



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Kauno technologijos universiteto

STUDIJŲ PROGRAMOS *PRAMONINĖ BIOTECHNOLOGIJA*
(valstybinis kodas – 612J70001)

VERTINIMO IŠVADOS

EVALUATION REPORT
OF *INDUSTRIAL BIOTECHNOLOGY* (*state code – 612J70001*)
STUDY PROGRAMME

At Kaunas University of Technology

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Pramoninė biotechnologija</i>
Valstybinis kodas	612J70001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Biotechnologijos
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Pirmoji
Studijų forma (trukmė metais)	Nuolatinė (4), iššęstinė (6)
Studijų programos apimtis kreditais	240 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Biotechnologijos bakalauras
Studijų programos įregistravimo data	Lietuvos Respublikos švietimo ir mokslo ministro 2010 m. lapkričio 16 d. įsakymu Nr. SR-16-01-40.

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Industrial Biotechnology</i>
State code	612J70001
Study area	Technological Sciences
Study field	Biotechnology
Type of the study programme	University studies
Study cycle	First
Study mode (length in years)	Full-time (4), part-time (6)
Volume of the study programme in credits	240 ECTS
Degree and (or) professional qualifications awarded	Bachelor of Biotechnology
Date of registration of the study programme	16 th November 2010, under the Order of the Minister of the Ministry for Education and Science of the Republic of Lithuania No. SR-16-01-40.

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I. INTRODUCTION

1.1. *Background of evaluation process*

The evaluation of on-going study programmes is based on the **Methodology for Evaluation of Higher Education Study Programmes**, approved by the Order No 1-01-162 of 20th December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter, SKVC). Evaluation is intended to help higher education institutions to constantly improve their study programmes and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: *1) self-evaluation and the Self-evaluation Report (hereafter, the SER) prepared by a Higher Education Institution (hereafter, the HEI); 2) a visit of the Review Panel at the higher education institution; 3) preparation of the evaluation report by the Review Panel and its publication; 4) follow-up activities.*

On the basis of the study programme external evaluation SKVC takes a decision to accredit the study programme either for 6 years or for 3 years. If evaluation of the programme is negative such programme is not accredited.

The programme is **accredited for 6 years** if all evaluation areas were evaluated as “very good” (4 points) or “good” (3 points).

The programme is **accredited for 3 years** if none of the areas was evaluated as “unsatisfactory” (1 point) and at least one evaluation area was evaluated as “satisfactory” (2 points).

The programme **is not accredited** if at least one of evaluation areas was evaluated as “unsatisfactory” (1 point).

1.2. *General*

The application documentation submitted by the HEI follows the outline recommended by SKVC. Along with the Self-evaluation Report and Annexes, the following additional documents have been provided by the HEI before and during the site visit:

No.	Name of the document
1.	Programme 'Industrial biotechnology' update
2.	List of local participants in site-visit meetings

1.3. Background of the HEI/Faculty/Study field/Additional information

Kaunas University of Technology (hereafter, KTU) has a deep tradition in the field of technology studies. The University has evolved from the Higher Education Courses established in 1920. KTU has 9 faculties, a library, 10 research institutes and departments of administration and support. The academic staff consist of 2,413 employees, including 184 professors, 438 associate professors and 440 research fellows. Currently 7,895 bachelor students, 2,648 master students, and 352 doctoral students are enrolled at KTU, of which 566 are foreign students. At KTU the results of fundamental and applied research are integrated into the study process. The mission of KTU is to provide research-based studies at international level, to create and to transfer knowledge and innovative technologies for the sustainable development and innovative growth of the country, to provide open-minded creative environment inspiring leaders and talented individuals, and to be a leading European University within knowledge and technology development and transfer-based activities. KTU offers 64 bachelor programmes, 69 master programmes, 17 doctoral programmes and 1 non-degree study programme, of which 39 are taught in English. KTU conducts studies in Technological, Physical and Social Sciences, Arts, Humanities and Biomedicine.

The BSc programme *Industrial Biotechnology* is provided by the Faculty of Chemical Technology. The Department of Organic Chemistry is in charge of bachelor level studies. The programme was accredited on December 2, 2010. The implementation of the study programme was started September 1, 2011. The previous external evaluation was performed in 2013. The study programme was accredited for three years. KTU also offers a master's programme in *Industrial Biotechnology*.

KTU describes that 'Industrial biotechnology is the contemporary application of biotechnology for sustainable production of biochemicals, biomaterials, and biofuels. Industrial biotechnology includes the employment of biotechnological processes in industrial production and plays an important role as a cutting-edge cross-sectional technology in several industries due to its innovativeness and systematic growth'.

KTU has internally evaluated the BSc programme in *Industrial Biotechnology* in the SER prepared in January, 2016. The basis for the evaluation of the study programme is the SER, its annexes, and the site-visit of the Review Panel to KTU on May 11, 2016. The site-visit included meetings with senior management and faculty administration, staff responsible for the preparation of the SER, teaching staff, students, alumni, employers and social partners as well as

a tour on the premises at KTU (visits to classrooms, lecture halls, the library, and a number of laboratories). While the SER is not always clear, partly because it is unnecessary long and written in a font too small to facilitate a smooth reading process, the site-visit was informative and very well-organised.

1.4. The Review Panel

The Review Panel was composed according to the *Description of the Review Team Member Recruitment*, approved by the Order No 1-01-151, 11/11/2011 of the Director of the Centre for Quality Assessment in Higher Education. The site visit to the HEI was conducted by the Panel on 11/05/2016.

1. Prof. Halina Gabryś (Chair of the Team)

Professor at Jagiellonian University, Poland.

2. Prof. Ruth Shimmo

Professor at Tallinn University, Estonia.

3. Assoc. Prof. Niels Thomas Eriksen

Associate Professor at Aalborg University, Denmark.

4. Mr Julius Gagilas

Managing Director at JSC "Diagnolita", Lithuania.

5. Ms Vaida Šidlauskaitė

Doctorate candidate at Lithuanian Sports University (Biology field), Lithuania.

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

The aims and the intended learning outcomes of the BSc study programme in *Industrial Biotechnology* are publicly available on the University's website at www.ktu.edu/lt and in the information system AIKOS.

The aim of the programme is to educate Biotechnology Bachelors with basic competences in Biotechnology and Engineering coherently associated with the relevant knowledge in the field of Fundamental Sciences, who shall be capable to solve practical tasks in Biotechnology, to choose the appropriate equipment and to design technologies independently, to integrate business and management knowledge and to be able to apply knowledge and innovative technologies in Bio-industrial areas, to maintain lifelong learning. In the opinion of the Review Panel, it is quite ambitious for a bachelor level. For example, independent design of technology requires a deep knowledge of a great number of up-to-date technologies which is difficult to reach at BA level. The major emphasis of the aim is on Technology while Biology at a fundamental level is given too little attention for a Biotechnology programme. BA students of Biotechnology programmes should have a sound knowledge of Biology. The intended learning outcomes described in the SER are detailed and cover well the fields of Chemistry and Engineering. However, Biological disciplines, e.g. Systems Biology, Plant Biology, Protein Chemistry are underrepresented. The recommendation of the Panel is to expand the intended learning outcomes by including Biological disciplines. At present, the programme aims, intended learning outcomes and the programme content are not fully consistent with the programme name.

The aims and the intended learning outcomes seem to meet the needs of Lithuania as well as of the larger (European) market which is demonstrated by the willingness of companies (e.g. Aconitum, ThermoFisher Scientific, Lithuanian Energy Institute, Energenas etc) and social partners, like The Lithuanian Research Centre for Agriculture and Forestry to provide students with the opportunity of the practical placement during their studies. The social partners characterized the students as being strong in Mathematics and Chemistry which is a very positive feature and adds to the students' competitiveness. At the same time, the social partners also mentioned that wider knowledge of Biological disciplines would be beneficial.

In conclusion: the programme aims and the intended learning outcomes are well described for the Technology part of the programme. However, the Biology-related part should be emphasized

more strongly to cover the important aspects of Biology in relation to Biotechnology. At present, the name and the content of the programme are not fully compatible.

2.2. Curriculum design

The legal requirements for the first cycle study programmes¹ are claimed to be met in the SER. The requirements state that:

- a) Study field subjects should make at least 165 ECTS (currently on the programme are 177 ECTS);
- b) General university study subjects should be no less than 15 ECTS (currently on the programme are 30 ECTS – 15 ECTS for Social Sciences subjects and 15 ECTS for general university study subjects);
- c) Practice and internship should make at least 15 ECTS (currently on the programme are 15 ECTS);
- d) Final thesis (project) should be allocated at least 12 ECTS (currently on the programme are 12 ECTS);
- e) Freely chosen subjects should comprise no more than 60 ECTS (currently on the programme are around 6 ECTS).

The BSc programme in *Industrial Biotechnology* is comprised of 240 ECTS. The credit points are distributed evenly: 30 ECTS on each term for full-time studies and for part-time studies the semester workload ranges from 18 to 27 ECTS. Schedules of lectures are designed considering the specificity of subjects and the individual plans of the students. The Social Sciences subjects are included into the programme but there is no study subject particularly dedicated to ethics or social skills. Knowledge of professional ethics is, however, included into the intended learning outcomes of transferable skill F3: “To demonstrate awareness of the health, safety and legal issues and responsibilities of the engineering practice, to be aware of the impact of engineering solutions on the societal and environmental context, and to be committed to professional ethics, responsibilities and norms of engineering practice” (Table 1 of the SER).

The study plan is organised so that the first and second years of the study programme are composed of general subjects, core subjects of Engineering, Mathematics, other Physical Sciences subjects, Social Sciences subjects, and core field subjects. During the third and fourth years of studies students acquire knowledge and skills in core subjects of Engineering, again

¹ Order of the Minister for Education and Science of the Republic of Lithuania “General Requirements of First Degree and Integrated Study Programmes”.

Social Sciences, and core field subjects. Instrumental Analysis, Principles of Biochemistry, and Gene Engineering are all taught during third year of studies. During 6th and 7th semesters subjects of the major study field are taught. The final semester of studies is reserved to Professional Practice and Bachelor Final Degree Project. The programme involves a good amount of Mathematics and Chemistry-related subjects providing sound education in these disciplines. An increase of the volume of Biological disciplines, (e.g. System Biology, Plant Biology, Protein Chemistry) would benefit the programme and make the graduates more competitive on the labour market.

The content of the study subjects is up-to-date. According to the site-visit interviews, most of the teachers are involved in research, which ensures that the latest research is present in their study subjects and in their supervision of student research projects. The programme is involved with industry which also helps to keep the students aware of the latest achievements of the field.

However, as the so-called ‘Core Field Subjects’ are dominated by study subjects in Chemistry while the ‘Major Field Subjects’ are dominated by subjects within Engineering, both areas are heavily represented in the programme. This leaves very little room for other study subjects and the programme does not reflect the present day strong emphasis of modern Biotechnology on targeted molecular methodologies as well global omics approaches. The in-depth knowledge and understanding of Bioscience subjects seem therefore underrepresented and should be further encouraged.

Overall, the study programme ensures the achievement of the intended learning outcomes within most of the study subjects, but with the Life Sciences subjects as an exception. Having more in-depth knowledge of Biosciences the students would have access to a wider spectrum of second cycle programmes at other universities.

The content of the taught subjects is consistent with the type and level of the studies but not entirely with the degree name. Otherwise the scope of the programme is sufficient to ensure the achievement of the intended learning outcomes.

The methods used for the achievement of the intended learning outcomes are appropriate – all classical forms of teaching (lectures, seminars and practical work) are used. Practice in companies is a regular part of the studies.

Compared to the previous external evaluation some new study subjects related to bioprocesses have been included: *Fundamentals of Biotechnology Process Design* and *Bioprocess*

Engineering. Also, the topic of fermentation is included into other Biotechnology related study subjects. The order of study subjects has been changed as well and follows better logic: several specific subjects of Biotechnology have now been moved to the beginning of the studies which enables students to get introduced with the core topics of their field at an earlier phase of their studies.

2.3. Teaching staff

The number of the teaching staff: 8 professors, 15 associate professors, 3 lecturers, 1 senior research assistant and 1 research scientist, is fully adequate to fulfil the intended learning outcomes. The ratio between the teaching staff and students is approximately 1:3. The teaching staff of the programme meet the legal requirements. Teachers of all study subjects have scientific degrees. All major study field teachers are active researchers in fields which comply with the study subjects taught.

The teachers of the first level studies at KTU are well qualified. This is reflected in their scientific degrees and achievements. Annex A6 of the SER shows achievements of individual teachers as ranging from 1 to 37 articles in journals ranked by ISI. The average is 9,3 publications, but as many as 9 teachers have only 1-3 ISI ranked publications in the last 5 years, which is certainly not a top achievement. As presented in Annex A5 of the SER, most teachers are active leaders or investigators in scientific research projects, which is impressive. These activities not only show the research commitment of the educational team, but they are also very important for the establishment of a proper base for scientific activities of students. The teachers have sufficient experience in both education and research: the average research and pedagogical experience of the academic staff is about twenty years. The vast experience of the teaching staff provides a high quality of the study process.

The profile of the teaching staff education, as analysed on the basis of CVs in Annex A3 of the SER, shows a rather heavy bias towards Chemistry and Chemical Engineering while Biotechnology and Biology are not presented to the same extent. In the preceding evaluation report, the Panel recommended KTU to introduce new study subjects (and teachers) that would lead to a stronger orientation towards the major themes of Biology and provide “in-depth knowledge and understanding of biosciences”. Some action has been taken in that direction, for example the insufficient number of staff members within Life Sciences has been partly compensated by guest lecturers from foreign universities and companies. Still, the number of staff is quite heavily biased towards Chemistry and Chemical Engineering. It has to be

mentioned that during the site visit members of the Review Panel noticed the efforts of the Programme management to improve the situation. Panel members acknowledge these efforts and encourage further improvement in this area.

Moderate changes took place among the main teaching and support staff during the evaluation period. Since the previous external evaluation, one professor has retired and altogether 7 newly recruited persons started to work at the BSc programme in *Industrial Biotechnology*. Some changes that took place at other Departments of the Faculty were the consequence of the University reform processes.

KTU provides conditions for the professional development of the teaching staff necessary for the provision of the programme. The members of the teaching staff actively participate in seminars, courses, and conferences as part of their professional development. They are offered academic mobility opportunities under Erasmus+ as well as other programmes in the form of teaching and training visits. Although the number of visits to foreign institutions (157 as given in the Table 8 of SER) is remarkably high, the durations of most visits have been very short, up to one week. Longer internships, which are important for raising the professional qualifications, are rare. This was commented during the meeting with the teachers. The main reason for giving up longer internships is too large teaching workload and the lack of institutional support that practically produces a financial barrier. Here, some assistance would be desirable from the University as well as from the governmental level.

In general, the teaching staff at the BSc programme in *Industrial Biotechnology* are involved in research directly related to the study programme. However, on the basis of the SER, it was difficult to evaluate precisely to what extent the scientific profile of teachers actually conforms to their teaching areas. This information should be clearly provided in the teachers' CVs. One additional important piece of information is absent in teachers' CVs: there is no mentioning about patents which are equally important in the field of Industrial Biotechnology as the scientific publications. Patenting will require financial support from the University, because the costs of patenting will usually be too high to be covered by individual researchers. Nevertheless, such an expense would be profitable both for staff and for students who might gain new, practical knowledge about the patenting process and the practical potentials of the inventions.

2.4. Facilities and learning resources

The premises for the study programme in *Industrial Biotechnology* are fully adequate both in their size and quality. The programme is hosted partly in modern buildings and partly in older, to some extent historic buildings belonging to the Faculty of Chemical Technology. All lectures can be held in 18 Faculty auditoriums which are assigned according to requirements of hygiene and work safety and offer modern multimedia equipment.

KTU is also very well equipped in regard to laboratories for pilot scale studies in Chemical Engineering, Dairy Industries, Brewing, and Extraction Technologies. The brewery pilot plant is very well in line with central aspects of Industrial Biotechnology, while the remaining pilot scale facilities are more oriented towards Chemical Engineering and Food Engineering. It is worth mentioning that KTU has employed an 'Open Access Principle' for more than 800 pieces of research equipment. This means that all students have access to and can use this equipment; understandably, some pieces can be used only under supervision. During the site visit, it became clear that students actively use even the largest pilot facilities at KTU.

KTU has three dedicated Biotechnology and Microbiology Laboratories used for teaching Biotechnology, Microbiology and Plant Biology, of which one was presented in detail during the site visit. In contrast to the pilot scale facilities this laboratory is older and less well equipped with modern instruments, thus the conditions for doing experimental or analytical work are less comfortable. It has to be stressed that additional, relevant analytical capacities are located in other laboratories. In spite of that, the described laboratory needs some modernization. Such various activities as cultivation of microorganisms and plants should not be carried out in the same room as e.g. PCR-reactions and electrophoresis, because cross contaminations may be hard to avoid. The Faculty is aware of the necessity to upgrade some older laboratories and its Administrative Body seeks funds for the modernization. After the modernization the laboratory will provide students full opportunity to become familiarized with works in modern biotech facilities.

The University library at KTU provides basic books used in the programme and regularly gets new books including those related to Industrial Biotechnology. There is access to electronic literature databases, for example Sciencedirect, Springerlink, etc. The library offers sufficient number of computers with the necessary software and databases, literature catalogues, search systems, connection with databases of larger libraries and connection to the Internet. Apart from using the databases at library computers students can access them from a distance using vpn

connections. Moreover, students can use the premises and facilities of all the libraries of the University.

2.5. Study process and students' performance assessment

KTU has procedures for the selection of new students based on their qualifications. Secondary education is a prerequisite. Admission to the programme has clear rules presented on the KTU website². Information on admission for international students is given in Lithuanian and in English at <http://www.lamabpo.lt/turinys/holders-foreign-qualifications>.

The study process is very well organised, it ensures student involvement and an even distribution of credit points during the study period. The intended learning outcomes (Table 4 of the SER) are quite ambitious. Still, the organisation and progression of the study programme (Tables 6 and 7 of the SER) seem to ensure that students achieve the intended learning outcomes with the exception of Life Sciences subjects. The programme suffers from a big drop-out rate of 27-33% on the whole programme (the SER, Table 19). Managers, teachers and students are well aware of these numbers which are attributed to the lack of motivation by some students in combination with challenging Mathematics study subjects on the 1st year of studies. Neither the Panel find the high drop-out rate problematic, as it appears to be normal at KTU. Students confirm that the Mathematics taught early in the programme is used at later semesters. It will, however, be advisable for KTU to try to lower the drop-out rate.

Students of the programme are encouraged to participate in research and applied research activities. Students carry out a research project already in the 1st semester. The programme also includes a Professional Practice, and a Final Degree Project. The Open Access Principle for research equipment at KTU is viewed as very important for student' research projects, by programme managers, teachers, and students themselves. Still, practical exercises are to some extent provided with excessive assistance from staff members leaving for quite little room for hand-on experience by the students.

Students do have opportunities to participate in mobility programmes. KTU has an Erasmus related web page <http://ktu.edu/en/erasmus> which on the first sight may seem a bit complicated. The University has provided Erasmus scholarship and Erasmus trainee scholarships for 6 and 3 students respectively during the period from 2013 to 2015. This seems to be a comparatively low number of scholarships for a 3-year period. The programme management and the teaching staff

² <http://stojantiesiems.ktu.edu/study-program/pramonine-biotechnologija/#salygos>

are recommended to further promote participation of students in the Erasmus programme. A new Erasmus+ programme was recently started (the SER, paragraph 107).

KTU ensures a high level of academic support by having a large teaching staff of 28-52 lecturers, associate professors and full professors associated with the programme (depending on whether the list of teachers in Table 8 or in Annex A6 of the SER is the most descriptive). This seems to be a high number compared to the student numbers – around 60 admitted every year (Table 18 of the SER). KTU has regulations for teacher involvement, feed-back to students, assessments of e.g. practical exercises, as well as opportunities for establishment of individual study programmes. Teaching and support are also acquired from outside research institutions. Students acknowledged that they receive sufficient academic support. Teachers are generally viewed as good, especially younger teachers who involve students in their research.

KTU also provides a long list of various programmes and activities for social support of students. Talented students have a possibility to obtain additional scholarships from social partners and from the University. Students confirmed that they have access to adequate social support.

The assessment system of students' performance in study subjects is adequate and publicly available at <http://ktu.edu/lt/studijos>. University regulations ensure that the assessment criteria of individual study subjects are presented to students during the first week of the semester. A number of activities can be included in the assessment, as described in the individual study subjects' descriptions.

The evaluation of BSc projects could have been described more clearly in the SER but it seems to be a tedious procedure (the SER paragraph 136), as compared to evaluation procedures at other universities. A Committee consisting of at least 7 members provides 50% of the marking, a reviewer provides 20% of the marking, while the remaining 30% are the defence mark. In a system where teachers are already struggling with time constraints, it is hard to see the justification for such a comprehensive evaluation procedure.

The graduates who finished Bachelor studies in *Industrial Biotechnology* in 2015 have been employed at various companies, e.g. JSC 'Biotechpharma', JSC 'ThermoFisher Scientific Baltics'. Other graduate students are continuing their studies for a master's degree. It is not clear from the SER how well the professional activities of the graduates meet the programme providers' expectations or the expectations of social partners. Social partners, however, look

positive on the job opportunities for the graduates in Industrial Biotechnology and they strongly emphasize their skills in Mathematics and Engineering. However, some social partners do not differentiate between graduates from the *Industrial Biotechnology* programme and graduates from the more established Chemical Engineering or Food Engineering programmes also offered at KTU. Companies are satisfied with graduates from KTU, but are only aware of graduates from Chemical Engineering or Food Engineering. In reality, the knowledge of graduates from the *Industrial Biotechnology* programme is still lacking, but this might be due to fact that the programme is quite new.

2.6. Programme management

The programme is developed and revised by the Study Programme Committee, which also coordinates it with research departments. The Committee meets 3-4 times each semester. A Programme Manager is responsible for managing most aspects of the programme. The Manager is also responsible for the definition of the intended learning outcomes and thereby has a comparatively large responsibility in comparison to the Study Programme Committee. The programme seems well managed on a daily basis and students are well aware of who the Manager is and how problems are solved.

The size of the Study Programme Committee was reduced in March 2016 (5 faculty members, 4 students, and 3 social partners). This is the main responsible forum for study programme revisions. Its members include student representatives and social partners. A representative of “Lithuanian Association of Biotechnology” is a member of the Committee. Based on discussions during the site visit, programme revisions are taken care of.

The preceding external evaluation of the BSc programme in *Industrial Biotechnology* has been taken into consideration for the improvement of the programme. It should be noted that the recommendations relating to the need for an increased Life Sciences component of this programme and the need for new staff within the Biological Sciences have been followed to a smaller degree. However, the Panel would like to praise the management of the programme for taking steps to improve the situation. This direction should be followed in the future as well.

The internal quality assurance measures seem to be quite effective and efficient. The Programme Manager takes responsibility for almost all major issues regarding the quality of the programme, thereby the responsibility is clearly allocated to one position. KTU has recently introduced round table discussions and a mentor system, which are very positive initiatives that serve to improve

the programme. KTU also has an electronic platform for student evaluations. Student opinion influences e.g. salaries of teachers (some teachers have even received reduced salaries based on student evaluations). Teachers receiving student evaluations less than 7 (1-10 scale) are sent to didactics or language courses. While the managing team reports that teachers have been positive about the evaluations, teachers indicate that although there are good things about the system it is also a demotivating factor because the outcome of the evaluation is not reliable as only few students participate.

III. RECOMMENDATIONS

1. Life Sciences must be strengthened in the curriculum of the study programme in *Industrial Biotechnology*. The suggestion of the Panel is to expand the intended learning outcomes by including Biological disciplines.
2. Active researchers in relevant Life Sciences areas should be included in the academic staff.
3. Learning resources, especially those serving the practical training of students in the laboratories must be expanded and modernised, particularly in the area of the Biological and Molecular aspects of Biotechnology and adjacent Life Sciences areas, i.e. Molecular Biology, Microbiology, and Plant Biology.
4. Social partners should be involved more extensively in the planning and execution of the programme, partly because the awareness of this particular programme is too limited.
5. The programme management and the teaching staff are recommended to promote participation of students in the Erasmus+ programme.
6. The Review Panel recommends the programme management to review the actual workload of the teaching staff. It is also recommended to work out a motivation and support system enabling younger teachers to participate in longer international internships.
7. Another issue which may need a contribution of the managing team is to create a good, reliable and simple system of questionnaires which would lead to greater activity of students in the quality evaluation.

IV. SUMMARY

The programme aims and the intended learning outcomes are publicly available and well described for the Chemical Engineering part of the programme. The Biology-related part should be emphasized more strongly in order to cover important aspects of Biology in relation to Biotechnology. During the discussion with the social partners, they expressed the need for specialists of that profile in Lithuania and abroad.

In the curriculum for BSc programme in *Industrial Biotechnology*, Life Sciences are underrepresented. This criticism is now expressed for the second time: also the previous Panel brought up this issue. Even though some progress has been done since the previous evaluation, this issue needs thorough improvement. The combined BSc and MSc programmes in *Industrial Biotechnology* will not provide students the knowledge and expertise within Biotechnology as expected by foreign companies and research institutions not being aware of the history and strong engineering traditions at KTU.

The teaching staff is professional, enthusiastic about their teaching, research-active, and has good communication with the students.

Learning resources, serving the practical training of undergraduates in Chemical Engineering are excellent with several opportunities for practical experience at pilot scale. The Open Access Principle at KTU ensures that students have access to experimental equipment and facilities beyond what can be expected. Learning resources, serving the practical training of undergraduates in Biotechnology not in all cases live up to modern standards. The library is on a good level.

KTU provides for a good study process. Students from KTU receive good and highly relevant education within Engineering, they are educated by enthusiastic teachers, and have access to for the most parts good or very good facilities. The students obtain a strong background in Chemistry and Engineering. Social partners strongly support the background of KTU graduates and find it very useful. Students have positive opinions about the study programme in general. The introduction of round tables and mentors must be emphasised as very positive initiatives that serve to continuously improve the programme.

The programme seems well managed on a daily basis by the Programme Manager and students are well aware of who the Manager is and how problems are solved. However, there appears to be too little exchange of information/discussion with social partners. The representatives who

took part in the discussion with the Review Panel were unable to differentiate between to some extent the similar programmes at KTU. This is an area for the further improvement.

V. GENERAL ASSESSMENT

The study programme *Industrial Biotechnology* (state code – 612J70001) at Kaunas University of Technology is given a positive evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	2
2.	Curriculum design	2
3.	Teaching staff	3
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	3
6.	Programme management	3
	Total:	16

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

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

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

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

Grupės vadovas: Team leader:	Prof. Halina Gabrys
Grupės nariai: Team members:	Prof. Ruth Shimmo
	Assoc. Prof. Niels Thomas Eriksen
	Mr Julius Gagilas
	Ms Vaida Šidlauskaitė

**KAUNO TECHNOLOGIJOS UNIVERSITETO PIRMOSIOS PAKOPOS STUDIJŲ
PROGRAMOS *PRAMONINĖ BIOTECHNOLOGIJA* (VALSTYBINIS KODAS –
612J70001) 2016 RUGPJŪČIO 23 D. EKSPERTINIO VERTINIMO IŠVADŲ
NR. SV4-200 IŠRAŠAS**

<...>

VI. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijos universiteto studijų programa *Pramoninė biotechnologija* (valstybinis kodas – 612J70001) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	2
2.	Programos sandara	2
3.	Personalas	3
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	Iš viso:	16

* 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)

<...>

V. SANTRAUKA

Studijų programos *Pramoninė biotechnologija* tikslai ir numatomi studijų rezultatai, susiję su šios programos Chemijos inžinerijos dalimi, yra viešai skelbiami ir gerai apibūdinti. Reikėtų labiau akcentuoti Biologijos dalį, siekiant apimti svarbius biologijos aspektus, kiek jie susiję su Biotechnologija. Socialiniai partneriai per diskusijas nurodė to profilio specialistų poreikį Lietuvoje ir užsienyje.

Dabartinėje bakalauro studijų programoje *Pramoninė biotechnologija* nepakankamai pateikti gyvosios gamtos mokslai. Ši kritika išreiškiama jau antrą kartą – šį klausimą iškėlė ankstesnio vertinimo ekspertų grupė. Net jei tam tikros pažangos ir pasiekta po ankstesnio vertinimo, šį klausimą reikia nuodugniai spręsti. Abi – bakalauro ir magistrantūros – studijų programos *Pramoninė biotechnologija* nesuteiks studentams biotechnologijos žinių ir kompetencijos, kaip tikisi užsienio įmonės ir mokslinių tyrimų institucijos, nežinančios Kauno technologijos universiteto (KTU) istorijos ir stiprių inžinerijos tradicijų.

Dėstytojai yra profesionalūs, savo darbo entuziastai, aktyviai dalyvaujantys moksliniuose tyrimuose ir intensyviai bendraujantys su studentais.

Mokymosi (materialieji) ištekliai, skirti praktiniam bakalauro studijų studentų mokymui chemijos inžinerijos, yra puikūs, suteikiantys realią galimybę ugdyti praktinius gebėjimus. KTU galiojantis atviros prieigos principas užtikrina studentams visus lūkesčius pralenkiančią galimybę naudotis eksperimentine įranga ir priemonėmis. Ne visi mokymosi (materialieji) ištekliai, skirti praktiniam bakalauro studijų studentų mokymui biotechnologijos, atitinka šiuolaikinius standartus. Biblioteka yra tinkamo lygio.

KTU užtikrina tinkamą studijų procesą. KTU studentai gauna gerą ir labai aktualų inžinerinį išsilavinimą, juos ugdo entuziastingi dėstytojai, studentams yra prieinamos geros ir labai geros priemonės. Studentai įgyja gerą chemijos ir inžinerijos išmanymą. Socialiniai partneriai tvirtai remia KTU absolventų išsilavinimą ir laiko jį labai naudingu. Studentų nuomonė apie šią studijų programą apskritai yra teigiama. Būtina pabrėžti, kad labai teigiama iniciatyva yra apvalaus stalo diskusijos ir mentoriai, kurie padeda nuolat tobulinti šią studijų programą.

Atrodo, kad šiai studijų programai kasdien labai gerai vadovauja jos vadovas, studentai gerai jį pažįsta ir žino, kaip sprendžiamos problemos. Tačiau panašu, kad per mažai keičiamasi

informacija ir (arba) diskutuojama su socialiniais partneriais. Diskusijose su vertinimo grupe dalyvavę jų atstovai negalėjo atskirti tam tikra prasme panašių KTU studijų programų. Tai sritis, kurią reikia toliau tobulinti.

<...>

III. REKOMENDACIJOS

1. Studijų programos *Pramoninė biotechnologija* turinys turi būti papildytas gyvosios gamtos mokslais. Vertinimo grupė siūlo išplėsti numatomus studijų rezultatus įtraukiant biologijos studijų dalykus.
2. Į dėstytojų kolektyvą turėtų būti įtraukiami aktyvūs gyvosios gamtos mokslų tyrėjai.
3. Mokymosi ištekliai, ypač skirti studentų praktiniam darbui laboratorijose, turi būti didinami ir modernizuojami, o labiausiai tie, kurie reikalingi studijuojant biotechnologijos biologinę ir molekulinę sritį ir gretimas gyvosios gamtos mokslų sritis, t. y. molekulinę biologiją, mikrobiologiją ir augalų biologiją.
4. Į šios studijų programos planavimo ir vykdymo procesus reikėtų plačiau įtraukti socialinius partnerius, iš dalies dėl to, kad apie šią programą pernelyg mažai žinoma.
5. Programos vadovams ir dėstytojams rekomenduojama skatinti studentų dalyvavimą *Erasmus+* programoje.
6. Vertinimo grupė rekomenduoja, kad šios programos vadovai persvarstytų dabartinį dėstytojų krūvį. Dar rekomenduojama sukurti motyvavimo ir paramos sistemą, užtikrinsiančią jaunesniesiems dėstytojams galimybę vykti į ilgesnes tarptautines stažuotes.
7. Dar vienas klausimas, prie kurio sprendimo gali tekti prisidėti vadovų komandai, yra geros, patikimos ir paprastos klausimynų sistemos, nulemsiančios didesnę studentų aktyvumą vertinant kokybę, sukūrimas.

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Paslaugos teikėjas patvirtina, jog yra susipažinęs su Lietuvos Respublikos baudžiamojo kodekso 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė, parašas)