STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

KAUNO TECHNOLOGIJOS UNIVERSITETO

PROGRAMOS *CHEMIJOS INŽINERIJA* (621H81004) VERTINIMO IŠVADOS

EVALUATION REPORT OF *CHEMICAL ENGINEERING* (621H81004) STUDY PROGRAMME

AT KAUNAS UNIVERSITY OF TECHNOLOGY

Grupės vadovas: Tekam Leader:	Prof. Michel Andre Troquet
Grupės nariai: Team members:	Prof. Jan Lundell Prof. Carlos Nieto de Castro Giedrius Mažūnaitis Kristina Daniūnaitė

Išvados parengtos anglų kalba
Report language - English

Vilnius
2014

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	**Chemijos inžinerija**
Valstybinis kodas	621H81004
Studijų sritis	Technologijos mokslai
Studijų kryptis	Chemijos ir procesų inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2)
Studijų programos apimtis kreditais	120
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Chemijos inžinerijos magistras
Studijų programos įregistravimo data	2011-09-01

INFORMATION ON ASSESSED STUDY PROGRAMME

Name of the study programme	**Chemical Engineering**
State code	621H81004
Study area	Technological Sciences
Study field	Chemical and Process Engineering
Kind of the study programme	University studies
Level of studies	Second
Study mode (length in years)	Full-time (2)
Scope of the study programme in credits	120
Degree and (or) professional qualifications awarded	Master of Chemical Engineering
Date of registration of the study programme	2011-09-01

CONTENTS

CONTENTS 3
I. INTRODUCTION 4
II. PROGRAMME ANALYSIS 6
1. Programme aims and learning outcomes 6
2. Curriculum design 8
3. Staff 9
4. Facilities and learning resources 10
5. Study process and student assessment 11
6. Programme management 14
III. RECOMMENDATIONS 16
IV. SUMMARY 18
V. GENERAL ASSESSMENT 19

I. INTRODUCTION

The external assessment of the study programme *Chemical Engineering* (state code - 621H8004) of Kaunas University of Technology (hereafter KTU) was initiated by the Centre for Quality Assessment in Higher Education of Lithuania (SKVC) nominating the external assessment expert group formed by Professor Michel Troquet (Blaise Pascal University of Clermont-Ferrand, France - team leader), Professor Jan Lundell (University of Jyväskylä, Finland), Professor Carlos Nieto de Castro (University of Lisbon, Portugal), stakeholder representative Mr. Giedrius Mažūnaitis (The Association of Lithuanian Chemical Industry Enterprises, Lithuania) and student representative Ms. Kristina Daniūnaitė (PhD student, Vilnius University, Department of Botany and Genetics, Lithuania).

The evaluation of the study programme *Chemical Engineering* (state code - 621H8004) made use of the legal and regulatory information, and methodological guidelines provided to the Expert Team by the SKVC, as well as the Self-Evaluation-Report (SER) prepared by the assessed unit.

The basis for the evaluation of the study programme (hereafter, the programme) is the Self-Assessment Report, written in September 2013, its annexes and the site visit of the expert group to Vilnius University (hereafter, the University) on 26th February 2014. The visit incorporated all required meetings with different groups: the administrative staff of the Faculty of Chemical Technology, staff responsible for preparing the Self-Evaluation Report (hereafter the SER), teaching staff, students representing all years of programme action, alumni, and social partners. The expert group inspected various support services (classrooms, laboratories, library, computer facilities), examined students' final works, and various other materials.

After discussions and preparations of conclusions and remarks, the Expert Team presented introductory general conclusions of the visit to the administration and self-assessment teams. After the visit, the group met to discuss and agree the content of the report, which represents the members' consensual views.

KTU is one of the leading universities of technological studies and research in the Eastern Baltic. Vision of the University - a leading European university with knowledge and technology development and transfer based activities.

KTU mission is to provide research-based studies of international level, to create and to transfer knowledge and innovative technologies for sustainable development and innovative growth of the country, to provide an open creative environment that inspires leaders and talented individuals. Scientists of the University carry out 70% of country's higher education researches for business. The implementation of the study programmes conforms to the requirements of the European higher education.

All over the world, it is recognized that the development of chemical and related industries is possible only through application of sustainable chemistry principles. Enterprises of the Lithuanian chemical industry in collaboration with national and international experts developed a Technological Platform for Sustainable Chemistry, providing a long-term strategy for Lithuanian chemical industry, research and experimental development. Lithuanian chemical industry remains the main Lithuanian industry in terms of turnover and holds a significant part of international markets in such areas as fertilizers, plastics and petroleum products.

According to the SER, among the factors hindering the more rapid economic growth of the chemical industry in Lithuania it was identified the shortage of skilled labour, determined by excessive theoretical knowledge of graduates and training of new professionals with insufficient consideration of industry needs. This master degree was developed to increase the interface with industry, trying to meet industry demands in the area of chemical engineering, not forgetting the existing need of highly skilled professionals for research laboratories. Now the students have the option to specialize in the areas of fertilizers, silicate materials, textile, polymer, paint, fur, oil, biotechnology, and environmental protection.

KTU is the only university in Lithuania which trains Masters in Chemical Engineering.

The second-cycle study programme Chemical Engineering (120 ECTS) is provided by the Faculty of Chemical Technology, one of the 13 Faculties. The following departments take part in the implementation of the Programme: Department of Organic Chemistry, Department of Organic Technology (now Polymer Chemistry and Technology), Department of Environmental Engineering (now Environmental Technology), Department of Silicate Technology, and Department of Physical Chemistry (now Physical and Inorganic Chemistry). Several other Departments from other Faculties have also contributions, like the Departments of Ergonomics,

Electrical Engineering, Process Control, Quality Management, Business Economics and Graphics Drawing.

The aims of the programme are the training of highly-skilled Masters in chemical engineering

a) who have gained a deep theoretical and practical knowledge in chemical engineering and technology;
b) acquired research skills;
c) are able to formulate problems in chemistry science and industry and solve them on the basis of the newest achievements in chemistry and chemical engineering;
d) are able to work at the chemical production companies and design enterprises;
e) are able to create and develop their own chemical production business;
f) are able to effectively collaborate and communicate in the native and foreign language, make, analyse and implement decisions.

The course complements the first cycle in Chemical Technology and Engineering of the same university (240 ECTS).

The last accreditation of the second-cycle study programme Chemical Engineering was accomplished in 30-06-2011. Since 01-09-2011, the study programme Chemical Engineering has been implemented and functioned since 2011/2012 with 40 + 20+24, having produced 36 Master degrees.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

The aims of the programme correspond to the requirements of institutional, state and international requirements, as well as conjunct with the KTU values of Master level studies offered. The programme is well defined in its outcome and reflects in a broad sense the overall pedagogical motivation of training skilful and self-sufficient experts in the programme's field.

The programme aims are well-defined and they relate to the type and cycle of studies and the purpose of the programme in the area of Chemical Engineering, at the second cycle level and it is comparable with most Chemical Engineering Master courses in Europe. It meets legal requirements, as it was formulated on the basis of normative documents of the Republic of

Lithuania and the Bologna Process [Guides from Eurashe - European association of institutions in higher education].

The programme has 66% of credits in the core curriculum and 34% for additional specialization and broadening, in accordance with the Dublin descriptors, its aims and learning outcomes are well defined, clear and publicly accessible, and communicated on University webpage, and communicated to stakeholders via mutual meetings and dissemination of printed information. The learning outcomes were grouped into the following categories: knowledge and understanding, engineering analysis, engineering design, investigation, engineering practice and transferable skills, according to the EUR-ACE Framework Standards. They are consistent with the type and level of studies and the level of qualifications offered and follow what is comparatively asked for a Chemical Engineering Master degree at well recognized universities worldwide.

The programme is student oriented; the aims are targeted to build the capabilities of the students and it provides the professionals with adequate skills (theoretical, experimental and computational) for chemical and related industries, especially in Lithuania. This was clearly stated by the social partners during the site visit. Learning outcomes are very well focused on public needs. The SER introduced transferable skills within the programme, which appear to be beyond the training profile with targets set to a level not practical for Master level studies as the programme here. Such targets are especially "*function effectively as leader of team that are composed of different disciplines and levels*". This is clearly aiming at leadership capabilities which are not catered for in the programme – and on European level which could be introduced at the first stage on the post-graduate level of training. Moreover, "*work and communicate effectively in national and international contexts*" are aiming very high and it is unlikely that any student reaches this level. Furthermore, such learning outcome is very difficult to measure, since there is no straightforward way of setting measures for *effective* performance.

The study programme is reviewed at the meeting of the Study Programme Committee (hereafter – SPC) of the Faculty of Chemical Technology, coordinated by the Dean of the Faculty. Its composition and formation of is not specifically described in the SER. However, industry people are involved, as clarified by the meetings with ex-alumni and employees. The composition, activities and functionality in conjunction of other academic bodies would warrant a more efficient planning and administration of the programme.

The integration of the different subjects (disciplines) is discussed every year and necessary changes are implemented. Students make surveys, during which the content of study subjects, methods of delivery, as well as teacher's competences are assessed. Opinions and suggestions expressed by social and industrial partners (potential employers) make an important role in the development of the study Programme.

2. Curriculum design

The programme meets legal requirements and general university requirements covering obligatory and optional study fields in basic and expanded subject knowledge and specialized professional education. The curriculum design is broadly based at the first year of studies, followed by progressive complexity in the second year of study programme. Finally the curriculum leads to specialized professional education subjects on technological and industrial-related focusing on hands-on research training in research laboratory.

The study Programme Chemical Engineering consists of: Core and Compulsory Subjects – 84 ECTS points (70 % of total volume of the studies); Research Project – 6 ECTS points (5 % of total volume of the studies) and Final Degree Project – 30 ECTS points (25 % of total volume of the studies). Studies are organized in semesters (4); duration of one semester is 16 weeks. Semester load is 30 ECTS. The contact hours vary from 20-24 hours in the first semester, decreasing gradually to none in the fourth semester (Final Degree Project). This corresponds to an organization which is in accordance with the Bologna documents for 2nd cycle courses.

Study subjects (disciplines) are spread evenly, their themes are not repetitive. The content of the subjects is consistent with the type and level of the studies, as demonstrated by the detailed curricula and SAR Annexes. It includes traditional and new areas, like Biotechnology and Environmental Protection, which indicate a constant revision of the programme.

The scope of the programme is sufficient to ensure learning outcomes. However several subjects present in chemical engineering Masters like Instrumentation, Quality, Environment and Safety Management and Prevention, Process Optimization, Heterogeneous Catalysis, Green Technologies, are not explicit as disciplines (names and contents) and not compulsory. In addition, Innovation and Technology Transfer, as well Entrepreneurship, are also not visible. As an example Design of Chemical Industry Enterprises (T230M121), Risk of Chemical Industry Processes (T350M102) Engineering Economics (S185M005) and Technological Process Control

(T125M015) are electives of the course, but not compulsory, so a student can choose a path without having learned them. Modelling and Analysis of Processes (T350M106) is compulsory but presents a challenge to include all the content (according to the course description) in the awarded 6 credit points with respect to the probable amount of work and engagement of students.

With a strong research in Polymers, not many courses about plastics, thermosetting polymers and elastomers, reflecting the industry in Lithuania (PE, PET, PU, etc…) are given. This should be improved and could have a drastic upscale when collaborated with industrial partners.

The content and methods of the subject are appropriate for the achievement of the intended learning outcome. They reflect to a great extent, the latest achievements in science and chemical technologies. There is a strong connection with industry. Good practice outdoors can define a more useful Master thesis. There is a need of making modules more efficient, from a learning point of view. For example a variety of teaching methods, like group working and pre-defined innovation themes in laboratory are suggested. The inclusion of these subjects will improve the quality of the degree. These actions clearly have a positive impact in pursuing for more efficient achievement of learning objectives.

The content of the programme is modern, the teaching staff trying to reflect the latest achievements in science and technology, explained at an adequate level for the course. The inclusion of a strong interaction of the students with research in chemical engineering areas, promoting their participation in international conferences also guaranties a good connection with the real scientific and technical world.

3. Staff

The teaching staff has all legal requirements of teacher training and are adequate to ensure, with quality, the learning needs of the students. Its selection is based on their research activities and/or professional experience is in accordance with the taught subject. 38 teachers participate in the programme. In the first three years, a total of 84 (1st year) + 58 (2nd year) = 142 students (around 170-200 students in full operation in 2014/2015), gives a ratio teacher/student around 1:5, a very good value within European standards for Master courses.

A high percentage of the teaching staff is involved in research in Chemical Engineering Science and Technology, and their applications to materials, environment and energy, very appropriate to the course syllabus. They are heavily involved in the student assessment, accompanying very closely the student learning process. The average publication rate (ISI journals) is good (2 papers/year/staff member) (for a 5 year period), although it is much higher than this average for given members of staff. The distribution of staff's performance in scientific activity is, however, very broad. Some members of staff (around 6) have very low scientific production (< than 0.4 papers/year/staff member), a fact that should not be overlooked and corrected.

KTU creates very good conditions for professional development of the teaching staff expressed by the infrastructure (i.e. library, offices and laboratories) and working environment, i.e. collaboration and scientific mentoring. The facilities are very adequate for personal development and Faculty actions give also opportunities to pursue individual scientific paths. Moreover, there exist Faculty-wide activities in support of complementary pedagogical techniques for education, as the staff has the opportunity for voluntary university pedagogical training. There exists also internationalization support in the form of opportunities to visit foreign countries, and the Faculty encompasses good contacts with the stakeholders, namely chemical and associated industries companies, which create opportunities of industrial collaboration. The average age of the teaching staff is lower than 50 years, which can be taken as a good sign of a young and dynamic group. In the upcoming few years the situation of staff turnover is not alarming, but in the long run there will be a Faculty-wide need for strategies and measures. The Expert Team also notes that there is a need to step up the employment Information and Communication Technologies (ICT), which could have a profound impact of training and research in the upcoming years. This needs to be connected with Faculty level strategies of education, research and staff competence enhancements.

The number of technical staff that provides laboratory technical support in the main supporting Departments (Physical Chemistry, Organic Chemistry and Organic Technology) is adequate.

4. Facilities and learning resources

The laboratories are equipped with operative and safe laboratory equipment, and supported by maintenance, continuous improvement and modernization. Several laboratories are very new (a good asset for programme development), and present and future students can obtain a better understanding about the Chemical Engineering processes. Two specialized Chemical

Engineering Laboratories are equipped with several pilot plants and momentum, heat and mass transfer units (a total of 14). Another laboratory has two Chemical reactors (batch, with pressure or vacuum).
The software used in the technological (engineering) studies, is focused on engineering calculations, modelling, automated design, and laboratory work. A special room for process simulation, with computers equipped with software was shown. All these facilities demonstrate a correct implementation of the necessary tools for graduate learning in Chemical Engineering. During the meetings with representatives of the companies, it was said that industry is open to many types of collaboration and therefore their support must be explored.

The auditoriums are adequate and well equipped. Library and reading/methodological rooms are sufficient and adequate, and well equipped with books, monographs and journals. The material available to the students seems adequate and accessible, but the description of printing facilities raises some questions about copyrights. The access by the students to foreign electronic databases is very good. Wi-Fi and broadband Internet connections are available through all area of the Faculty.

The higher education institution has adequate arrangements for "in-house" students' practice in the referred teaching and research laboratories. However good practice outdoors, already existing with several companies, act as good practises that could be used to improve activities throughout all the programmes within the Faculty.

In summary, the facilities and learning resources have very good quality and adequate, to a greater extent, to the subject and level taught.

5. Study process and student assessment

The admission requirements are the Bachelor's degree in chemistry or chemical engineering or their equivalent. This admission requirements are well-founded, and equivalent to European standards.

The selection of students is made on a competitive basis, taking into account: 1) grades of the subjects listed in the annex of the Bachelor's diploma; 2) results of the scientific research work carried out during the first-cycle studies. Within the next coming years, the Study Programme Commity should obtain information for the yearly application pressure (total number of

applicants), compare it with the annual intake, in order to analyse better the impact of the actual courses within the programme, with respect to the needs of the Lithuanian society. From the results presented on average entrance points of candidates as quoted in the SER, it is clear that students with low level scores are admitted. The entrance with low entrance scores possess a challenge for the students to manage and succeed in the programme, since it could turn out to be hard to elevate the lacking starting content knowledge competences within a challenging study programme. Therefore, there seems to be a need for enhanced recruitement strategy to attract higher level candidates into the programme. This affects also the recruitement strategies for the lower level Bachelor studies, and a common policy for the two subsequent programmes is advisable to ensure best possible students into the study programmes.

Studies include 16 weeks in 2 semesters. The number of contact hours per day is very high (up to 8h and 36 academic hours per week), which does not leave enough time to student work on his/her own, which is also highlighted by the Bologna Process. This point must be revised, trying to avoid more than 6 hours a day, on a 5-day week in order to allow personal study time outside classes, and to allow flexibility of extracurricular activities of the students. . The organization of the study process (for example, timetables, lecture durations, self-study assignments and homework) ensures an adequate coverage of the programme and the achievement of the prie-defined learning outcomes. Case studies related with the Lithuanian industry will be very useful to understand the reality of the country.

Students are encouraged to participate in scientific and applied research activities, which represents a very favourable approach in seeking of highly desirablee learning methodologies. However, the weekly working load is too high to ensure effective study possibilities, and the net result of this has a consequence of a lesser performance than targeted for. Also, student training should not be concentrated only in one particular research environment and subdiscipline of research, but a wider exposure would benefit capability building in a larger extent.

Students have opportunities to participate in student mobility programmes, namely ERASMUS and can go to study to any country participating in the programme for the period of 3–12 months, teachers to the internships – for 1–2 weeks, and to deliver lectures – for 1–6 weeks. However, there is a problem in accepting the courses taken abroad as part of the student programme, which demotivates the students for such programmes. Measures must be taken to overcome this problem.

The University/Faculty provides a strong academic (information of all kinds, consultation in private and in group, methodological publications, etc) and social support (a varied scholarship scheme) to the students. According to the students interviewed, there are opportunities of extracurricula activities, but these are time-restricted by heavy study load in the programme.

The assessment system of students' performance is clear, adequate to the programme and publicly available. On the other hand, the overall programme appears very heavy, asking for a continuous and exigent assessment. Following the information obtained in the SER and the comments received by the Expert Team during interviews, it is clear that the students are permanently under evaluation. The percentage of their time in curricular tasks exceeds 40 % of all time consumed in the programme. This indicate surprisingly small amount of time to student self-work, and has a negative impact on their learning as the programme is also directed to highlight problem-solving skills in a research environment.

The final degree project assessment is very exigent, and the students reach very high marks (in 2012/2013, 75% were graded 10, 16.7% graded 9 and the rest (8.3%) graded 8. This result seems exceptional, demonstrating the high exigency for these last 30 credits. Faculty wide evaluation criteria especially for the Master thesis would enhance transparency of the Quality Assurance system and justify better these high achievements.

The subjects of the Master thesis cover a wide range of matters in chemical engineering, 25% of them being realized in companies, outside the academic environment. This number should be increased substantially in the upcoming years to answer the needs and developments in the industry.

The graduate placement is also greatly dominated by company employment (78%), complemented by third cycle (doctoral) studies (22%). Quoting the self-assessment report, the majority of the graduates had job proposals from various industrial enterprises already at the end of their Master's studies". This is a sign of that the competences and knowledge of the graduate meets the programme providers and industrial companies expectations.

Most of graduates are employed according to the speciality or choose to study at the third level programmes at the Faculty of Chemical Technology, which indicates that students are satisfied with their education at KTU. This was supported by the interviewed students as well. Alumni interviewed indicated that the training they received have been adequate and useful for their employment in industry. This was confirmed by social partners as well, even though they

expressed some concerns on missing skills related to industrial research and development environment, like safety, legislation and standards.

The overall impression is that the study process and student assessment are on a very good level.

6. Programme management

Study programme is managed by the Study Programme Committee (SPC), but the relations with the diverse levels of responsibilities of the Faculty (Head of Department, Vice Dean of Academic Affairs, Coordinator of studies…) is not crystal clear for the expert panel after SER and interviews.

Based on initiatives from staff, the course activities may be changed up to 20% of the previous without recourse to SPC or Faculty level and above. However, if learning outcomes or requirements are changed, it needs approval from SPC and above. Interviewed teachers also indicated that even though the teacher can make changes in a teaching module; this is usually discussed with program coordinator, the SPC and the Head of Department in an informal manner. There is no evidence for assessment of the changes decided by teachers on the SPC or Faculty level.

Employers interviewed during the review confirmed that they had informal input via personal contacts with the Faculty members and into the study programme via a member on the SPC. The Master Thesis projects often involve industrial partners. These forms of interaction productively enhance this dialogue with employers. Based on the interviewed employers there is no systematic way of communication of assessment requirements of Master Thesis projects.

Based on the self-evaluation report, the course is regularly monitored (annually), and information and data on the implementation of the programme are collected and analysed. At the end of each semester a questionnaire must be filled by the students, focussing the most important points of the quality assessment. However, there is no evidence of systematic data collection, except this student feedback – and even then the return percentage of answers is generally low. Data on continuous improvement must base the implementation and correction of non-conformities in the study process that were found necessary. As the programme is very recent only internal evaluations have been done, but any outcome seems to have been used for its improvement.

There is progress going on at the University level Quality Assurance (QA). The outcomes are not yet well implemented at the Faculty level. There is not a complete awareness by the administrative or teaching staff about its utility, since the KTU general QA system is very new. Implementations of the general QA requirements and practices are still to be implemented on the Faculty and Department levels. Moreover, since the preceding Bachelor programme and the discussed Master programme are managed by the same personnel and taught by the same teachers, the similarities between the two programmes are obvious in programme management. On the other hand, the larger extent of research work in Master programme can rely on more self-directivity of students towards the end of their studies. In general, both consecutive programmes should be seen as a continuous training scheme with similar challenges of realising the programmes but with different biases on the depth of learning targets.

The evaluation and improvement processes involve stakeholders into a large extent. Cooperation with the future employers is implemented through the annual KTU ‘Career Days‘, practices and seminars by and for the staff of enterprises, University and Faculty.

III. RECOMMENDATIONS

1. Enhance the transparency of Quality Assurance. Develop a mechanism for raising staff teaching skills to include, amongst other things, peer evaluation of staff teaching and annual evaluation of staff teaching. Implement a transparent assessment system for Master Thesis projects. Align assessment methods in general to reflect the learning outcomes, teaching and learning methods in order to develop a more profound feedback on all aspects of the study program

2. Enhance the student-centred enquire based practical training at the Master level, and employ the stakeholders in the decisions making, assessment and curriculum design activities to a greater extent. Revise and create common practices for collaboration and involvement. Upscale information delivery and outreach towards employers and stakeholders on the programme values, aims, practices and outcomes.

3. Enhance cross-research group activities in order to broaden the skills and capabilities of students. The enhancement of practical skills was highlighted by all participants of the evaluation, and laboratory-related, inquiry-based with more industrial and novel research can be used to step up the training programme efficiency with respect to the employer's needs.

4. It is noted by the Expert Team that the duration of the Bachelor studies is four years, which is not in sync with most of the European countries (three years). This disjunction could be disfavor the international exchange programmes and could introduce a misunderstanding on the profile of skills of the graduates, as well as causing the programme graduates an impeccable time lag compared with their European peers.
However, the Expert Team acknowledges that this is due to National regulations in Lithuania, and thereby it can't be affected by KTU alone. As this is presented here as a suggestion, this is something that should be recommended for the Ministry of Science and Education in modifying the Lithuanian science training into the mode of the European research Area.
On the assessment target here, merging of the Bachelor study programme (in Chemical Technology and Engineering, 612H81001) with this Master study programme in Chemical Engineering (621H8004) in an Integrated Master in Chemical Engineering of 5 years, thereby replacing the actual 4+2 organization, would benefit the administration, curriculum development, pedagogical development, content and enhance the learning possibilities of this unique training now offered in Lithuania – and appreciated and needed by the surrounding society.

5. Increase the percentage of Master thesis developed in industrial environment within the next 3 years. This appears to be a very good practise which also benefits the students in finding employment after graduations as well as developing the research targets and environment at the University.

IV. SUMMARY

The programme aims and learning outcomes are well defined and student oriented. The consideration of the opinions and the suggestions of the stakeholders during the annual revisions is a positive point. It allows a continuous update of the programme and guarantees a good professional integration. The faculty has to pursue the implementation of the tools of the quality assurance.

The scope of the programme is sufficient to ensure learning outcomes. However, several subjects present in Chemical Engineering are not taught or are simply elective. A deeper reflection to refocus the study programme on the Chemical Engineering is imperative.

The teaching staff is important and a high percentage of them is involved in research in Chemical Engineering Science and Technology but there is strong disparities and a strategy in medium-to-long term human resources management must be implemented. In counterpoint the renovation of premises and learning resources is remarkable.

The internationalization of the programme should be a priority for the future; the international exchanges are still too timid. The mobility of the students must be encouraged, made even compulsory as it is the case in numerous European countries at the level Master's degree.

V. GENERAL ASSESSMENT

The study programme Chemical Engineering (state code – 621H81004) at Kaunas University of Technology is given **positive** evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	3
2.	Curriculum design	3
3.	Staff	3
4.	Material resources	4
5.	Study process and assessment (student admission, study process student support, achievement assessment)	3
6.	Programme management (programme administration, internal quality assurance)	3
	Total:	**19**

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

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

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

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

Grupės vadovas: Team Leader:	Prof. Michel Andre Troquet
Grupės nariai: Team members:	Prof. Jan Lundell Prof. Carlos Nieto de Castro Giedrius Mažūnaitis Kristina Daniūnaitė

KAUNO TECHNOLOGIJOS UNIVERSITETO ANTROSIOS PAKOPOS STUDIJŲ PROGRAMOS *CHEMIJOS INŽINERIJA* (VALSTYBINIS KODAS – 621H81004) 2014-06-16 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-341-4 IŠRAŠAS

<...>

V. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijos universiteto studijų programa Chemijos inžinerija (valstybinis kodas – 621H81004) vertinama **teigiamai**.

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

* 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

Programos tikslai ir studijų rezultatai yra gerai apibrėžti ir orientuoti į studentą. Teigiamas dalykas, kad per metines peržiūras atsižvelgiama į socialinių dalininkų nuomonę ir pasiūlymus. Tai leidžia nuolat atnaujinti programą ir užtikrina gerą profesinę integraciją. Fakultetas turi įgyvendinti kokybės užtikrinimo priemones.

Programos apimtis yra pakankama studijų rezultatams pasiekti. Tačiau keletas Chemijos inžinerijos programos dalykų nėra dėstomi arba yra tiesiog pasirenkamieji. Būtina giliau atspindėti ir perorientuoti studijų programą į chemijos inžineriją.

Dėstytojai yra svarbūs ir didelis jų procentas dalyvauja chemijos inžinerijos mokslo ir technologijų moksliniuose tyrimuose, bet yra dideli neatitikimai, todėl būtina įgyvendinti vidutinės trukmės ir ilgalaikę žmogiškųjų išteklių valdymo strategiją. Tačiau svarbu pažymėti, kad patalpos ir metodiniai ištekliai yra atnaujinti.

Programos tarptautiškumas turi tapti prioritetu ateityje; tarptautiniai mainai vis dar pernelyg nedrąsus. Būtina skatinti studentų judumą ir padaryti net privalomu, kaip tai daroma daugelyje Europos šalių studijuojant magistrantūroje.

III. REKOMENDACIJOS

1. Stiprinti kokybės užtikrinimo skaidrumą. Parengti personalo dėstymo įgūdžių tobulinimo mechanizmą ir, be kitų dalykų, įtraukti dėstytojų kolegų įvertinimą ir personalo metinį vertinimą. Įgyvendinti skaidrią magistro baigiamųjų darbų vertinimo sistemą. Suvienodinti vertinimo metodus apskritai, kad būtų atspindėti studijų rezultatai, mokymo ir mokymosi metodai, siekiant sukurti įžvalgesnę visų studijų programos aspektų grįžtamojo ryšio sistemą.

2. Didinti į studentą orientuotą, tyrimais grindžiamą praktinį mokymą magistro lygmeniu, socialinius dalininkus labiau įtraukti į sprendimų priėmimo, vertinimo ir programos sandaros rengimo procesus. Persvarstyti ir sukurti bendrą bendradarbiavimo ir dalyvavimo tvarką. Pagerinti informacijos pateikimą ir informuoti darbdavius ir socialinius dalininkus apie programos vertybes, tikslus, praktikas ir rezultatus.

3. Plėsti skirtingų mokslinių tyrimų grupių veiklą, siekiant gerinti studentų įgūdžius ir gebėjimus. Visi vertinimo dalyviai akcentavo, kad reikia tobulinti praktinius įgūdžius, skatinti laboratorijoje atliekamus ir tyrimais grindžiamus pramonės ir naujus mokslinius tyrimus, galinčius padidinti studijų programos veiksmingumą, atsižvelgiant į darbdavio poreikius.

4. Ekspertai pažymėjo, kad bakalauro studijų trukmė (ketveri metai) skiriasi nuo daugumos Europos šalių studijų trukmės (treji metai). Toks neatitikimas gali būti nenaudingas tarptautinių mainų programoms ir gali lemti nesusipratimus dėl absolventų įgūdžių profilio, taip pat dėl tokios situacijos programos absolventai gali prarasti laiko, lyginant su Europos kolegomis.

Tačiau ekspertai pripažįsta, kad tokią situaciją lemia Lietuvos nacionaliniai teisės aktai, todėl vien KTU išspręsti šio klausimo negali. Kadangi šiame dokumente šis klausimas pateikiamas kaip pasiūlymas, Švietimo ir mokslo ministerijai reikėtų rekomenduoti pakeisti Lietuvos mokslo studijas pagal Europos mokslinių tyrimų erdvės režimą.

Vienas iš vertinimo tikslų – sujungti bakalauro studijų programą (Chemijos technologijų ir inžinerijos (612H81001) su šia magistro studijų programa (Chemijos inžinerija (621H8004) ir sukurti integruotą 5 metų Chemijos inžinerijos magistro laipsnį. Tokiu atveju esamas modelis 4+ 2 būtų pakeistas ir tai būtų naudinga administravimo, programos sandaros rengimo, pedagoginio tobulėjimo, turinio prasme ir pagerintų šių unikalių Lietuvoje siūlomų studijų galimybes. Šis žingsnis būtų įvertintas ir jo reikia visuomenei.

5. Per artimiausius 3 metus reikia siekti padidinti magistro baigiamųjų darbų, rengiamų pramonės srityje, procentą. Tai yra labai gera praktika, kuri naudinga studentams ieškantiems darbo baigus studijas, taip pat plėtojant mokslinių tyrimų tikslus ir aplinką universitete.

<...>

Paslaugos teikėja patvirtina, jog yra susipažinusi su Lietuvos Respublikos baudžiamojo kodekso[1] 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

[1] Žin., 2002, Nr.37-1341.