impact on the programme, including computer and language laboratories. Classrooms are excellently equipped with modern teaching equipment which can fully exploit multi-media teaching aids. Increasing capability for e-learning is being developed through e-learning environments, suitably counter-balanced by the College’s Information and Self-Study Centre. The Centre includes a good library, with subscription to extensive on-line civil engineering publications. Student surveys strongly indicate satisfaction with the library’s holdings of reference material.

### ***4.3. Arrangements for students’ practice***

Co-operation agreements are in place with over 30 companies to provide professional practical training. This aspect of the course is a strong motivator for engagement with theoretical subjects on the programme.

### ***4.4. Teaching materials***

The laboratories are equipped with excellent teaching demonstration units. These units allow the students to explore the impact of parameter variation in a controlled experiment. The library has stocked 120 titles specific to the needs of the programme. Increased use is being made of virtual learning environments through Moodle.

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

### ***5.1. Admission requirements***

Admission is competitive. The criteria for admission includes performance at secondary school in mathematics (0.4), information technology (0.2) and Lithuanian (0.2) together with secondary school exam annual marks and foreign language (0.2). Isn't it worth to consider a criterion for admission of "Information technology" to expand into: "Information technology" or "Physics" or "Chemistry"? The entrance scores average approximately 11 and are based on highest scores of approximately 16 and significant lows – for example 2.8 in the part-time admissions of 2011. This has led to high drop-out rates of 47% from full-time students and 35% among part-time students. Reasons vary but it is significant that academic failure rates were 33% and 17% for the full-time and part-time cohorts respectively. Completion rates are approximately 40% and 33% for full-time and part-time cohorts respectively. A disadvantage for the College and the programme is that many students do not have adequate prior learning in physics and other scientific subjects when they enter the course. In addition some students do not have strong ability in mathematics, although staff endeavour to bring them up to standard.

### ***5.2. Organisation of the study process***

The student workload involves very few contact hours of theoretical work (5%) and a lot of the workload expectation is devoted to individual work (50%). The study process includes 25% for consultation. The contact hours devoted to theoretical work are very low and are a cause of concern to the Expert Review Group. The low contact hours may or may not be a cause of the high drop-out rate. The causes(s) need to be identified and addressed by measures taken by the College alone (e.g. more classroom contact hours) or in partnership with industry (e.g. sponsorship schemes for talented students by social partners).

### ***5.3. Participation in research, artistic and applied research activities***

Students are involved in applied research activities and some have presented their work at conferences. Students of the programme have also been involved in improvement projects at College level. In addition to these activities there is a College and City Youth Choir.

### ***5.4. Participation in student mobility programmes***

Arrangements are in place for Erasmus exchange but take up is minimal from students on the course. Weakness in foreign language skills is one factor mitigating against a good rate of take-up.

### ***5.5. Academic and social support***

Sports facilities are good and students have free access to physical education classes. A particular issue is the high drop-out rates in first year. To this end an orientation programme is in place. Students are assigned tutors. There is significant staff/student consultation. Students with special needs can avail of financial assistance. A Career and Public Relation Centre provides career support. Hostel accommodation is available to all students if required. The significant contribution of a Student Society to the College is fully recognised and

enthusiastically supported by management, leading to a working atmosphere based on mutual respect, of benefit to all students on the programme.

### ***5.6. Assessment system***

The students are informed of the assessment regulations at the beginning of the semester. A clear 10 point scale is used for assessment. The final grade is based on a cumulative grade. Typically end of semester examinations are weighted at a minimum of 60%. In the case of subjects with a laboratory component, the end of semester examination is weighted at 50%. Feedback on coursework assessment is provided and students can check results online as the semester progresses. The assessment method for the final project is published and set out clearly in the “Procedures on Final Projects Submission, Defence and Assessment”. The final project mark is determined by a 6-person (minimum) assessment board, of whom more than half are representatives of employers.

The period allocated for assessment is shorter than usual. It is at least a week shorter than other Lithuanian colleges and universities. Assessment strategies should be reviewed to ensure the appropriateness of the College’s general assessment approach to this study field programme and amended, where necessary.

### ***5.7. Graduate attributes and professional activities***

The intended graduate attributes are the ability to design, maintain or supervise the construction of building engineering systems, with appropriate cognisance of economy and the context of the business environment. To date 67% of the graduates have found employment after graduation with 50% employed in the study field.

## **6. Programme management**

### ***6.1. Programme management structure***

The programme is hosted by a very well-managed College, however the future programme management requires more consideration, if the programme is going to grow academically and be sustainable. The programme itself is managed by the Engineering Department under the Faculty Council, whose Dean reports to the Academic Council and in turn to the Academic Board. A Study Programme Committee is in place. The Committee membership, of not less than 6 people, includes the co-ordinator, Faculty Dean, student representative, employer representative and another representative of the social partners. The role of the Programme Committee is not effective in academic areas (high drops out and poor organization of the study process). Thus while the Director of the College demonstrated excellent management at the college level, the management at programme level, while satisfactory, does not embrace the type of strong leadership that the programme requires for future growth in academic reputation and sustainability.

As noted in Section 3, a shortcoming in the staff structure for this programme relates to the fact that other programmes in the Faculty are unrelated to construction. At present the programme is not led at the highest levels in the Department or Faculty by staff with extensive backgrounds in construction engineering practice and research. Combining this with concerns expressed in

Section 2 in respect of the volume and distribution of contact hours and the need for more mandatory subjects embracing fundamental engineering principles in the study field, the co-ordination of the programme should be entrusted to a strong academic leader, who would champion the development of the reputation of the programme through achievement of high academic standards in respect of fundamental engineering knowledge and practical skills.

### ***6.2. Ongoing programme review***

Data on results from the previous year are analysed and provided for inclusion in the College's Annual Report. The existence of a Study Programme Committee helps to ensure that recommendations for programme renewal are regularly presented to the Deputy Director of Academic Affairs.

### ***6.3. Quality improvement implementation***

External and internal assessments have informed the study programme. Continual improvement is based on feedback loop from staff/student interaction. In 2010-11 training courses and seminars for teachers and managers associated with the course were held. Following this in 2011 changes were introduced to the "studies, their goals, quality and study process". The quality of teaching materials is assured through a Commission of Assessment and Certification of Teaching Materials.

### ***6.4. Stakeholder involvement***

There is a very strong and supportive bond between regional business enterprises and the College. It is recommended that these synergistic relationships with social partners be harnessed to the fullest extent possible through membership of relevant programme committees, commissions etc. This would help to ensure ongoing generation of interest in the programme by school leavers in the region. Retention of graduates of the College as participants in the economic development of the region is a core aim of the programme which should be supported by all stakeholders. The College should continue to facilitate such engagement.

Students are represented on the Academic Board.

### ***6.5. Effectiveness of internal quality assurance measures***

Quality assurance is in accordance with national and European guidelines. Quality assurance outcomes are published on the College website and advised to the Director and Faculty Council.

### III. RECOMMENDATIONS

1. The programme aim needs to be reframed according to the level of degree awarded. It is necessary to clarify that graduates who aspire to international recognition as 'engineers' would be required to acquire additional qualifications after graduation. The information provided to prospective students about the programme aim through the official documents and College's website should be modified.
2. A co-ordinated review of the programme aims, learning outcomes and curriculum should be undertaken to optimise graduate attributes for the targeted regional economy, while underpinning fundamental engineering principles in a strengthened curriculum and study process. Appropriate revisions should be made, although the extent will be unclear until the review is complete. The process should begin with a clear definition from employers of the role in industry of the average-ability graduate, so that the College may more specifically frame the programme aims. These programme aims should be translated into a description of graduate attributes. These attributes should be framed in respect of knowledge and its application; research skills; special, social and personal abilities. A revision of the phrasing of learning outcomes should be conducted in modules, where required, to reflect the required graduate attributes under the five categories. Any collateral impact on the existing curriculum should then be addressed.
3. It is recommended that as part of the curriculum review the workload be examined and increased if necessary. The percentage of hours devoted to theory is low. It is recommended that mandatory subjects embracing fundamental engineering principles in the study field be increased by at least 5 credits, either through addition or substitution of some of the modules from other study fields. This may involve increasing the total credit volume up to 210 ECTS credits.
4. Assessment strategies should be reviewed to ensure the appropriateness of the College's general assessment approach to this study field programme and amended, where necessary. In particular the period allocated for assessment should be extended to a duration that is more usual in Lithuanian colleges and universities.
5. Measures need to be taken to progressively reduce the drop-out or failure rate year-on-year. A survey of students who failed to complete their studies should be carried out to identify the primary cause(s). These causes should be addressed by measures taken by the College alone (e.g. more classroom contact hours) or in partnership with industry (e.g. sponsorship schemes for talented students by social partners).
6. The effectiveness of the Programme Committee's activity should be significantly improved, especially in academic areas. The co-ordination of the programme should be entrusted to a strong academic leader, who would champion the development of the reputation of the programme through achievement of high academic standards in respect of fundamental engineering knowledge and practical skills.
7. It is recommended that synergistic relationships with social partners, which already exist, be fully harnessed through membership of relevant programme committees, commissions etc. to ensure ongoing generation of interest in the programme by school leavers in the region and their retention after graduation in the economic development of the region.

## IV. SUMMARY

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

The aim of the programme is to train professional bachelor degree practitioners to manage the installation of building engineering systems and to design HVAC, water supply or sewage disposal systems. The programme is dedicated to the sector of industry encompassed by ‘building services’, a vital component of the construction sector. There is an on-going need for suitably qualified personnel to design, construct and organise the maintenance of such systems for new buildings and, increasingly importantly, for retrofit schemes. There are benefits to the region of having such a course located in Alytus. Employment growth is forecast in construction by national and regional labour exchanges.

The aims and learning outcomes are informed by eight study outcomes which are consistent with European Qualification Framework Level 6. The aims of the programme are well publicised on the College’s website but part of the information may be misleading. The website indicates that successful completion of the course may lead to qualification as an ‘engineer’. It is necessary to clarify that graduates who aspire to international recognition as ‘engineers’ would be required to acquire additional qualifications after graduation.

Thus the main programme aim is formulated incorrectly (not only in the self-analysis report but also on the website) in that it refers to the training of ‘engineers’. Learning outcomes were formulated to cover special, social and personal abilities, but there were no learning outcomes for knowledge and its application either research skills according to the ‘Description of Learning Outcomes of the First Study Cycle’ (Appendix 2, Descriptor of Study Cycles, Order of the Minister for Education and Science, No. 2212) or classification of EUR-ACE.

Although the graduates cannot meet the academic requirements for international recognition as ‘engineers’ without further study, a desired graduate output, as described by one of the social partners, is “engineering thinking”. For a programme at this level this requires student engagement with an appropriate balance of engineering fundamental knowledge, its typical application in the solution of engineering problems and exposure to engineering practice. The programme learning outcomes do not achieve an appropriate balance. A co-ordinated review of the programme aims, learning outcomes and curriculum should be undertaken to optimise graduate attributes for the targeted regional economy, while ensuring greater underpinning of fundamental engineering principles in a strengthened curriculum and study process.

### **2. Curriculum design**

The programme totals 180 credits. Subjects in the study field could be deemed to reach the minimum threshold of 135 credits, depending on how subjects are classified. Other subjects include at least 30 credits of practice, free choice and other subjects recommended by the college. Thus the curriculum can be deemed to meet the minimum legal requirements. The programme content is kept current through a survey of employers every second year, reflecting the close collaborations between the College and stakeholders in the region.

Although the curriculum meets minimum legal requirements, concern must be expressed in respect of the volume and distribution of contact hours. The contact hours of full-time students represent 40.4% of the credits, while part-time students engage in a greater proportion of independent study and have 21.4% of their programme as contact hours. These contact hours are low but of even greater concern is the fact that the theoretical hours only

amount to 5% for full-time students and 2.5% for part-time studies. This is inadequate. Some subjects are particularly challenging for the average academic ability student typically admitted to such programmes and they need proportionately more contact hours to assist their understanding.

Appropriate revisions should be made to the curriculum to address these shortcomings. The extent of these will be unclear until the review by the College, recommended in Section 1 above, is complete. Due regard needs to be given to minimum theoretical knowledge appropriate to the qualification. It is recommended that mandatory subjects embracing fundamental engineering principles in the study field be increased by at least 5 credits, either through addition or substitution of some of the modules from other fields. The Review Group questions the priority of the following subjects at this level of qualification and specialisation when time required for engagement with an appropriate balance of engineering fundamental knowledge is at a premium: 'Corporate Economics and Management'; 'Marketing'; 'Logistics'. A revision of the phrasing of learning outcomes should be conducted in modules, where required, to reflect the required graduate attributes. Any collateral impact on the existing curriculum should then be addressed. This may include increasing the total credit volume up to 210 ECTS credits.

### **3. *Teaching staff***

The programme is staffed by 28 teachers, half of whom have over 20 years experience in the workplace. One staff member has a doctoral degree and all other staff members have master's degrees. Staff qualification improvement and professional development is supported by the institution and there are many examples of international activity by staff. All staff have good practical experience relevant to the programme. The staffing of the programme is distributed 75% among experts of the study field and 25% among teachers of other higher education courses. Many staff are members of relevant professional associations.

The student:teaching staff ratio is about 3:1 and each staff member is not required to supervise more than 8 student projects. Student evaluation surveys comment favourably on the teaching.

The programme is hosted by the Engineering Department in the Engineering Faculty. A shortcoming in the staff structure for this programme relates to the fact that other programmes in the Faculty are unrelated to construction. At present the programme is not led at the highest levels in the Department or Faculty by staff with extensive backgrounds in construction engineering practice and research. A staff development plan in this regard is required. This is further commented on in Section 6.

### **4. *Facilities and learning resources***

The programme is hosted by the Department of Engineering using shared teaching facilities and laboratories. The total area used covers a significant 1165 m<sup>2</sup> including 534 m<sup>2</sup> of laboratory/practical teaching space. There has been significant investment from national and EU funds, in teaching and learning equipment recently. Classrooms are excellently equipped with modern teaching equipment. Increasing capability for e-learning is being developed through e-learning environments, suitably counter-balanced by the College's Information and Self-Study Centre. Student surveys strongly indicate satisfaction with the library's holdings of reference material. The laboratories are equipped with excellent teaching demonstration units which allow the students to explore the impact of parameter variation in a controlled experiment. Attention to detail is evident in many aspects of the interior design

of room equipment layout and ergonomic furniture design. Staff and students have justifiable pride in the facilities.

Co-operation agreements are in place with over 30 companies to provide professional practical training.

#### **5. *Study process and students' performance assessment***

The criteria for admission includes performance at secondary school in mathematics (0.4), information technology (0.2) and Lithuanian (0.2) together with secondary school exam annual marks and foreign language (0.2). Many students do not have adequate prior learning in physics and other scientific subjects when they enter the course. In addition some students do not have strong ability in mathematics. It is significant that academic failure rates were 33% and 17% for the full-time and part-time cohorts respectively.

The student workload involves very few contact hours of theoretical work (5%) and a lot of the workload expectation is devoted to individual work (50%). The low contact hours may or may not be a cause of the high failure rates. An orientation programme is in place for first year students and each student is assigned a tutor. Nevertheless, completion rates are approximately 40% and 33% for full-time and part-time cohorts respectively. The causes(s) of high failure and drop-out rates need to be identified and addressed by measures taken by the College alone (e.g. more classroom contact hours) or in partnership with industry (e.g. sponsorship schemes for talented students by social partners).

Arrangements are in place for Erasmus exchange but take up is minimal from students on the course. Weakness in foreign language skills is one factor mitigating against a good rate of take-up.

Sports facilities are good and students have free access to physical education classes. A Career and Public Relation Centre provides career support. Hostel accommodation is available to all students if required. The significant contribution of a Student Society to the College is fully recognised and enthusiastically supported by management.

The period allocated for assessment is shorter than usual. It is at least a week shorter than other Lithuanian colleges and universities. Assessment strategies should be reviewed to ensure the appropriateness of the College's general assessment approach to this study field programme and amended, where necessary. In particular the period allocated for assessment should be extended to a duration that is more usual in Lithuanian colleges and universities.

#### **6. *Programme management***

The programme is hosted by a very well-managed College, however the future programme management requires more consideration, if the programme is going to grow academically and be sustainable. The programme is managed by the Engineering Department and a Study Programme Committee is in place. The Committee membership, of not less than 6 people, includes the co-ordinator, Faculty Dean, student representative, employer representative and another representative of the social partners. The role of the Programme Committee is not effective in academic areas (high drop out and poor organization of the study process). Thus while the Director of the College demonstrated excellent management at the college level, the management at programme level, while satisfactory, does not embrace the type of strong leadership that the programme requires for future growth in academic reputation and sustainability.



As noted in Section 3, a shortcoming in the staff structure for this programme relates to the fact that other programmes in the Faculty are unrelated to construction. At present the programme is not led at the highest levels in the Department or Faculty by staff with extensive backgrounds in construction engineering practice and research. Combining this with concerns expressed in Section 2 in respect of the volume and distribution of contact hours and the need for more mandatory subjects embracing fundamental engineering principles in the study field, the co-ordination of the programme needs to be entrusted to a strong academic leader, who would champion the development of the reputation of the programme through achievement of high academic standards in respect of fundamental engineering knowledge and practical skills.

Quality assurance is in accordance with national and European guidelines. External and internal assessments have informed the study programme.

Retention of graduates of the College as participants in the economic development of the region is a core aim of the programme. There is a very strong and supportive bond between regional business enterprises and the College. It is recommended that these synergistic relationships with social partners be harnessed to the fullest extent possible.

## V. GENERAL ASSESSMENT

The study programme *Building Engineering Systems* (state code – 65302T109, 653H24002) of Alytus College 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	2
2.	Curriculum design	2
3.	Teaching staff	3
4.	Facilities and learning resources	4
5.	Study process and students' performance assessment	2
6.	Programme management	2
	<b>Total:</b>	<b>15</b>

\*1 (unsatisfactory) - there are essential shortcomings that must be eliminated;

2 (satisfactory) - meets the established minimum requirements, needs improvement;

3 (good) - the field develops systematically, has distinctive features;

4 (very good) - the field is exceptionally good.

Grupės vadovas:  
Team leader:

Dr. Mark Gerard Richardson (grupės vadovas)

Grupės nariai:  
Team members:

Assoc.prof.dr.Rasa Apanavičienė

Prof.dr.Roger Frank

Mr.Salvijus Juodikis

Ms. Monika Simaškaitė

**ALYTAUS KOLEGIJOS PIRMOSIOS PAKOPOS STUDIJŲ PROGRAMOS PASTATŲ  
INŽINERINĖS SISTEMOS (VALSTYBINIS KODAS –653H24002, 65302T109) 2012-12-19  
EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-158 IŠRAŠAS**

&lt;...&gt;

**V. APIBENDRINAMASIS ĮVERTINIMAS**

Alytaus kolegijos studijų programa *Pastatų inžinerinės sistemos* (valstybinis kodas – 653H24002, 65302T109) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	2
2.	Programos sandara	2
3.	Personalas	3
4.	Materialieji ištekliai	4
5.	Studijų eiga ir jos vertinimas	2
6.	Programos vadyba	2
	<b>Iš viso:</b>	<b>15</b>

\* 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)

&lt;...&gt;

**IV. SANTRAUKA****1. Programos tikslai ir numatomi studijų rezultatai**

Programos tikslas – parengti profesinio bakalauro laipsnį turinčius specialistus, gebančius vadovauti statinių inžinerinių sistemų montavimo darbams, rengti šildymo, vėdinimo ir oro kondicionavimo arba vandens tiekimo ir nuotekų šalinimo sistemų projektus. Ši programa skirta pramonės sektoriui, susijusiam su „statybos paslaugomis“, kurios yra svarbiausias statybos

sektorius komponentas. Nuolat reikalingi tinkamos kvalifikacijos darbuotojai, gebantys projektuoti, montuoti minėtas sistemas naujuose pastatuose ir organizuoti jų priežiūrą, o taip pat (ir šis poreikis nuolat didėja) modifikuoti schemas. Regionui naudinga turėti tokią programą Alytuje. Planuojama, kad užimtumas statybos sektoriuje didės esant nacionalinei ir regioninei darbo jėgos migracijai.

Studijų programos tikslai apibrėžiami pateikiant aštuonis studijų rezultatus, kurie atitinka Europos kvalifikacijų sąrangos 6 lygmenį. Programos tikslai viešai paskelbti Kolegijos interneto svetainėje, bet tam tikra informacijos dalis gali būti klaidinanti. Svetainėje nurodyta, kad sėkmingai užbaigus kursą galima įgyti inžinieriaus kvalifikaciją. Būtina paaiškinti, kad inžinieriaus pripažinimo tarptautiniu lygmeniu siekiantiems absolventams baigus studijas reikės įgyti papildomų kvalifikacijų.

Taigi pagrindinis programos tikslas yra netinkamai suformuluotas (ne tik savianalizės suvestinėje, bet ir interneto svetainėje), kadangi kalbama apie inžinierių rengimą. Studijų rezultatų formuluotė apima specialius, socialinius ir asmeninius gebėjimus, bet nenurodyti studijų rezultatai, susiję su žiniomis ir jų taikymu, taip pat mokslinė kvalifikacija pagal „Pirmosios studijų pakopos studijų rezultatų aprašą“ (2 priedas, Studijų pakopų aprašas, Švietimo ir mokslo ministro įsakymo Nr. 2212 „Dėl studijų pakopų aprašo patvirtinimo“) arba EUR-ACE (Europos inžinerinių studijų akreditavimo sistema) klasifikaciją.

Nors toliau nestudijavę absolventai negali atitikti akademinių reikalavimų, keliamų inžinieriaus specialybės pripažinimui tarptautiniu lygmeniu, pageidaujamas absolvento rezultatas, kaip teigė vienas socialinis partneris, yra „inžinerinis mąstymas“. Šio lygio programai tai reiškia reikalavimą, kad studentas turėtų atitinkamą kiekį pagrindinių inžinerinių žinių, mokėtų jas įprastai panaudoti sprendžiamas inžinerines problemas ir turėtų inžinerinės patirties. Programos studijų rezultatai nerodo, kad būtų pasiektas tinkamas balansas. Reikėtų atlikti suderintą programos tikslų, studijų rezultatų ir studijų programos apžvalgą siekiant optimizuoti absolventų kvalifikacijas atsižvelgiant į tikslinę regiono ekonomiką kartu įtvirtinant pagrindinius inžinerinius principus patobulintoje programoje ir studijų eigoje.

## **2. Programos sandara**

Programa apima 180 kreditų. Galima laikyti, kad studijų krypties dalykai siekia minimalią 135 kreditų ribą, atsižvelgiant į dalykų suskirstymą. Kiti dalykai – praktika, laisvai pasirenkami ir kiti Kolegijos rekomenduojami dalykai – apima ne mažiau kaip 30 kreditų. Galima teigti, kad studijų programa atitinka minimalius teisės aktų reikalavimus. Programos turinys nuolat atnaujinamas atsižvelgiant į kas dveji metai atliekamų darbdavių apklausų rezultatus; tai rodo glaudų Kolegijos ir regiono socialinių partnerių bendradarbiavimą.

Nors studijų programa ir atitinka minimalius teisės aktuose nustatytus reikalavimus, reikėtų išreikšti susirūpinimą dėl kontaktinių valandų skaičiaus ir jų paskirstymo. Nuolatinių studijų studentų kontaktinės valandos apima 40,4 proc. kreditų, o iššestinių studijų studentai daugiau mokosi savarankiškai, ir jų kontaktinės valandos sudaro 21,4 proc. Šių kontaktinių valandų nėra daug, bet dar labiau neramina tai, kad teorinio kurso valandos sudaro tik 5 proc. nuolatinių studijų ir 2,5 proc. iššestinių studijų programos. To nepakanka. Kai kurie dalykai yra ypač svarbūs vidutinių mokslinių gabumų studentams, kurie dažniausiai priimami į tokias programas, todėl jiems atitinkamai reikia daugiau kontaktinių valandų suvokimui.

Norint įveikti šiuos trūkumus, reikėtų atitinkamai peržiūrėti ir pataisyti programą. Pakeitimų apimtis išliks nežinoma, kol Kolegija neužbaigs šios santraukos 1 skirsnyje rekomenduotos peržiūros. Reikiamas dėmesys turi būti skiriamas kvalifikaciją atitinkančioms minimalioms teorinėms žinioms. Rekomenduojama ne mažiau kaip 5 kreditais padidinti privalomuosius dalykus, apimančius studijų krypties pagrindinius inžinerijos principus – papildant modulius arba pakeičiant juos kitų kryptių modeliais. Ekspertų grupė abejoja kai kurių dalykų – bendrosios ekonomikos ir vadybos, marketingo, logistikos – pirmenybe šiame kvalifikacijos ir specializacijos lygyje, kai laiko atitinkamam pagrindinių inžinerinių žinių kiekiui įgyti skiriama mažai. Norint atspindėti reikalaujamas absolventų kvalifikacijas pagal penkias kategorijas, ten kur reikia, turėtų būti peržiūrėtos studijų rezultatų formuluotės moduluose. Tada turėtų būti įvertintas galimas to poveikis dabartinei programai. Bendras kreditų skaičius tokiu atveju gali padidėti iki 210 ECTS kreditų.

### **3. *Personalas***

Šioje programoje dėsto 28 dėstytojai, iš kurių pusė turi 20 metų patirtį šioje darbovietėje. Vienas darbuotojas turi daktaro, visi kiti – magistro laipsnius. Institucija remia personalo kvalifikacijos tobulinimą ir profesinį tobulėjimą, daug darbuotojų dalyvauja tarptautinėje veikloje. Visi darbuotojai turi gerą praktinę patirtį, kuri svarbi šiai programai. 75 proc. šioje programoje dalyvaujančių darbuotojų yra šios studijų krypties specialistai, 25 proc. – kitų aukštojo lavinimo kursų dėstytojai.

Studentų ir dėstytojų santykis – maždaug 3:1; kiekvienas darbuotojas vadovauja ne daugiau kaip 8 studentų projektams. Studentų nuomonės tyrimai rodo, kad jų požiūris į dėstymą teigiamas.

Programai vadovauja Inžinerijos fakulteto Inžinerijos katedra. Šios programos personalo struktūros silpnybė ta, kad kitos fakulteto teikiamos programos nesusijusios su statyba. Šiuo metu minimai programai aukščiausiu – katedros arba fakulteto – lygmeniu vadovauja personalas, neturintis plataus praktinio ar mokslinio statybos inžinerijos srities išsilavinimo. Būtina parengti personalo tobulinimo planą. Apie tai toliau rašoma 6 dalyje.

#### **4. Materialieji ištekliai**

Šiai programai vadovauja Inžinerijos katedra, kuri naudojasi bendromis mokymui skirtomis patalpomis ir laboratorijomis. Visas plotas sudaro net 1165 m<sup>2</sup>, įskaitant 534 m<sup>2</sup> laboratorijoms/ praktiniam mokymui skirtą plotą. Neseniai į mokymosi ir mokymo įrangą investuota nemažai nacionalinių ir ES lėšų. Auditorijose yra puiki šiuolaikiška mokymo įranga. Kuriant e. mokymo aplinką, kuriai tinkamą atsvarą sudaro Kolegijos informacijos ir savarankiškų studijų centras, didinama e. mokymosi galimybė. Studentų apklausos rodo, kad juos tenkina bibliotekoje esanti informacinė medžiaga. Laboratorijose yra puikios mokomosios demonstravimo priemonės, suteikiančios studentams galimybę kontroliuojamo eksperimento metu tirti įvairių parametru poveikį. Išorinis dizainas, įrangos patalpose išdėstymas ir ergonomiškas baldų dizainas rodo akivaizdų dėmesį detalėms. Darbuotojai ir studentai gali pagrįstai didžiuotis patalpomis bei įrengimais.

Su 30 įmonių sudaryti bendradarbiavimo susitarimai dėl profesinio praktinio mokymo teikimo.

#### **5. Studijų eiga ir jos vertinimas**

Priėmimo kriterijai yra vidurinės mokyklos brandos egzamino įvertinimas balais – matematikos (0,4), informatikos technologijos (0,2) ir lietuvių kalbos (0,2) – kartu su vidurinės mokyklos metiniais pažymiais ir užsienio kalbos įvertinimas (0,2). Daugelis įstojusių studentų neturi pakankamai gerų fizikos ir kitų mokslų žinių. Be to, kai kurie studentai neturi didelių gabumų matematikai. Svarbu, kad nuolatinių ir išstęstinių studijų studentų nubyrežimo lygis siekia atitinkamai 33 proc. ir 17 proc.

Studentų darbo krūvį sudaro labai nedaug kontaktinių teorinio darbo valandų (5 proc.), daug vilčių dedama individualiam darbui – tikimasi, kad jis sudarys 50 proc. Galimas dalykas, kad aukštą nubyrežimo lygį lemia nedidelis kontaktinių valandų skaičius. Pirmo kurso studentams taikoma orientavimo programa, kiekvienam studentui priskirtas kuratorius. Vis dėlto nuolatinių ir išstęstinių studijų studentų grupių baigimo lygis yra atitinkamai maždaug 40 proc. ir 33 proc. Reikia nustatyti tokio aukšto nesėkmės ir nubyrežimo lygio priežastis; Kolegija turėtų imtis priemonių joms pašalinti pati viena (pvz., didinti kontaktinių valandų skaičių) arba kartu su pramonės įmonėmis (pvz., taikyti socialinių partnerių rėmimo programas, skirtas gabiems studentams).

Siūloma *Erasmus* mainų programa, bet kurso studentai tik minimaliai ja pasinaudoja. Vienas iš veiksnių, mažinančių susidomėjimą mainų programa, yra prasti užsienio kalbos įgūdžiai.

Sporto įrenginiai geri, studentams prieinamos fizinio lavinimo pamokos. Karjeros ir viešųjų ryšių centras teikia paramą karjeros srityje. Bendrabučius gauna visi studentai, kurie jų prašo. Vadovybė palaiko studentų atstovybę ir pripažįsta jos svarbą indėlių Kolegijai.

Vertinimui skiriamas trumpesnis nei įprasta laikotarpis. Jis ne mažiau kaip viena savaitė trumpesnis už kitose Lietuvos kolegijose ir universitetuose taikomą laiką. Siekiant užtikrinti vertinimo tinkamumą, reikėtų peržiūrėti ir prireikus pataisyti vertinimo strategijas. Visų pirma turėtų būti pratęstas vertinimui skirtas laikas, kad jis labiau atitiktų Lietuvos kolegijose ir universitetuose nustatytą įprastą trukmę.

#### **6. Programos vadyba**

Programą administruoja labai gerai vadovaujama Kolegija, tačiau tolesnė programos vadyba reikalauja išsamesnio apsvairstymo, jeigu norima, kad programa tobulėtų akademinų žinių prasme ir būtų ilgalaikė. Programai vadovauja Inžinerijos katedra, įsteigtas Studijų programos komitetas. Komitetą sudaro ne mažiau kaip 6 nariai: koordinatorius, fakulteto dekanas, studentų atstovas, darbdavių atstovas ir kitų socialinių partnerių atstovas. Programos komiteto funkcija neveiksminga akademinėse srityse (didelis nubyreėjimas, prastas studijų eigos organizavimas). Todėl, nors direktorė pademonstravo puikų valdymą Kolegijos lygmeniu, vadyba programos lygmeniu, nors ir patenkinama, tačiau nėra stipraus vadovavimo, kuris būtinas tolesnei programos plėtrai ir ilgaamžiškumui, pavyzdys.

Kaip nurodyta 3 dalyje, šios programos personalo sandaros silpnybė yra ta, kad kitos fakulteto teikiamos programos nesusijusios su statyba. Šiuo metu minimai programai aukščiausiu – katedros ar fakulteto – lygmeniu vadovauja personalas, neturintis plataus praktinio ar mokslinio statybos inžinerijos srities išsilavinimo. Susumavus šią ir kitas 2 dalyje nurodytas problemas dėl kontaktinių valandų apimties bei paskirstymo ir didesnio privalomųjų dalykų, apimančių pagrindinius inžinerijos principus šioje studijų kryptyje, poreikio, programos koordinavimas turėtų būti pavestas stipriam moksliniam vadovui, kuris stengtųsi kurti programos reputaciją įgyvendindamas aukštus mokslo standartus pagrindinių inžinerinių žinių ir praktinių įgūdžių atžvilgiu.

Kokybės užtikrinimas atitinka nacionalines ir Europos gaires. Studijų programoje atsižvelgta į išorinį ir vidinį vertinimus.

Pagrindinis šios programos tikslas – išsaugoti Kolegijos absolventus, kad jie dalyvautų ekonominėje regiono plėtroje. Tarp regiono verslo įmonių ir Kolegijos yra labai stiprus palaikomasis ryšys. Rekomenduojama kuo labiau išnaudoti šiuos savitarpio santykius.

### **III. REKOMENDACIJOS**

1. Programos tikslą reikia suformuluoti iš naujo atsižvelgiant į suteikiamą laipsnį. Būtina

paaikškinti, kad absolventai, siekiantys būtų pripažinti inžinieriais tarptautiniu lygmeniu, po baigimo turės įgyti daugiau kvalifikacijų. Reikėtų pakeisti būsiamiems studentams skirtą informaciją apie programą, pateiktą oficialiuose dokumentuose ir Kolegijos interneto svetainėje.

**2.** Reikėtų atlikti suderintą programos tikslų, studijų rezultatų ir studijų programos peržiūrą, siekiant optimizuoti absolventų kvalifikacijas atsižvelgiant į tikslinę regiono ekonomiką kartu įtvirtinant pagrindinius inžinerinius principus patobulintoje programoje ir studijų eigoje. Turėtų būti padaryti atitinkami pataisymai, nors jų apimtis nebus aiški, kol nebus baigta peržiūra. Šios procedūros pradžioje darbdaviai turėtų aiškiai apibrėžti vidutinių gebėjimų absolvento vaidmenį pramonėje, kad Kolegija galėtų suformuluoti konkretesnius programos tikslus. Šie programos tikslai turėtų būti perkelti į absolvento kompetencijų aprašą. Šios kompetencijos turėtų būti susijusios su žiniomis ir jų taikymu, moksline kvalifikacija, konkrečiais, socialiniais ir asmeniniais gebėjimais. Prireikus turėtų būti peržiūrėtos studijų rezultatų formuluotės moduluose, kad jose atsispindėtų būtinos absolventų kvalifikacijos pagal penkias kategorijas. Tada reikėtų įvertinti to poveikį dabartinei programai.

**3.** Rekomenduojama, kad peržiūrint studijų programą būti patikrintas ir prireikus padidintas darbo krūvis. Mažai valandų skiriama teorijai. Rekomenduojama ne mažiau kaip 5 kreditais padidinti privalomųjų dalykų, apimančių studijų krypties pagrindinius inžinerijos principus skaičių papildant modulius arba pakeičiant juos kitų studijų krypties moduliais. Bendras kreditų skaičius tokiu atveju gali padidėti iki 210 ECTS kreditų.

**4.** Reikėtų peržiūrėti ir prireikus pataisyti vertinimo strategijas ir taip užtikrinti teisingą Kolegijos bendrojo šios studijų krypties programų įvertinimo metodiką. Ypač svarbu pratęsti vertinimui skirtą laiką, kad jis labiau atitiktų Lietuvos kolegijose ir universitetuose nustatytą įprastą trukmę.

**5.** Būtina imtis priemonių kasmet laipsniškai mažinti studentų nubyrejimo lygį. Reikėtų apklausti studentus, kurie nebaigė studijų, ir nustatyti pagrindinę nebaigimo priežastį (priežastis). Priemonių šioms priežastims pašalinti Kolegija turėtų imtis pati viena (pvz., didinti kontaktinių valandų auditorijose skaičių) arba kartu su pramonės įmonėmis (pvz., taikyti socialinių partnerių rėmimo programas, skirtas gabiems studentams).

**6.** Turėtų būti žymiai pagerintas programos komiteto veiklos efektyvumas, ypač akademinėse srityse. Programos koordinavimą reikėtų pavesti stipriam akademiniam vadovui, kuris stengtųsi kurti programos reputaciją įgyvendindamas aukštus mokslo standartus pagrindinių inžinerinių žinių ir praktinių įgūdžių srityse.

**7.** Rekomenduojama visapusiškai išnaudoti jau esamus sinerginius ryšius su socialiniais



partneriais kartu dalyvaujant atitinkamų programų komitetuose, komisijose ir t. t., siekiant užtikrinti, kad regione baigusieji mokyklas nuolat domėtusi šia programa, o baigę Kolegiją pasiliktu dirbti ir taip dalyvautų regiono ekonominėje plėtroje.

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