



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Kauno technikos kolegijos

***KELIŲ INŽINERIJOS (65302T102, 653H22002)***

**STUDIJŲ PROGRAMOS VERTINIMO IŠVADOS**

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**EVALUATION REPORT**

***OF ROAD ENGINEERING (65302T102, 653H22002)***

**STUDY PROGRAMME**

At Kaunas Technical College

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Išvados parengtos anglų kalba

Report language - English

## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	Kelių inžinerija
Valstybinis kodas	65302T102, 653H22002
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	Kelių inžinerijos profesinis bakalauras
Studijų programos įregistravimo data	2002-08-30

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## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	Road engineering
State code	65302T102, 653H22002
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	Professional Bachelor of Road Engineering
Date of registration of the study programme	30-08-2002

## CONTENTS

I. INTRODUCTION.....	4
II. PROGRAMME ANALYSIS .....	5
1. Programme aims and learning outcomes.....	5
2. Curriculum design .....	6
3. Staff .....	8
4. Facilities and learning resources .....	9
5. Study process and student assessment.....	11
6. Programme management .....	12
III. RECOMMENDATIONS .....	14
IV. SUMMARY .....	15
V. GENERAL ASSESSMENT .....	18

## I. INTRODUCTION

This report presents the findings of an evaluation of the programme *Kelių inžinerija* (65302T102, 653H22002), referred to in English as the programme **Road Engineering**. The report is based on an analysis of the document “Kauno Technikos Kolegija, Road Engineering Study Programme, Self-Evaluation Report, Volume 1, June 2012”, associated annexes and information gathered by the Review Team during a site visit to Kaunas Technical College on 11 October 2012.

The site visit included:

- discussions with senior faculty administration staff,
- discussions with staff responsible for preparation of Self-Evaluation Report (SER),
- 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 three year full-time (4 years part-time) Professional Bachelor of Road Engineering programme is the only programme of its type in Lithuania. Graduates up to 2009 received a Diploma in Engineering and the original title of the programme was “Road Construction”. Since then the programme title was changed to “Road Engineering” and this is reflected in the qualification awarded: ‘Professional Bachelor of Road Engineering’. The programme is designed to provide the industry with technically competent graduates capable of designing standard road and street layouts, designing simple structures associated with roads, organising road construction and repair contracts, supervising such contract works, evaluating road safety deficiencies and monitoring evidence of road infrastructure deterioration. The graduates are equipped with skills to work independently and in teams. It was stated in the SER (Paragraph 46) that entrants from 2012 would have an opportunity to take a route to a “double (joint) road and construction engineering Professional Bachelor’s degree qualification”. The Expert Group requested clarification of this statement at the beginning of the site visit and were informed that this was not the case and that a Professional Bachelor’s degree qualification in Road Engineering was the sole aim. The evaluation was conducted on this understanding.

The programme commenced in 2002 and was externally assessed several times, from different perspectives, in the period 2002 to 2011. This assured that the programme was first offered in accordance with Vocational Education and Training requirements and that it was later updated in accordance with the requirements of the General Regulation of Technology (Engineering) Sciences.

## II. PROGRAMME ANALYSIS

### 1. Programme aims and learning outcomes

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

The aims of the programme are well-defined. The programme aim is to produce Professional Bachelors Degree graduates in Road Engineering with competence in standard road and street design, design of simple structures associated with roads, organisation and supervision of road construction and maintenance, evaluating road safety deficiencies and monitoring evidence of road infrastructure deterioration.

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

The sector of the construction industry related to road construction, repair and safety enhancement requires a strong cohort of technically-proficient graduates with adequate skills to set-out, organise and supervise construction projects. Such a cohort is an essential requirement to interface between the day-to-day operational demands of realising the project, ensuring quality of the works to the standards set by those responsible for design and specification of the project, resource deployment and cost control on behalf of the construction company. The skill-set required involves a blend of technical, communication and organisational competence combined with specific practical skills relevant to the sector. This need is met by the programme, which is the only one of its type at this level in Lithuania. The demand from applicants is very strong and interest in the programme from employers ensures that the employment prospects of graduates is very good. The demand in 2011 was such that two academic groups had to be formed.

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

The studies are at the level of European Qualification Framework Level 6. The aims and learning outcomes are informed by twelve documents and two surveys (specialist demand and road construction companies). The level of studies is appropriately matched to the skill-set required and the qualification awarded.

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

The programme name ('Road Engineering'), learning outcomes, content and qualifications ('Professional Bachelor of Road Engineering') are compatible.

It may be noted that one of the documents referenced in respect of programme outcomes is the Road Engineers Training Standard (No.1159/A1-178) of 2004. The use of this document as an indicator of relevant competences should only be informative, for several reasons. Firstly, the Standard was prepared in 2004 for programmes of a lower level to this programme. Secondly, the graduates of this programme need to be clear that competence to the requirements of the standard will not bring them to a level internationally recognised in Europe as 'road engineers'. Its use in the context of this programme cannot imply a level of qualification at a level higher

than that allocated to the College. Regulation of the profession of engineering may become a feature of the European Union (EU) in the future. Therefore it is increasingly important that prospective students be informed about the context of the programme's qualification award under the Bologna process. This should be clearly set in the context of it being both an (appropriate) end in itself, for many, and a subset of the educational requirements for attainment of Chartered Engineer status in the field of road engineering (at some much later time in their careers), for some others.

## **2. Curriculum design**

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

The programme meets the legal requirements for a Professional Bachelor's degree qualification in Road Engineering. It was stated in the SER (Paragraph 46) that entrants from 2012 would have an opportunity to take a route to a "double (joint) road and construction engineering Professional Bachelor's degree qualification". The Expert Group requested clarification of this statement at the beginning of the site visit and were informed that this was not the case and that a Professional Bachelor's degree qualification in Road Engineering was the sole aim.

The programme totals 180 credits of which: 141 credits are allocated to modules of the study field, 15 credits for common modules, 15 credits for specialisation modules and 9 credits for optional subjects. The final project is valued at 9 credits.

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

The programme duration is three years, over 6 semesters, for full-time students. Part-time students study over 8 semesters in a four year period. The sequence of modules is logical moving from fundamental knowledge (mathematics/physics/materials science), through to the applied sciences (applied physics/mechanics/soil mechanics/economics), through to development of engineering practice (design/planning/practice).

Learning is enhanced by a period of practice at the end of the second year. This could be further enhanced by a period of introductory practice at the end of the first year, during the summer. Introductory practice would typically involve a significant degree of observation but certain skills (e.g. geodesy) could be employed in practice. This may require some changes to the sequence of subjects to allow acquisition of skills to be used during the earlier practice period. The introduction of any further practice periods as part of the learning process should be done in the context of reinforcing the understanding and relevance of fundamental engineering principles. It should not be used to replace the lifelong educational value of studying theoretical material by an overemphasis on training.

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

The curriculum is informed by the knowledge and skills appropriate to European Qualification Framework Level 6. This is reflected in the programme outcomes which have an appropriate

blend of knowledge and skills for this level of study. The core focus is, appropriately, on application of technology and scientific knowledge.

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

A review of the module descriptors indicates that the content is appropriate for the achievement of the intended programme outcomes. The content of each module is very clearly stated in respect of objectives, topics covered, practical exercises and the relationship with the programme outcomes.

The programme outcomes are very well framed and reflect best practice in specifying the outcomes in vocabulary centred on verbs such as ‘know....’, ‘comprehend....’, ‘apply....’, ‘analyse....’ and ‘evaluate...’. These programme outcomes are cross-referenced in the module descriptors. The learning outcomes of each module however are not expanded beyond the level of the programme outcome. The opportunity should be used to expand the statement of learning outcomes in a way that explicitly states what the student will be capable of doing on completion of the module. This would greatly aid the effective communication of expected learning outcomes at the module level to the students.

A primary aim of the course should be to contribute to greater road safety. The development of a road safety culture in the graduate attributes should be encouraged by incorporation of this aspect in all subjects where appropriate and feasible.

The Expert Group also expresses some concern about the minimum knowledge that the graduates should acquire, in a mandatory manner, about basic geotechnics (slope stability, foundations and retaining structures) in so far as it applies to works that they may reasonably be expected to organise or supervise in construction.

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

It was stated in the SER (Paragraph 46) that there is provision for entrants from 2012 to take a route to a double (joint) road and construction engineering professional bachelors degree. The Expert Group requested clarification of this statement at the beginning of the site visit and were informed that this was not the case and that a Professional Bachelor’s degree qualification in Road Engineering was the sole aim. The scope of the programme is sufficient to ensure the learning outcomes relevant to a professional bachelor’s degree in road engineering.

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

Being the only programme of its type in Lithuania, the graduates fulfil an important role at the interface between the designers/specifiers and those engaged in the actual construction of road projects. Thus they have a significant influence on the quality of completed projects. It is very important therefore that strong dialogue is maintained between industry representatives, Road Administration authority under the Ministry and the programme provider on recent changes in policy, procedures and technology. Currency of programme content is best facilitated through strong leadership of the programme by an expert in the field, not least in their role as a well-informed chairperson of the Programme Study Committee. This is further discussed in Section 6.1.

The programme learning outcomes are informed by the Road Engineers Training Standard. See comments in Section 1.4 regarding the context of the document and its limitations in respect of this programme.

### **3. Staff**

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

The programme meets the legal requirements. The programme is staffed by 27 teachers (23 regular and 4 invited) and 5 technical staff. Approximately 20% of the regular teachers have doctoral degrees and the figure rises to about 30% when the total includes both regular and invited contributors. A total of 17 of the regular teachers have master's degrees in construction engineering (or a relevant cognate discipline). Those with more than 3 years experience in practice related to the study programme is reported in the SER as comprising 48% of the regular teachers and 25% of the invited teachers, leading to a 44% average for all teachers.

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

All but one of the teaching staff on the programme have either a doctoral degree or a relevant master's degree (in construction engineering or a relevant cognate discipline). About a third of staff teaching on the programme have doctoral degrees. It is reported in the SER that almost half (44.4%) have practical experience exceeding 3 years in the field of the programme.

A key strength of any programme is the academic leadership provided by the course director/programme co-ordinator. This leadership is most effective when it is entrusted to an expert practitioner in the field of study of the programme. While staff qualifications are adequate, the programme would benefit from continuity of leadership by an expert in road engineering, who is engaged with teaching duties in a core aspect of the programme. This aspect of staffing is further discussed in Section 6.1.

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

The student:teaching staff ratio is about 8:1, comfortably below the maximum value of 11:1 permitted in the institutions own regulations.

In respect of those from the regular teachers group with more than 3 years experience in practice related to the programme, the Expert Group note that this group is reported as representing just about half (44.4%) of the staff. This meets the minimum legal requirement. However a review of staff CV's in the Annex provided to the Expert Group shows very few teachers from the regular or invited group with significant experience in practice with road engineering companies or road authorities. This may be a flaw in data collection or may represent the true picture. It would strengthen the programme if the proportion of staff with more than 3 years experience with road engineering companies or road authorities was increased. This could be achieved through recruitment or staff internships.



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

Staff turnover is satisfactory. About two-thirds of the teachers on the programme are in the 46 to 60 year age cohort. This leads to a stable staff base with typically only one or two staff member changes per annum.

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

Staff qualification improvement is supported by policy within the institution (Regulation V1-156). There is evidence of ongoing involvement by staff in courses to enhance their pedagogical skills.

As discussed in Section 3.3, it would benefit the programme if the proportion of staff with more than 3 years experience with road engineering companies or road authorities was increased. This could be achieved through staff internships.

Staff mobility is very limited, if any. Measures should be taken to enhance the career development of staff in this respect.

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

The workload is 1584 hours annually and teaching hours allocations range from up to 850 hours for junior lecturers to 650 hours for associate professors. The remaining time is devoted for scientific and methodological work, including timetabled consultation hours for students.

In the analysed period 29 applied research projects were completed (using full-time and part-time students). One member of staff is a member of the group who prepared the Road Engineers Training Standard.

On average the research publication rate has been 2 publications per staff member in the period 2007 to 2011. Most of these were learning publications. Just 3 publications were published externally. The learning publications include 17 books that represent a very significant resource for this and similar programmes – see Section 4.4. Hopefully current significant investment in modern test equipment will provide the opportunity to undertake more technical applied research and dissemination of the results in international journals.

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

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

The programme is hosted by the Department of Civil Engineering using shared facilities in the main building and also a Building Materials Laboratory in a separate building (dormitories). Shared facilities include subject-specific classrooms. The facilities in the ground floor of the dormitories building are of good quality but there is current investment in relocating the Building Materials Laboratory to the main building. This includes enhancement of the capacity of the laboratories. Continued investment in renovation of the main building is yielding

enhanced conditions for students. Ventilation arrangements in the main building are less than optimal. Adequate ventilation of the new laboratories will be essential to the indoor air environment of these facilities, especially when bituminous mixes are under test.

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

The teaching laboratories have been renovated and equipment updated in recent years. There has been significant investment from EU structural funds. Ongoing significant investment plans include enhancement of the College's IT infrastructure from the EU Project "Establishment of Technological Area Multidisciplinary Practical Training Centre at Kaunas Technical College". The student learning experience for those on the study programme benefits from these College-wide developments. Some equipment has also been donated from companies, which demonstrates the long-term interest of stakeholders in the programme. Here has been targeted investment in appropriate road design software.

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

Students engage in visits to companies, practical classes in geodetic measurement, apprenticeship and final practices. These final practices are of 4 weeks duration and are held in a range of certified companies at the end of the second year of studies. Part-time students are typically in employment and can gain relevant practice in their companies. Opportunities to strengthen learning and motivation to study theoretical aspects of the programme (by seeing the relevance of mathematics, applied physics, mechanics etc. in practice early in the programme) could be achieved by extending student practice to include an introductory practice period at the end of the first year – see Section 2.2.

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

A significant suite of teaching materials (books, online resources) has been developed meeting the needs of 17 subjects in the programme, through a funded project "Improvement of engineering study programmes at Kaunas Technical College". This represents support to approximately half of the subjects. It demonstrates recognition of texts and online resources specific to the needs of the students, since many publications are tailored to university studies. The literature needs to be more practical in some cases. In addition to the College library there are co-operation agreements with the Kaunas University of Technology and the Public Library of Kaunas. Access to computers in the Library is currently restricted because of the number of students. In addition the number of copies of some recommended textbooks is inadequate. Increased use is being made of virtual learning environments through Moodle and this will be further rolled out with the extensive current investment in IT services across the College.

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

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

Admission is competitive and is conducted through the Lithuanian association for joint admissions. The criteria include performance at secondary school in mathematics, physics and Lithuanian. Nevertheless there is evidence of high drop-out rates. The ratio between entry students and graduating numbers equates to about 65% in the case of full-time students. A possible cause is where students with weak backgrounds in mathematics and/or physics cannot (or do not) rise to the challenge of meeting the academic standard required in their first year subjects. This should be addressed by a combination of revised criteria for admission and extra support classes in these subjects.

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

The study process involves a combination of lectures, laboratory classes and practice. The practice (currently at the end of the second year) is a useful motivator for student engagement with modules. This could be further reinforced for subjects in second year by the introduction of a period of practice at the end of first year – see Section 2.2.

Contact hours amount to about 60% of the programme and independent study is 40%. The level of independent study is about right for this level of course, but should not be much less. Greater use of small group teaching and problem-based learning is recommended if future availability of virtual learning environments increases the expectations of independent learning above the current level.

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

In addition to artistic and sports activities the students on the course have participated in applied research projects, half of which were commissioned by external parties. A recent introduction is an annual “Young Road Engineer Day”, which showcases research related to the programme outcomes, in the presence of potential employers.

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

Arrangements are in place for Erasmus exchange in Germany, Poland and Denmark. Uptake is very low, despite the high competitive score of some students on the programme. An expansion of the range of opportunities would assist in growing the numbers, especially if these new agreements were with institutions in countries with comparable costs of living to Lithuania. In addition mobility could be greatly enhanced if formal arrangements were made to facilitate the period of practice in other countries, for example with roads administrations.

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

A particular issue is high drop-out rates in first year. This could be addressed by the introduction of extra tutorial support in mathematics and physics at first year level. A special subject “Introduction to Studies” has been developed, which is commendable. Full-time students are assigned tutors.

Motivation for high achieving students is available through competition for the ‘Memorial Scholarship of JSC Lithuanian Railways’.

Sports and social clubs are available. Students can avail of low cost accommodation, psychological assistance, legal advice and career support advice. A formal system of meetings between student representatives and the vice dean are held on a weekly basis.

The Adult Education Centre assists in the design and implementation of part-time studies. Individual study programmes are available if required to students who have demonstrated commitment to their studies.

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

A clear 10 point scale is used for assessment. The final grade is based on a cumulative grade. The final project mark is determined by a 5-person qualifications commission, of whom 3 are representatives of employers.

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

The graduate attributes are such that graduates are prepared for entry to the international labour market. Talented graduates also have the capability to take prerequisite courses for admission to a master’s degree. Approximately 10% of graduates have successfully gained employment in road construction companies outside of Lithuania.

On a more general point it is recommended that the graduate attributes in respect of having a strong road safety culture be developed by changes in the curriculum – see Section 2.4.

## **6. Programme management**

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

The programme is managed by the Department of Civil Engineering, one of two departments in the Faculty of Civil Engineering. The Head of Department reports to the Dean, who reports to the Deputy Director for Academic Work. A Study Programme Committee is in place with a membership of six. This includes representatives of teaching staff, social partners and students.

The study programme has traditionally been implemented and co-ordinated by the Head of the Civil Engineering Department. Following the departure in 2011 of a long-serving and very experienced staff member from the position of Head of Department it is strongly recommended

that new academic leadership of the programme be entrusted to an expert in road engineering. It is therefore recommended that the Head of the Civil Engineering Department would review the Study Programme Committee chairmanship with a view to appointing a person with significant experience in road engineering and a teaching role in a core module of the programme.

Given the fact that this Professional Bachelor's Degree programme in Road Engineering is unique in Lithuania, it is recommended that the links with the Lithuanian Road Administration under the Ministry of Transport and Communications be further strengthened by the participation of a representative of this Administration in the Study Programme Committee.

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

The results from the previous year are analysed at the beginning of the academic year at departmental, faculty and College level (Academic Council). Yearly quality improvement plans are prepared.

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

Several external assessments have informed the study programme. These have included employer's surveys, General Regulations of Technology (Engineering) Sciences; and improvement in the Kaunas Technical College engineering field study programmes (EU supported project). Road construction companies are surveyed occasionally and graduates are surveyed annually. A detailed review of the new programme was also conducted by the Head of Study Programmes Department of Vilnius University in 2011, who commented favourably on the updated programme and who provided recommendations for further improvement.

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

There is strong and efficient stakeholder involvement at several levels. The dialogue between the institution and the employers is, in particular, provided by ongoing links through use of certified companies for practical training and involvement in the qualifications commission. The Expert Group noted the great satisfaction of the employers that they had the chance to meet during the site visit. This satisfaction seems to be relevant to most aspects of the programme.

Student involvement includes a survey process combined with a feedback loop which notes changes implemented on foot of student opinions. Such feedback loops are commendable and encourage participation in the survey process.

There is strong interest in the programme from those wishing to employ such graduates. The opportunity to use graduates and employers' representatives to communicate the programme's aims to prospective students should not be missed. This could potentially attract more good quality well-motivated students to the programme.

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

Quality assurance is in accordance with European standards. A customer-centred quality process is in place. The ongoing development of the programme has been informed by several reviews since 2002.

### III. RECOMMENDATIONS

1. It is recommended that the learning outcomes of each module be more effectively communicated to students by expanding the material in the module descriptors beyond the current level, which relates to the programme outcome. The opportunity should be used to expand the statement of learning outcomes in a way that explicitly states what the student will be capable of doing on completion of the module.
2. It is recommended that consideration be given to the proposition that learning through practice could be further enhanced by a period of introductory practice at the end of the first year, during the summer. The learning outcomes could centre around reinforcement of the understanding and relevance of fundamental engineering principles. It should not be used to replace the lifelong educational value of studying theoretical material by an overemphasis on training.
3. It is strongly recommended that modules related to soil mechanics be expanded. Mandatory learning outcomes need to be added in respect of basic geotechnics (slope stability, foundations and retaining structures) in so far as they apply to works that they may reasonably be expected to organise or supervise in construction.
4. It would strengthen the programme if the proportion of staff with more than 3 years experience with road engineering companies or road authorities was increased. This could be achieved through recruitment or staff internships.
5. It is recommended that measures should be taken to enhance the career development of staff in respect of mobility.
6. It is recommended that ventilation arrangements in the main building be improved to keep the indoor air quality at an acceptable level, especially when the newly developed laboratory suite is operational and bituminous mixes are under test.
7. It is recommended that measures be taken to reduce the drop-out rate, potentially by a combination of revised criteria for admission and extra support classes in theoretical subjects, especially during the first year of studies.
8. A primary aim of the course should be to contribute to greater road safety. The development of a road safety culture in the graduate attributes should be encouraged by incorporation of this aspect in all subjects where appropriate and feasible.
9. Following the departure in 2011 of a various experienced staff member from the position of Head of Department it is strongly recommended that new academic leadership of the programme be entrusted to an expert in road engineering. It is therefore recommended that the Head of the Civil Engineering Department would review the Study Programme Committee chairmanship with a view to appointing a person with significant experience in road engineering and a teaching role in a core module of the programme.
10. It is recommended that links with the Lithuanian Road Administration, under the Ministry of Transport and Communications, be further strengthened by the participation of a representative of this Administration in the Study Programme Committee, in recognition of the uniqueness of the programme at this study level in Lithuania.

## IV. SUMMARY

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

The three year full-time (4 years part-time) Professional Bachelor in Road Engineering programme is the only programme of its type in Lithuania. The programme commenced in 2002 and was externally assessed several times, from different perspectives, in the period 2002 to 2011. Graduates up to 2009 received the Diploma of Engineer and the original title of the programme was “Road Construction”. Since then the programme title was changed to “Road Engineering” and this is reflected in the qualification awarded: ‘Professional Bachelor of Road Engineering’. The programme is designed to provide the industry with technically competent graduates capable of designing standard road and street layouts, designing simple structures associated with roads, organising road construction and repair contracts, supervising such contract works, evaluating road safety deficiencies and monitoring evidence of road infrastructure deterioration. The aims of the programme are well-defined.

The sector of the construction industry related to road construction, repair and safety enhancement requires a strong cohort of technically-proficient graduates with adequate skills to set-out, organise and supervise construction projects. The skill-set required involves a blend of technical, communication and organisational competence combined with specific practical skills relevant to the sector. This need is met by the programme, appropriately set at the level of European Qualification Framework Level 6. Demand from applicants is strong and the employment prospects of graduates is good.

### **2. *Curriculum design***

The programme meets the legal requirements. The programme totals 180 credits of which: 141 credits are allocated to modules of the study field, 15 credits for common modules, 15 credits for specialisation modules and 9 credits for optional subjects. The final project is valued at 9 credits. The sequence of modules is logical moving from fundamental knowledge, through to the applied sciences, through to development of engineering practice.

The programme outcomes are very well framed. These programme outcomes are cross-referenced in the module descriptors. The learning outcomes of each module however are not expanded beyond the level of the programme outcome. In respect of content, the coverage of basic geotechnics (slope stability, foundations and retaining structures) needs to be increased in so far as it applies to works that the graduates may reasonably be expected to organise or supervise in construction. Learning through practice could be further enhanced by a period of introductory practice at the end of the first year, during the summer.

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

The programme is staffed by 27 teachers (23 regular and 4 invited) and 5 technical staff. Staff turnover is satisfactory. The student:teaching staff ratio is about 8:1. The programme meets the legal requirements.

It is reported in the SER that almost half (44.4%) have practical experience exceeding 3 years in the field of the programme. However a review of staff CV's in the Annex provided to the Expert Group shows very few teachers from the regular or invited group with significant experience in practice with road engineering companies or road authorities. This may be a flaw in data collection or may represent the true picture. It would strengthen the

programme if the proportion of staff with more than 3 years experience with road engineering companies or road authorities was increased. This could be achieved through recruitment or staff internships.

There is evidence of ongoing involvement by staff in courses to enhance their pedagogical skills. However staff mobility is very limited and measures should be taken to enhance the career development of staff in this respect.

On average the research publication rate has been 2 publications per staff member in the period 2007 to 2011. Most of these were learning publications. Just 3 publications were published externally. The learning publications include 17 books that represent a very significant resource for this and similar programmes.

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

The programme is hosted in good facilities, in which there is continual investment, not least from EU structural funds. Ongoing significant investment plans include enhancement of the College's IT infrastructure. The programme is hosted by the Department of Civil Engineering using shared facilities in the main building and also a Building Materials Laboratory in a separate building. There is current investment in relocating the Building Materials Laboratory to the main building. This includes enhancement of the capacity of the laboratories. Continued investment in renovation of the main building is yielding enhanced conditions for students. Ventilation arrangements in the main building are less than optimal. Adequate ventilation of the new laboratories will be essential to the indoor air environment of these facilities, especially when bituminous mixes are under test.

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

Admission criteria include performance at secondary school in mathematics, physics and Lithuanian. Nevertheless there is evidence of high drop-out rates. The ratio between entry students and graduating numbers equates to about 65% in the case of full-time students. A possible cause is where students with weak backgrounds in mathematics and/or physics cannot (or do not) rise to the challenge of meeting the academic standard required in their first year subjects. This should be addressed by a combination of revised criteria for admission and extra support classes in these subjects. A special subject "Introduction to Studies" has been developed, which is commendable. Full-time students are assigned tutors.

Arrangements are in place for Erasmus exchange in Germany, Poland and Denmark. Uptake is very low, despite the high competitive score of some students on the programme.

The graduate attributes are such that graduates are prepared for entry to the international labour market. Talented graduates also have the capability to take prerequisite courses for admission to a master's degree. Approximately 10% of graduates have successfully gained employment in road construction companies outside of Lithuania. On a more general point it is recommended that the graduate attributes in respect of having a strong road safety culture be developed by changes in the curriculum.

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

The programme is managed by the Department of Civil Engineering, one of two departments in the Faculty of Civil Engineering. The study programme has traditionally been implemented and co-ordinated by the Head of the Civil Engineering Department. Following the departure in 2011 of a long-serving and very experienced staff member from



the position of Head of Department it is strongly recommended that new academic leadership of the programme be entrusted to an expert in road engineering. It is therefore recommended that the Head of the Civil Engineering Department would review the Study Programme Committee chairmanship with a view to appointing a person with significant experience in road engineering and a teaching role in a core module of the programme. Also, given the fact that this Professional Bachelor's Degree programme in Road Engineering is unique in Lithuania, it is recommended that the links with the Lithuanian Road Administration under the Ministry of Transport and Communications be further strengthened by the participation of a representative of this Administration in the Study Programme Committee

There is strong and efficient stakeholder involvement at several levels. The dialogue between the institution and the employers is, in particular, provided by ongoing links through use of certified companies for practical training and involvement in the qualifications commission. The Expert Group noted the great satisfaction of the employers that they had the chance to meet during the site visit. Student involvement includes a survey process combined with a feedback loop which notes changes implemented on foot of student opinions.

A customer-centred quality process is in place.

## V. GENERAL ASSESSMENT

The study programme *Road engineering* (state code - 65302T102, 653H22002) of Technical College of Kaunas is given **positive** evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	4
2.	Curriculum design	3
3.	Teaching staff	3
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	3
6.	Programme management	3
	Total:	<b>19</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 nariai:

Team members:

Prof.dr. Roger Frank

Mr. Salvijus Juodikis

Mr. Dionis Martsinkevichus

Assoc.prof. dr.Vincentas Vytis Stragys

**KAUNO TECHNIKOS KOLEGIJOS PIRMOSIOS PAKOPOS STUDIJŲ PROGRAMOS  
KELIŲ INŽINERIJA (VALSTYBINIS KODAS – 653H22002, 65302T102) 2012-12-06  
EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-135 IŠRAŠAS**

<...>

**V. APIBENDRINAMASIS ĮVERTINIMAS**

Kauno technikos kolegijos studijų programa *Kelių inžinerija* (valstybinis kodas – 653H22002, 65302T102) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	4
2.	Programos sandara	3
3.	Personalas	3
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	<b>Iš viso:</b>	<b>19</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)

<...>

**IV. SANTRAUKA**

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

Trejų metų trukmės nuolatinį (ketverių metų trukmės išstėtinių) kelių inžinerijos profesinio bakalauro studijų programa yra vienintelė tokio tipo programa Lietuvoje. Programa pradėta vykdyti 2002 m.; jos išorinis vertinimas įvairiais aspektais atliktas kelis kartus 2002–2011 m. Absolventai,

baigę programą iki 2009 m., gavo inžinieriaus diplomą, o programa vadinosi „Kelių statyba“. Vėliau programos pavadinimas pakeistas į „Kelių inžineriją“, o suteikiama kvalifikacija vadinosi „profesinis kelių inžinerijos bakalauras“. Programos paskirtis – paruošti rinkai technines kompetencijas turinčius specialistus, gebančius projektuoti standartinius kelius ir gatves, paprastas su keliais susijusias konstrukcijas, organizuoti kelių statybos ir remonto rangą, prižiūrėti tokios rangos darbus, įvertinti kelių saugumo trūkumus ir stebėti kelių infrastruktūros nusidėvėjimo požymius. Programos tikslai gerai suformuluoti.

Statybos pramonės sektorius, susijęs su kelių statyba, remontu ir saugumo gerinimu, reikalauja aukštos techninės kvalifikacijos specialistų, turinčių tinkamų statybos projektų rengimo, organizavimo ir priežiūros įgūdžių. Reikalingi įgūdžiai apima techninius, komunikacinius ir organizacinius gebėjimus kartu su sektoriui aktualiais specifiniais praktiniais įgūdžiais. Europos kvalifikacijų sąrangos 6 lygmens programa tenkina šiuos poreikius. Stojančiųjų paklausa didelė, o absolventų įsidarbinimo galimybės puikios.

## **2. Programos sandara**

Programa atitinka teisinius reikalavimus. Programos apimtis – 180 kreditų, iš jų 141 kreditas skirtas studijų krypties moduliams, 15 kreditų – bendriesiems moduliams, 15 kreditų – specializacijos moduliams ir 9 kreditai – pasirenkamiesiems dalykams. Baigiamojo darbo apimtis – 9 kreditai. Modulių seka logiška; jie išdėstyti nuo fundamentaliųjų žinių iki taikomųjų mokslų ir inžinerinės praktikos.

Programos studijų rezultatai puikiai suformuluoti. Jie atspindi modulių aprašuose. Tačiau kiekvieno modulio numatomi studijų rezultatai neišplečiami už programos studijų rezultatų. Kalbant apie turinį, geotechnikos pagrindai (šlaitų stabilumas, pamatai ir atraminės konstrukcijos) turėtų būti išplėsti tiek, kiek jie susiję su darbais, kuriuos absolventams gali tekti organizuoti arba prižiūrėti statybose. Reikėtų toliau stiprinti mokymąsi per praktiką, įtraukiant pažintinę praktiką po pirmojo kurso vasarą.

## **3. Personalas**

Programos darbuotojų kolektyvą sudaro 27 dėstytojai (23 etatiniai ir 4 kviestiniai) ir 5 techniniai darbuotojai. Personalo kaita patenkinama. Studentų ir dėstytojų santykis yra maždaug 8:1. Programa atitinka teisinius reikalavimus.

Savianalizės suvestinėje teigiama, kad beveik pusė (44,4 proc.) jų turi praktinės daugiau nei 3 metų patirties programos srityje. Tačiau peržiūrėjusi priede pateiktus darbuotojų gyvenimo aprašymus, ekspertų grupė nustatė, kad mažuma etatinių ar kviestinių dėstytojų turi didelės darbo

kelių inžinerijos įmonėse ar kelių eismo institucijose patirties. Gali būti, kad priede pateikti duomenys neteisingi, tačiau tai gali būti ir tiesa. Programą galima sustiprinti padidinus darbuotojų, turinčių daugiau nei 3 metų darbo kelių inžinerijos įmonėse ar kelių eismo institucijose patirties, skaičių. Tą galima pasiekti priimant naujus darbuotojus arba per dėstytojų stažuotes.

Yra požymių, kad dėstytojai nuolat dalyvauja pedagoginės kvalifikacijos kėlimo kursuose. Vis dėlto dėstytojų judumas labai ribotas, todėl reikėtų imtis priemonių darbuotojų karjeros vystymo galimybėms stiprinti.

Bendras tyrimų publikacijų vidurkis yra 2 publikacijos vienam dėstytojui 2007–2011 m. Dauguma jų yra mokomoji medžiaga. Tik 3 publikacijos paskelbtos išorėje. Mokomosios publikacijos apima 17 knygų, kurios yra labai reikšminga šios ir kitų panašių programų metodinė medžiaga.

#### **4. *Materialieji ištekliai***

Programa vykdoma geroje patalpose, į kurias nuolat investuojama, ypač iš ES struktūrinių fondų. Vykdomi didelių investicijų planai apima kolegijos IT infrastruktūros gerinimą. Programą pagrindinio pastato patalpose ir statybinių medžiagų laboratorijoje atskirame pastate vykdo Statybos inžinerijos katedra. Šiuo metu investuojama į statybinių medžiagų laboratorijos perkėlimą į pagrindinį pastatą. Investicijos skirtos ir laboratorijų pajėgumams didinti. Nuolatinės investicijos į pagrindinio pastato renovaciją prisideda prie sąlygų studentams gerinimo. Pagrindinio pastato vėdinimo sistema neatitinka reikalavimų. Tinkamas naujųjų laboratorijų vėdinimas bus svarbus šių patalpų vidaus oro sąlygų kokybei, ypač kai bus bandomi bituminiai mišiniai.

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

Priėmimo kriterijai apima vidurinės mokyklos matematikos, fizikos ir lietuvių kalbos dalykų rezultatus. Nepaisant to, yra didelis nubyrežimo procentas. Įstojusiųjų ir absolventų santykis lygus maždaug 65 proc. (nuolatinėje studijų formoje). Galima to priežastis yra ta, kad studentai su silpnais matematikos ir (arba) fizikos pagrindais nesugeba atitikti akademinių pirmojo kurso dalykų reikalavimų. Reikėtų peržiūrėti priėmimo kriterijus ir pridėti papildomų šių dalykų užsiėmimų. Pagirtina tai, kad parengtas specialus įvado į studijas dalykas. Nuolatinė studijų studentai turi kuratorius.

Pasirašyti Erasmus mainų susitarimai su Vokietija, Lenkija ir Danija. Dalyvavimas mainuose labai žemas, nepaisant aukšto konkursinio kai kurių programos studentų balo.

Absolventai pagal savo gebėjimus yra pasirenkę dirbti tarptautinėje darbo rinkoje. Gabiausieji absolventai gali pasirinkti išlyginamąsias studijas ir stoti į magistrantūrą. Maždaug 10 proc.

absolventų sėkmingai įsidarbino užsienio kelių statybos įmonėse. Apskritai rekomenduojama keisti programą, kad į absolventų gebėjimus būtų įtrauktas stiprios kelių saugumo kultūros ugdymas.

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

Programą valdo Statybos inžinerijos katedra, kuri yra viena iš dviejų Statybos inžinerijos fakulteto katedrų. Studijų programą tradiciškai įgyvendina ir koordinuoja Statybos inžinerijos katedros vedėjas. 2011 m. iš katedros vedėjo pareigų pasitraukus ilgametę didelę patirtį turinčiam asmeniui, ypač rekomenduojama vadovavimą programai patikėti kelių inžinerijos ekspertui. Todėl rekomenduojama Statybos inžinerijos katedros vedėjui peržiūrėti Studijų programos komiteto pirmininko pareigas ir paskirti asmenį, turintį didelę patirtį kelių inžinerijos srityje ir dėstantį pagrindinį programos modulį. Taip pat atsižvelgiant į faktą, kad ši profesinio kelių inžinerijos bakalauro kvalifikacinio laipsnio studijų programa yra vienintelė Lietuvoje, rekomenduojama toliau stiprinti ryšius su Lietuvos automobilių kelių direkcija prie Susisiekimo ministerijos, įtraukiant direkcijos atstovą į Studijų programos komiteto sudėtį.

Socialiniai dalininkai svariai ir veiksmingai dalyvauja keliuose lygmenyse. Dialogą tarp kolegijos ir darbdavių ypač palaiko nuolatiniai ryšiai su praktikos vietas siūlančiomis sertifikuotomis įmonėmis ir dalyvavimas kvalifikacijos komisijos veikloje. Ekspertų grupė pastebėjo didelį darbdavių, su kuriais grupei teko susitikti vizito į kolegiją metu, pasitenkinimą programa. Studentai programoje dalyvauja per apklausas ir grįžtamojo ryšio procesą, iš kurių matyti, kad pokyčiai vykdomi atsižvelgiant į studentų nuomones.

Vykdomas į klientą orientuotas kokybės užtikrinimo procesas.

### **III. REKOMENDACIJOS**

1. Rekomenduojama veiksmingiau pateikti studentams kiekvieno modulio numatomus studijų rezultatus išplečiant modulių aprašų turinį ir susiejant su programos studijų rezultatais. Reikėtų išplėsti numatomų studijų rezultatų formuluotę, kad būtų aiškiai išdėstyta, ką studentai gebės baigę modulį.

2. Rekomenduojama apsvarstyti pasiūlymą, kad mokymasis per praktiką galėtų būti stiprinamas įtraukiant pažintinę praktiką po pirmojo kurso vasarą. Studijų rezultatai galėtų būti orientuoti į fundamentaliųjų inžinerijos principų suvokimo ir aktualumo stiprinimą. Tačiau

praktinio mokymo nereikėtų pernelyg sureikšminti, nuvertinant mokymosi visą gyvenimą vertę, kurią suteikia teorinės medžiagos studijos.

3. Ypač rekomenduojama išplėsti modulius, susijusius su gruntų mechanika. Reikia pridėti privalomus geotechnikos pagrindų studijų rezultatus (šlaitų stabilumas, pamatai ir atraminės konstrukcijos), kiek jie susiję su darbais, kuriuos absolventams gali tekti organizuoti arba prižiūrėti statybose.

4. Programą galima sustiprinti padidinus darbuotojų, turinčių daugiau nei 3 metų darbo kelių inžinerijos įmonėse ar kelių eismo institucijose patirties, skaičių. Tą galima pasiekti priimant naujus darbuotojus arba per dėstytojų stažuotes.

5. Rekomenduojama imtis priemonių stiprinti darbuotojų karjeros vystymo galimybes, kalbant apie judumą.

6. Rekomenduojama pagerinti vėdinimo sistemą pagrindiniame pastate, kad patalpų oro kokybė būtų priimtino lygio, ypač kai pradės veikti naujai įrengtos laboratorijos patalpos ir bus atliekami bituminių mišinių bandymai.

7. Rekomenduojama imtis priemonių, siekiant sumažinti nubyrijimo skaičių; galbūt peržiūrėti priėmimo kriterijus ir pridėti papildomų teorinių dalykų užsiėmimų, ypač pirmame kurse.

8. Pagrindinis programos tikslas turėtų būti prisidėti prie didesnio kelių eismo saugumo. Reikėtų skatinti vystyti absolventų kelių eismo saugumo kultūrą įtraukiant šį aspektą į visus dalykus, kur įmanoma ir tinkama.

9. 2011 m. iš katedros vedėjo pareigų pasitraukus didelę patirtį turinčiam asmeniui, ypač rekomenduojama vadovavimą programai patikėti kelių inžinerijos ekspertui. Todėl rekomenduojama Statybos inžinerijos katedros vedėjui peržiūrėti Studijų programos komiteto pirmininko pareigas ir paskirti asmenį, turintį didelę patirtį kelių inžinerijos srityje ir dėstantį pagrindinį programos modulį.

10. Rekomenduojama toliau stiprinti ryšius su Lietuvos automobilių kelių direkcija prie Susisiekimo ministerijos, įtraukiant direkcijos atstovą į Studijų programos komiteto sudėtį, taip pripažįstant šios studijų pakopos lygmens programos unikalumą Lietuvoje.

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