CENTRE FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

EVALUATION REPORT

STUDY FIELD of BIOTECHNOLOGY

at Kaunas University of Technology

Expert panel:

1. **Prof. Dr. Vinod Kumar (panel chairperson),** *academic panel member;*
2. **Prof. Dr. Ruth Shimmo,** *academic member;*
3. **Prof. Dr. Gintaras Valinčius,** *academic member;*
4. **Mr. Rimantas Tuskevičius,** *representative of social partners';*
5. **Mr. Daniel Šematovič,** *students' representative.*

Evaluation coordinator – *Mr. Gustas Straukas*

Report language – English

Vilnius
2022

Study Field Data

Title of the study programme	***Industrial Biotechnology***	***Industrial Biotechnology***
State code	6121FX006	6211FX010
Type of studies	University studies	University studies
Cycle of studies	First	Second
Mode of study and duration (in years)	4 years	2 years
Credit volume	240	120
Qualification degree and (or) professional qualification	Bachelor of Technology Sciences	Master of Technology Sciences
Language of instruction	Lithuanian	Lithuanian, English
Minimum education required	Secondary Education	Bachelor degree
Registration date of the study programme	11-16-2010	28-05-2015

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I. INTRODUCTION

1.1. BACKGROUND OF THE EVALUATION PROCESS

The evaluation of study fields is based on the Methodology of External Evaluation of Study Fields approved by the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC) 31 December 2019 Order No. V-149.

The evaluation is intended to help higher education institutions to constantly improve their study process and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: *1) self-evaluation and self-evaluation report (SER) prepared by Higher Education Institution (HEI); 2) site visit of the expert panel to the HEI; 3) production of the external evaluation report (EER) by the expert panel and its publication; 4) follow-up activities.*

On the basis of this external evaluation report of the study field SKVC takes a decision to accredit study field either for 7 years or for 3 years. If the field evaluation is negative then the study field is not accredited.

The study field and cycle are **accredited for 7 years** if all evaluation areas are evaluated as exceptional (5 points), very good (4 points) or good (3 points).

The study field and cycle are **accredited for 3 years** if one of the evaluation areas is evaluated as satisfactory (2 points).

The study field and cycle are **not accredited** if at least one of evaluation areas is evaluated as unsatisfactory (1 point).

1.2. EXPERT PANEL

The expert panel was assigned according to the Experts Selection Procedure as approved by the Director of Centre for Quality Assessment in Higher Education on 31 December 2019 Order No. V-149. The site visit to the HEI was conducted by the panel on *6th of May, 2022.*

Prof. dr. Vinod Kumar (panel chairperson) Senior Lecturer in Microbial Technology and Biorefining, School of Water, Energy and Environment, Cranfield University, Cranfield MK43 0AL, United Kingdom'

Prof. dr. Ruth Shimmo, professor in Tallinn University, Tallinn University, School of Natural Sciences and Health, Professor;

Prof. dr. Gintaras Valinčius, professor in Vilnius University, Life Sciences Centre (GMC);

Mr. Rimantas Tuskevičus, *social partners' representative, director at "SatiMed";*

Mr. Daniel Šematovič, *final year student of Molecular Biology at Vilnius University;*

1.3. GENERAL INFORMATION

The 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, during and/or after the site visit:

No.	Name of the document
1.	Response for the questions of experts

1.4. BACKGROUND OF BIOTECHNOLOGY FIELD STUDIES AT KAUNAS UNIVERSITY OF TECHNOLOGY

Kaunas University of Technology or KTU is known as the University with deep traditions in the field of technology studies in Lithuania. KTU has evolved from the Higher Education Courses institution established in Kaunas in 1920, later renamed the University of Lithuania. It is the University that integrates the results of fundamental and applied research into the study process, focusing on innovation development, internationality and interdisciplinary projects. The University has 2054 employees. The University is currently educating 8 094 students of whom 5 517 are students of the bachelor's studies, 2 073 – the students of the master's studies, 82 – the students of integrated studies, 366 – the doctoral students and 56 – the students of professional pedagogy studies. 664 foreign students are currently enrolled in the University aiming to receive a KTU diploma.

Biotechnology field Study Programme Committee (hereinafter – SPC) is responsible for the compliance of the content and implementation of the study programme with the University's and external legislation regulating the studies, the selection of the internal quality assurance measures for the study programme and the assurance of their implementation as well as the quality, development and achievement of the objectives of the study programme(s). The Fields' Study Programme Committee is led by the head of study programmes that directly conducts and coordinates the activities of the preparation, implementation and development of the study programme, communicates with the students, teachers and social partners of the programme, searches for and organises the strategic partnerships with foreign universities. In the Biotechnology study field, the Faculty of Chemical Technology implements the first and second cycle study programmes Industrial Biotechnology. 30. In 2019, the Centre for Bioprocess Research was established at the Faculty of Chemical Technology (CTF). The Centre has modern up-to-date equipment in order to

improve the knowledge and practical skills in the disciplines of molecular biology, genetic engineering and microbial biotechnology.

Previous external evaluation of the first and second cycle study programmes Industrial Biotechnology was conducted in 2016 by the Centre for Quality Assessment in Higher Education. The first cycle study programme Industrial Biotechnology (6121FX006) was accredited for 3 years and the second cycle study programme Industrial Biotechnology (6211FX010) was accredited for 6 years. In respect of experts' recommendations, the first and the second cycle study programmes have been expediently improved in the past few years; their structures have been updated, new modern study management methods and the study quality assurance system have been implemented.

II. GENERAL ASSESSMENT

Biotechnology study field and **first cycle** at Kaunas University of Technology is given **positive** evaluation.

Study field and cycle assessment in points by evaluation areas

No.	Evaluation Area	Evaluation of an Area in points*
1.	Intended and achieved learning outcomes and curriculum	4
2.	Links between science (art) and studies	4
3.	Student admission and support	5
4.	Teaching and learning, student performance and graduate employment	4
5.	Teaching staff	4
6.	Learning facilities and resources	4
7.	Study quality management and public information	4
	Total:	**29**

*1 (unsatisfactory) - the area does not meet the minimum requirements, there are fundamental shortcomings that prevent the implementation of the field studies.
2 (satisfactory) - the area meets the minimum requirements, and there are fundamental shortcomings that need to be eliminated.
3 (good) - the area is being developed systematically, without any fundamental shortcomings.
4 (very good) - the area is evaluated very well in the national context and internationally, without any shortcomings;
5 (excellent) - the area is evaluated exceptionally well in the national context and internationally.

Biotechnology study field and **second cycle** at Kaunas University of Technology is given **positive** evaluation.

Study field and cycle assessment in points by evaluation areas

No.	Evaluation Area	Evaluation of an Area in points*
1.	Intended and achieved learning outcomes and curriculum	4
2.	Links between science (art) and studies	4
3.	Student admission and support	5
4.	Teaching and learning, student performance and graduate employment	4
5.	Teaching staff	4
6.	Learning facilities and resources	4
7.	Study quality management and public information	4
	Total:	**29**

*1 (unsatisfactory) - the area does not meet the minimum requirements, there are fundamental shortcomings that prevent the implementation of the field studies.
2 (satisfactory) - the area meets the minimum requirements, and there are fundamental shortcomings that need to be eliminated.
3 (good) - the area is being developed systematically, without any fundamental shortcomings.
4 (very good) - the area is evaluated very well in the national context and internationally, without any shortcomings;
5 (excellent) - the area is evaluated exceptionally well in the national context and internationally.

III. STUDY FIELD ANALYSIS

3.1. INTENDED AND ACHIEVED LEARNING OUTCOMES AND CURRICULUM

Study aims, outcomes and content shall be assessed in accordance with the following indicators:

3.1.1. Evaluation of the conformity of the aims and outcomes of the field and cycle study programmes to the needs of the society and/or the labour market (not applicable to HEIs operating in exile conditions)

The programme fits very well the needs of the labour market and society, it is well aligned with the strategic goals of Lithuania as they are outlined in a number of recent strategic documents, including Smart Specialisation programme and the plan for the development of the Life sciences industry. Currently, the Lithuanian Roadmap for the Life Sciences Ecosystem is being initiated by the Ministry of Economy and Innovations in which the urgent need for highly qualified specialists are being emphasised, so in experts' panel opinion, the necessity of the programme in the context of Lithuania's goal to reach 5% of GDP from the Life Sciences industry is obvious.

3.1.2. Evaluation of the conformity of the field and cycle study programme aims and outcomes with the mission, objectives of activities and strategy of the HEI

The programmes are very much in line with the strategic plan of the institution, which sets the institutional goals specifically outlining the interdisciplinary approach to the studies in modern biotechnology. The objectives of the University activities such as internationalisation, constant improvement of competences of academic personnel as well as integration of studies and science - they all receive, in our opinion, significant contribution from implementation of the *Industrial Biotechnology* programmes. The programmes integrate and contribute to the mission statement of KTU, according to which the University provides research-based studies at the international level, create and transfer interdisciplinary knowledge and innovative technologies for the sustainable development of the state and innovation development, create an open-minded, creative environment inspiring leaders and talented individuals. In the context of the mission statement both programs contain all necessary elements of modern academic features of universities: deep integration of research and studies, strong engagement with business and society, and the constant quest for innovative study forms.

3.1.3. Evaluation of the compliance of the field and cycle study programme with legal requirements

The legal requirements of the programmes as they are described in the self-evaluation report and are fully met (see Table No. 1 and Table No. 2) below.

Table No. 1 Study Programme's *Industrial Biotechnology* compliance to general requirements for ***first cycle*** *study programmes:*

Criteria	Legal requirements	In the Programme
Scope of the programme in ECTS	180, 210 or 240 ECTS	240 ECTS
ECTS for the study field	No less than 120 ECTS	120 ECTS
ECTS for studies specified by University or optional studies	No more than 120 ECTS	< 120 ECTS
ECTS for internship	No less than 15 ECTS	15 ECTS
ECTS for final thesis (project)	No less than 15 ECTS	15 ECTS
Contact hours	No less than 20 % of learning	>20%
Individual learning	No less than 30 % of learning	>30%

Table No. 2 Study Programme's *Industrial Biotechnology* compliance to general requirements for ***second cycle*** *study programmes:*

Criteria	Legal requirements	In the Programme
Scope of the programme in ECTS	90 or 120 ECTS	120 ECTS
ECTS for the study field	No less than 60 ECTS	72 ECTS
ECTS for studies specified by University or optional studies	No more than 30 ECTS	<30 (18 ECTS)

ECTS for final thesis (project)	No less than 30 ECTS	30 ECTS
Contact hours	No less than 10 % of learning	14%
Individual learning	No less than 50 % of learning	50%

The expert panel finds that all legal requirements for first cycle and second cycle programmes are fulfilled.

3.1.4. Evaluation of compatibility of aims, learning outcomes, teaching/learning and assessment methods of the field and cycle study programmes

The first cycle programme *Industrial Biotechnology* aims at developing technological-engineering skills to produce sustainable bioproducts, select biotechnological equipment and design technologies, solve problems in biotechnology, integrate interdisciplinary knowledge and apply innovative technologies in different areas of the bioindustry, as well as maintain lifelong learning. The main outcome of the programme is acquisition of technological-engineering knowledge and practical skills allowing graduates to work in the area of modern industrial biotechnology in those positions that require a bachelor's qualification degree in Technological Sciences.

The second cycle programme aims at providing graduates with skills and competences to work in advanced industries of biotechnology, design and conduct research, develop competences to apply contemporary biotechnological methods and bioprocesses, and competences needed to create innovative technologies in production of fine chemicals, biomaterials and bioproducts. The main expected outcome of the programme is acquisition of interdisciplinary knowledge and practical skills that are required in the development and analysis of new bioproducts, renewable resources-based technologies, bioprocess engineering, biomaterials synthesis and environmental biotechnology.

Aforementioned aims and expected outcomes are typical for modern biotechnology oriented programmes and they are comparable to the ones in many universities across Europe and worldwide. Aims of the studies and learning outcomes, as well as learning methodologies and assessment methods are very much consistent and logically interconnected as it is explained and justified in the "Self-Evaluation Report" and in Annexes 4 and 5. However, in our opinion, the absence of the dedicated operational unit at the Faculty

operating specifically in the field of modern biotechnology does not provide competitive edge for the programs due to the lack of visibility. The expert panel believes, that pending financial capabilities of the University and the Faculty the dedicated biotechnology operational unit such as a Department of Biotechnology, with significant increases of the academic staff engaged in R&D in Biotechnology should make strong impact on building up the academic biotech community at KTU which in turn would translate to better visibility of the study programmes both nationally and internationally.

3.1.5. Evaluation of the totality of the field and cycle study programme subjects/modules, which ensures consistent development of competences of students

The study programmes of both cycles are being developed based on current academic potential and activities which are implemented at the Faculty of Chemical Technology. In general, the framework of the study modules covers many modern biotechnology fields, such as protein production and purification, process design and engineering, applied genomics and bioinformatics. The assignment of the courses to either group of core and elective subjects is done logically. However, the experimental techniques which are used for quality control in biotechnology can be supplemented with more technologies beyond spectroscopy (in the 2nd cycle), which would be quite beneficial for those coming to the programme without having passed the Instrumental analysis course in the 1st cycle of education of "Industrial biotechnology". In this context one may mention advanced microscopy techniques, electroanalytical methodologies, the techniques that aim at measuring enzymatic activities, etc.

3.1.6. Evaluation of opportunities for students to personalise the structure of field study programmes according to their personal learning objectives and intended learning outcomes

The study programmes have quite a decent balance between mandatory and elective courses; there is quite a large number of courses which can be selected by students from the proposed list of the core and major subjects of the field and general subjects provided by other departments at the university. As an obvious strength of the programmes we would emphasise a very good selection of the elective subjects in the group of Entrepreneurship Education and Economics. Also, the 1st cycle programme has an option for Bridging courses for those who might be willing to pursue education in Biotechnology without strong background in Physics, Mathematics and other subjects. In the 2nd cycle programme the MA+ options are very innovative and reflect deep conceptualisation of the mission and aims of the master programme at KTU. In general, the students are very much encouraged to

take upon responsibility to adjust their study content with the objectives and aims of the individual. Many social partners and alumni emphasised this aspect as a point which made them very satisfied with the studies at KTU.

3.1.7. Evaluation of compliance of final theses with the field and cycle requirements

The study programmes have a very broad selection of possibilities for students to carry out final projects both at first and the second cycle of the programmes. From the SER it follows that the final projects are carried out among others also in specialised departments of Organic, Inorganic and Silicate chemistry and in the facilities of the social partners. The latter is very much welcomed because the students have opportunities to perform their final projects in a "real world" environment concentrating on industrial processes. One thing, however, is necessary to emphasise – in some cases (see Annex 8, positions No. 1, 5, 8, 13 and 16), in panels' opinion, the final projects are more aligned with the competences and thematic of the departments and supervisors than to the needs of students who are aiming at competences in the field of biotechnology. It would be perfectly fine if all of the students would have a possibility to choose their final project themes from a list of proposed projects which are in close relationship with the technological and biotechnological competences which are being emphasised in the self-evaluation report. In this regard the need for the expansion of research fields covering major modern biotechnology areas is of great need. The establishment of Bioprocess Research Centre is a good step forward which would increase the attractiveness and competitiveness of the programme in the future.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Good compliance with the needs of national business and societal needs. Strong alignment with the university strategic plan.
2. Most of the final projects are in good compliance with the thematic specificity of the Biotechnology field, there are lots of options for students to apply basic knowledge and skills in the technology development (usage) during the preparation of final thesis.
3. Partnership with major players in Lithuania is being very well utilised to ensure possibilities for students to engage in the real world projects.

(2) Weaknesses:

1. In some cases student final projects are more aligned to the core competences at those departments than to the needs of the students' aims and expected outcomes such as competences and especially skills in the field of modern industrial biotechnology.

2. The absence of the operational unit specialising in Biotechnology in the Faculty of Chemical Technology is a weakness which translates into lesser visibility and lesser competitiveness of the programmes.

3.2. LINKS BETWEEN SCIENCE (ART) AND STUDIES

Links between science (art) and study activities shall be assessed in accordance with the following indicators:

3.2.1. Evaluation of the sufficiency of the science (applied science, art) activities implemented by the HEI for the field of research (art) related to the field of study

Both study programmes have qualified teaching staff: demonstrated by the increasing number of international projects as well as by the number of international publications. MOSTA assessment presented in Table 2.1. (Self-evaluation report) which describes the comparative expert assessment of research and experimental development activities
Is also showing that the quality of research is high for the research fields supporting both of the study programmes. More than 90 % of the academic staff has a PhD degree which also supports inclusion of latest research into the study field programmes. The teachers are involved in a number of national and international projects, and the number of the papers in international peer-reviewed journals is increasing.

Also the research based income (Table 2.5 from SER) and partners/collaborators from both national and international level (SER p. 32-33) are demonstrating the quality of research. The research based income has increased about 25 % from the year 2018 and reached 399776 Eur in 2020 for the Chemical engineering research field and 475804 Eur for Chemistry research field.

3.2.2. Evaluation of the link between the content of studies and the latest developments in science, art and technology
Not enough students are actively looking for the possibility of getting engaged in research
The motivation and communication methods for student involvement have room for improvement

In the first cycle of Biotechnology study programme the integration between research and studies is arranged through student projects which are part of the study programme. The student projects aim to teach students how to conduct theoretical overviews, analyse scientific literature, generalise and apply it in their target research. Sometimes companies offer co-supervisors and enable students to get involved in their research: a practice which is used in several EU universities. In order to complete these projects the students have to get acquainted with the newest research results on the topic of the

conducted project, analyse how similar issues are innovatively solved in the industry and research institutions.

For the second study cycle the up-to-date research is an integral and mandatory part of the studies and especially brought up *via* 3 Research projects and Master degree projects which involve both recent studies on the field and the competency of the researchers/lecturers supervising these projects.

3.2.3. Evaluation of conditions for students to get involved in scientific (applied science, art) activities consistent with their study cycle

While for the first study cycle the research is first and foremost represented through projects (and these projects are related to their studies), then in the second study cycle new research is directly related to courses (SER, Annexes 2–3). Research experience is included already in preparation of the class material and influences the teaching process. The topics proposed for students' research and final projects are related to the conducted research activities (Annexes 8–10, SER). Also, the research carried out in projects is important for study personalisation in the second cycle. Yearly scientific conference allows students to share their research outcomes.

Despite all the positives, still not enough students are actively looking for the possibility of getting engaged in research which could be partly coming from inefficient student involvement. The motivation and communication methods have room for improvement.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. The research activities in the Biotechnology study field are good to excellent.
2. Teachers are involved in a number of national and international projects, and the number of the papers in international peer-reviewed journals is increasing.
3. The second cycle study programmes consist of 3 Research projects and several courses involve learning up-to-date research methods and skills.
4. Yearly scientific conference allows students to share their research outcomes.

(2) Weaknesses:

1. Not enough students are actively looking for the possibility of getting engaged in research
2. The motivation and communication methods for student involvement have room for improvement

3.3. STUDENT ADMISSION AND SUPPORT

Student admission and support shall be evaluated according to the following indicators:

3.3.1. Evaluation of the suitability and publicity of student selection and admission criteria and process

Admissions to the first and second cycle studies are depicted by national and University regulations. However, Academic Regulation, which regulates Admission process in the University, is available only in Lithuanian language. Admission to the first cycle is carried out by Lithuanian higher education admission system LAMA BPO. Admission to the second cycle studies is carried out on two systems: one for the national applicants and another for the international applicants.

The information about the study programmes is available on the Website of Kaunas University of Technology. Potential applicants are able to get acknowledged with general information about the programme as well as information about all the courses (including syllabus, evaluation procedure, etc.) that they would study in case of being admitted.

Though admission rates to the first cycle study programme remain high, a decrease in the rate from 2018 to 2022 can be visible. The drop in applications is even more observant in the second cycle studies during the same period of admission (from 2018 to 2022).

3.3.2. Evaluation of the procedure of recognition of foreign qualifications, partial studies and prior non-formal and informal learning and its application

Foreign, formal, non-formal, and informal competencies recognition procedure is regulated by the Guidelines for the Recognition of Learning Outcomes at Kaunas University of Technology. The information about the recognition of learning outcomes is available on the website of the University.

3.3.3. Evaluation of conditions for ensuring academic mobility of students

Kaunas University of Technology provides students with opportunities for academic mobility, which can be physical and virtual. Physical mobility allows students to have partial studies and internships abroad. Virtual mobility is understood as information and communication platforms, which help to bring internationality to the University. Before the COVID-19 pandemic 100 % of students employed academic mobility opportunities, resulting

in the fact that every student studied abroad for at least a month during his or her study period. Unfortunately, the pandemic had a negative effect on these numbers.

Students who want to study abroad can choose between "Erasmus +" HEIs and other universities that have partnership agreements with KTU. Such students have various opportunities to participate in scholarship programmes to finance their partial studies. During the period of their studies, students can do the "Erasmus +", "Vulcanus in Japan" and other internships abroad for the entire year.

3.3.4. Assessment of the suitability, adequacy and effectiveness of the academic, financial, social, psychological and personal support provided to the students of the field

Students of Kaunas University of Technology can depend on Academic, Financial, Social and Psychological support. The University offers two types of Academic support programmes: mentorship programme, which aims to support motivated students, and a talent programme, which helps gifted students with developing their academic and personal competencies. Students can receive various scholarships for their achievements in academia, sports, and social activities. Students, who would like to participate in international activities (such as conferences, etc.), have a possibility to receive financial support as well.

Students with social disadvantage or special needs can be exempt from paying the tuition fee, receive scholarships or other support. Social support consists of a career development programme, student organisations, sports, and cultural activities, opportunity to get involved in the local start-up community. Students can receive free psychological consultations from two psychologists who work in Kaunas University of Technology as well as spiritual support. Students can also receive medical support in clinic "InMedica" for free. What is more, KTU also provides peer-mentorship opportunities for students.

The expert group finds everything to be very suitable for the well-being of the students in the University.

3.3.5 Evaluation of the sufficiency of study information and student counselling

The information about student services is promoted by various communication channels: newsletters, events, Intranet, etc. It is praiseworthy that students can find all the relevant information in the Academic Information System. Student counselling is also good and especially was emphasised by the students during the expert groups' visit to Kaunas University of Technology. The students during the meeting stated that they are happy with the amount and channels of information that reach them.

The expert panel can state that the study information and student counselling is in a good shape.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Big variety of mentorship programmes for students;
2. Academic information can be found in one system;
3. University provides students with big variety of scholarships;
4. Almost all students have experience abroad at least for a month.

(2) Weaknesses:

1. Not all the documents important for students are available in English language on the website.

3.4. TEACHING AND LEARNING, STUDENT PERFORMANCE AND GRADUATE EMPLOYMENT

Studying, student performance and graduate employment shall be evaluated according to the following indicators:

3.4.1. Evaluation of the teaching and learning process that enables to take into account the needs of the students and enable them to achieve the intended learning outcomes

The Biotechnology Fields' SPC is constantly monitoring the students' achievements in the Academic Information System: the overall grade point average, data of the intermediate and final assessments of the current semester, the records of the attendance in classes.

As stated in the SER, measures including classroom work, methods of active learning are applied in the study process, regulation of the system, and principles of the evaluation of the learning outcomes of the students, the accounting of the learning outcomes and the requirements for the student's attendance in the classes of study modules, applicable the accumulative evaluation system when the final evaluation of the module consists of the marks of Intermediate and final assessments, multiplied by the weighted coefficients (components in percentage) and the multiplications, the expert panel found adequate to the short and middle-term results.

3.4.2. Evaluation of conditions ensuring access to study for socially vulnerable groups and students with special needs

KTU organizes its activities by implementing the Equal Opportunities and Diversity Policy:
(ttps://en.ktu.edu/wp-content/uploads/sites/5/2016/08/Equality-and-Diversity-Policy.pdf) and ensuring its application, creating an open environment where the individual differences of all its employees and students, their potential and contribution are recognised and valued. The university offers the adaptation of studies for students with disabilities or individual educational needs (physical, sensory disorders, autism spectrum, dyslexia, mental health problems and other learning difficulties).

3.4.3. Evaluation of the systematic nature of the monitoring of student study progress and feedback to students to promote self-assessment and subsequent planning of study progress

The Biotechnology Fields' Study Programme Committee is constantly monitoring the students' achievements in the Academic Information System: the overall grade point average, data of the intermediate and final assessments of the current semester, the records of the attendance in classes.

Biotechnology SPC, analysing the report of the Department of Academic Affairs and the dynamics of student progress observed in AIS, identifies systemic problems, determines relations with data from student feedback surveys (completed in AIS) and round table observations defines the list of modules to be improved. The measures of the module's improvement are included into the annual work plan of SPC.

Feedback is an effective means to ensure the quality of studies. Based on the results of the feedback, decisions are made to assure the necessary changes. Each semester round tables are organised; meetings of student group leaders with the CTF administration take place. In the SPC of Biotechnology two students' representatives are included. The first one represents students of the first cycle while the second one - students from the second study cycle. In the distribution of the functions of Biotechnology SPC members the particular function of a student-SPC member is defined - to be the representative of students of their studies cycle in SPC, i.e., to represent the position of students in SPC on all issues concerning students, to provide direct feedback to students.

3.4.4. Evaluation of employability of graduates and graduate career tracking in the study field

The immediate results of the SER in the field were confirmed in the evaluation process. The majority of graduates find employment in Lithuanian and foreign companies. The data show that the first cycle of the study program Industrial biotechnology finished –

with 45; 38; and 24 graduates during 2018-2021. Graduates from the second cycle of the study program during 2018-2021 were 16, 21, and 15.

The experts confirm the strength of the study programs noted in the Self-evaluation report through an objective evaluation indicator. According to the summarised data, about 45-65% of the graduates from the first cycle study program and 70-90 % second cycle find employment during their studies or immediately after their graduation (within 1-2 months after graduation) in positions corresponding to the study field of Biotechnology and the level of preparation for professional activity. One Bachelor's student who graduated in 2019 in the field of Biotechnology continues her Master's studies at Molecular Bioengineering, Dresden Technical University. One Master's student graduated in 2019 and continues her studies at the University of the United States, Florida Atlantic University.

Furthermore, the employability of the Biotechnology study field graduates and their entry into the labour market demonstrate interdisciplinary knowledge and technological-engineering practical skills acquired in the first and second cycle study programs' competitiveness.

Graduates work in Lithuanian and international companies: Thermo Fisher Scientific Baltics, Hollister, Roquette Amilina, Kurana, Teva Sicor, Bioenergy, Santonika, Pienas LT, Aconitum, Achema, Bioenergy, Profarma, Northway Biotechpharma and in other industrial companies

Information on the opinion of employers regarding the professional preparation of graduates and acquired competencies after graduation usually comes from employers' organisations (Public Institution "Invest in Lithuania'', journal "Reitingai", Lithuanian Biotechnology Association).

Areas for improvement stated in the SER (interdisciplinary knowledge and technological-engineering practical skills) must be considered and expanded according to the suggestions from alumni.

There must be an improvement of emotional intelligence knowledge and skills formation from the first circle of study semester through its emphasis on intercultural awareness, empathy, self-awareness, and social skills can enormously aid intercultural communication competencies. Furthermore, it has been argued by alumni and second circle students that learning about other cultures should be an integral element of communication modules. That is part of a university curriculum, as this will also support greater linguistic competence and serve to break down student perceptions of stereotypes.

3.4.5. Evaluation of the implementation of policies to ensure academic integrity, tolerance and non-discrimination

By signing the learning agreement and the declaration of academic integrity, the students follow the academic discipline and the procedure stipulated by the Code of Academics.

All the University's employees and students, as well as candidates for the vacancies, who feel that equal opportunities have not been provided to them or the situation of the violation of equal opportunities has occurred, have a right to submit a justified complaint to the University. The cases of discrimination, harassment, violations of equal opportunities, and persecution at the University and the reports/complaints regarding the breaches of equal opportunities or persecution submitted by employees and students are examined. The Commission makes the decisions on Equal Rights of the University set up by order of the Rector (hereinafter – Commission). The Commission's regulations stipulate the Commission's composition and the organisation of its activities.

The University applies the Guidelines for the Organisation and Performance of the Study Modules Assessment; its objective is the assurance of integrity, transparency, and quality of the assessments performed at the University.

The following preventive measures are applied for the assurance of academic integrity: the students have to submit their identity cards for identification during the examinations, most of the assessments are in writing, the Commission of invigilators conducts the studies, and the examination tasks are updated yearly, each laboratory or semester's work is presented by the student who has completed it to make sure the student has prepared it independently. The teachers are constantly provided with training to formulate the tasks to assure academic integrity. The assessment monitoring groups monitor the examinations at the university level. The Commission examines the cases of academic violations identified during the reviews for Settlement of Academic Violations; it is a permanent commission consisting of KTU employees and a representative of students.

An academic debt and penalty imposed on the student (strict reprimand, reprimand, or notification) for the first violation of academic procedure. The reprimand is set on the module's supervisor or teacher for the tolerance of an academic breach or the failure to follow the requirements. The student offender is expelled from the university for the second case of the violation.

In the evaluation process, we found measures admitted in SER that align with the assurance of integrity, transparency, and quality of the assessments performed at the University.

3.4.6. Evaluation of the effectiveness of the application of procedures for the submission and examination of appeals and complaints regarding the study process within the field studies

There were no appeals and complaints regarding the study process and examination in the studies in the Biotechnology study field in 2018-2021.

An employee or a student reports an alleged case of the violation of equal opportunities or persecution in the electronic system pranesk.ktu.edu or by email pranesk@ktu.lt. The employee's or student's report/complaint is considered confidential. Therefore, it cannot be disclosed to persons unrelated to the alleged violation of its examination, except for the cases when the applicant has already announced this information. All the received reports/complaints regarding the violation of equal opportunities submitted by employees and students are analysed under the procedure stipulated by the regulations of the Commission.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Effective and transparent methods of assessment of students' achievements and academic integrity used at KTU are optimal and reduce the number of subjective evaluations, academic dishonesty, and student distrust cases to the minimum.
2. The complexity of the biotechnology study program ensures the fairness, transparency, and quality of student assessment forms.
3. Employers are very happy with KUT graduates' skills.

(2) Weaknesses:

1. Must be improved emotional intelligence, knowledge and skills formation from the first circle of study semester.

3.5. TEACHING STAFF

Study field teaching staff shall be evaluated in accordance with the following indicators:

3.5.1. Evaluation of the adequacy of the number, qualification and competence (scientific, didactic, professional) of teaching staff within a field study programme(s) at the HEI in order to achieve the learning outcomes

Biotechnology is an interdisciplinary field and teaching staff for both cycles of programmes have a wide range of expertise which is impressive. The teaching staff comes

from various disciplines including Social Sciences, Humanities and Arts, Informatics, Construction and Architecture, Organic Chemistry, Food Science and Technology, Inorganic and Physical Chemistry, Environmental Technology, Silicate Technology, Polymer Chemistry and Technology, Electronics, Mechanical Engineering and Design, Mathematics and Physical Sciences.

The total number of teaching staff for the first and second cycle of study programme is in the range of 78-80 and 30-35 of the evaluated period; respectively and among them more than 50% are at Associate Professor or full Professor levels indicating that students get the benefits of high quality teaching. The other positive thing is that a large number of faculty members hold PhD degrees. About 90-95% and 85-90% of teachers for the first and second cycle of the programme, respectively, have PhD degrees.

Majority of courses for first and second cycle of study programmes are taught by CTF and the student to teacher ratio for CTF has been almost consistent over the last years (6.88 -7.93), reflecting one teacher is available for 7-8 students. The ratio for CTF is better than for KTU (faculties + APINI) and KTU (faculties + institutes).

The students have been exposed to interesting Lectures by eminent Scientists from all over the world and industrial partners.

Though Annexure 15-16 and 18 provides teaching and research experience of Academic staff along with key publications, somehow the list does not include all the teaching members that have done research in the recent years. The syllabus of the first and second cycle programmes in Industrial Biotechnology is not mandatory for the SER but the experts would highly appreciate it if it was with the other annexes.

3.5.2. Evaluation of conditions for ensuring teaching staffs' academic mobility

KTU has "Erasmus+" mobility scheme to allow their Faculty members to participate in teaching and training activities across the world and selection takes place four times a year. The allowed duration of visit may vary from 2 days to 2 months and for a teaching visit, the minimum time needed to be spent for teaching is 8 academic hours. These visits were disrupted in the last two years due to Covid-19 pandemic. The data shows that the number of teaching staff from the study field of Biotechnology participated in the academic year 2018-19 and 2019-20 were 4-5 while the numbers of training visits were 10-14. These visits benefit teachers as well as students from exposure and transfer of knowledge and promote cooperation between institutions which positively impact the quality of teaching and

research. In comparison to the number of teaching staff in the first and second cycle of the Biotechnology programmes, the number of visits is small and the reasons for this are not clear. There may be a number of reasons for it: such as low participation of teaching staff or lack of motivation for this scheme, language barrier or low level of English, lack of arrangements for replacement of teaching staff during mobility visit. There is no information in SER about the criterion for this mobility scheme and cap on the number of Faculty members who can be allowed for international teaching and training visits. SER also does not tell anything about other such funding schemes at the University/National level for mobility of the academic staff. In future, more or all faculty members should become part of this mobility scheme.

3.5.3. Evaluation of the conditions to improve the competences of the teaching staff

KTU offers basic training for the development of didactic competencies and other training of innovative teaching methods for their academic staff. Edu Lab runs courses in basic training in development didactic competencies; team building; virtual learning tools and methods; team building; problem-based learning; design-thinking based training; academic public speaking; empowering students to learn using metacognitive skills, STEM: from fact-finding to systemic thinking. The data in SER shows that teaching staff from the field of Biotechnology have been attending these courses in the reported period of 2018-19 (38); 2019-20 (22) & 2020-21 (24). These numbers are low and decreasing over a period of time. The numbers need to be increased by encouraging more and more teachers to attend these courses to ameliorate their pedagogical skills. KTU should run some teaching qualifications where teachers have to pass it and make it mandatory for all the teaching staff which would really help in improving pedagogical skills.

KTU runs English language courses for academic staff and the teachers are provided with the possibility to attend these courses during their working hours. SER shows that more than 60% of staff teaching the first and second cycle of Industrial Biotechnology have a ≥B2 level of English. Biotechnology is an international field, and the market is growing tremendously. Further, to draft a high-quality Manuscript and publish in a high impact journal, a strong command over the language is important. The fluency in English will not only help teachers but also help in the transformation of graduating students in becoming global leaders. Therefore, more teachers should be encouraged to improve their English language

skills and a good knowledge of English (writing & speaking) language should be one of the important criterias in promotion and future recruitment.

As per the SER, teaching staff participate in national/international conferences, research traineeships, long term training and seminars. But no details of research training has been provided. In fact, the training on writing good quality Manuscript and Research Proposal is missing.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Highly qualified and experienced teaching staff.
2. Active participation in high quality research as evidenced by international proposals and good quality articles.
3. Good student to teacher ratio in the study programmes of Biotechnology.
4. Courses run by University for professional development of teaching staff.

(2) Weaknesses:

1. There is no separate Department of Biotechnology bringing all the teaching staff under one roof;
2. Low participation of academic staff in mobility programmes;
3. Teaching qualification is not mandatory for academic staff.

3.6. LEARNING FACILITIES AND RESOURCES

Study field learning facilities and resources should be evaluated according to the following criteria:

3.6.1. Evaluation of the suitability and adequacy of the physical, informational and financial resources of the field studies to ensure an effective learning process

CFT has 18 auditoriums of general use, 3 computer classes, teaching laboratories for studying basic and specialised subjects. The Library has a reading room with access to 123,798 publications: 25 166 e-journals and 456 172 e-books. All the Faculty facilities can be used by the students of the programmes. The classrooms are equipped with computers, audio and video devices, internet, laboratories with efficient and secure laboratory devices. Laboratory equipment and appliances necessary for the study process installed in educational and research laboratories are sufficient in relation to the student number and suitable for teaching applications. In CTF, there are different research and educational laboratories related to the field of Biotechnology. Most of the laboratories and classrooms have been renewed during the last 5 years and are systematically upgraded annually. In 2019, Centre for Bioprocess Research was established in CTF with modern equipment in order to improve

the knowledge and practical skills of molecular biology, genetic engineering, and microbiological biotechnology. Electronic library resources are available to students also in other computerised work places (specialised classes) or they can use their own computers and connect to library resources through intranet. The modules scheduled in the study process are provided in the buildings mostly adapted for persons with special needs, equipped with platforms and lifts. Library staff provide information literacy training for researchers and students in Lithuanian and English.

As mentioned above, learning facilities and resources are excellent. But, SER is about the first and second cycle of the programme in "Industrial Biotechnology" where fermentation, metabolic engineering, system/synthetic biology and downstream processing are at the heart of the field. The report does not say anything about experimental facilities/resources for teaching and performing research on these topics. Further, software facilities for design of bioprocess and sustainability assessment (Techno-economic analysis, Life cycle analysis) such as Aspen plus, SuperPro Designer, SimaPro, GaBi etc are not available.

3.6.2. Evaluation of the planning and upgrading of resources needed to carry out the field studies

The SER does not provide much information on planning and upgrading of resources. For keeping and maintaining instrumentation facilities is in good condition, time to time maintenance, repair and renovation is required. Further, technical staff is required to run and maintain the instruments, especially sophisticated and expensive ones such as HPLC, GC, NMR etc. The SER lacks the information about the annual budget set by the Department/University/Country towards this and what is the policy in regard to hiring of technicians and who pays for their salaries.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Well-equipped infrastructure and resources for teaching and research activities;
2. Good facilities to take care of students with special needs;
3. Start of a Centre for Bioprocess Research.

(2) Weaknesses:

1. Lack of information on fermentation, metabolic engineering, system/synthetic biology and downstream processing;
2. Software facilities for process design and sustainability assessment are not available.

3.7. STUDY QUALITY MANAGEMENT AND PUBLIC INFORMATION

Study quality management and publicity shall be evaluated according to the following indicators:

3.7.1. Evaluation of the effectiveness of the internal quality assurance system of the studies

The quality assurance systems and specific measures are very much targeting essential aspects of monitoring quality of studies both at the side of student satisfaction as well as on the side of administrative incentives facilitating teachers' will to seek for the best results in their teaching activities. The quality assurance system at KTU in general and the Faculty of Chemical Technology in particular contains all major elements aiming at maintaining the highest standards in teaching. In particular, the system is organised in a holistic manner and contains management quality evaluation, teachers' competences, and analysis of student's needs, student opinions surveys and monitoring of the achievements of students. While most of the target groups are involved in the measures for quality assurance, no procedures envision reference to independent expert teams to provide objective and unbiased views on the quality of study programmes under consideration and possibly other programmes at KTU.

3.7.2. Evaluation of the effectiveness of the involvement of stakeholders (students and other stakeholders) in internal quality assurance;

As presented in the self-evaluation report there is a considerable amount of information which is being harvested at the University aiming at improving quality of the studies at all levels (BS, MS and presumably doctoral studies). However, it is not clear how this information is being processed, and how both the staff and the general public are getting access to the conclusions which should come out in a systemized format. For example, even though there is a great need for specialists in the Biotechnology industry in Lithuania, the admission numbers are decreasing which is especially very well visible for the 2nd cycle programme. The panel did not find evidence neither in self-evaluation report nor in communication with the staff, of the analytical attempts to find out if the decreasing admissions may be related to a modest appreciation of the study programmes by target groups, or even negative perception of the quality of studies at KTU , Faculty of chemical technology by students, alumni and employers.

3.7.3. Evaluation of the collection, use and publication of information on studies, their evaluation and improvement processes and outcomes.

While a number of QA measures are yielding positive effects, it is still not fully clear how the outcomes of the quality of evaluation processes are being measured (in the analytical sense) by all levels of management. It looks like the problems that are being identified in the programmes are being communicated to teachers and in most cases the problems are solved through either improvement of the content of the subjects or adding/removing disciplines from the curriculum, or increasing competences (including horizontal ones) of the teachers. This is very good when the information on QA is being processed and outcomes are expected at the level of individual subjects. However, the holistic approach which is being stated by the self-evaluation team requires an in-depth analysis of the whole information collected from different sources and from different evaluation fields. While the indicator-based system works well for individual teachers it is not clear for us if such information is being processed to make an overall assessment of the quality of the programmes, especially in the context of other similar programmes provided by other national universities and universities across Europe. Such analysis would provide valuable information for all levels of the management to make well-informed decisions aiming at increasing the competitiveness of the programmes, and solving the problem of decreasing admission numbers. The reference to external QA service providers may ensure that the data collected from all sources can be processed and analysed in a systematic way.

3.7.4. Evaluation of the opinion of the field students (collected in the ways and by the means chosen by the SKVC or the HEI) about the quality of the studies at the HE

In general, students evaluate the quality of the programmes as good. In some cases, student remarks and complaints which are being received through the survey vehicle resulted in major improvements in study subjects. It is not though clear if the data which is being collected periodically are of sufficient quality, and whether or not it can deliver expected effect on quality assurance of the study process. While student opinions are a very important component of the QA process at the University, one should take into account that such opinions are often heavily biassed and include artefacts that have nothing to do with the quality of studies. We did not find any clear description of how biases are being estimated, and whether or not some data processing methodology is in place to address this issue. In this context the institute of external QA evaluators may help to approach such problems in an unbiased way.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Holistic approach to organising study quality assurance.
2. Major stakeholders are involved in quality assurance.

(2) Weaknesses:

1. There is a lack of the self-evaluation of effectiveness of the quality assurance system at the university, providing an objective view on the effectiveness of QA measures at all levels of study management.
2. There are no QA procedures which would provide an in-depth analytical reflection on the quality of study programmes at the Faculty and would allow the management (at all levels) to make effective interventions ensuring competitiveness of the programmes at national and international level.

IV. RECOMMENDATIONS

Evaluation Area	Recommendations for the Evaluation Area (study cycle)
Intended and achieved learning outcomes and curriculum	1. The establishment of the administrative operational unit of the Faculty of Chemical technology specialising in Biotechnology is recommended. 2. Advanced hot topics should be part of the curriculum. 3. Engineering topics such as Biochemical Engineering, Mass Transfer, Heat Transfer, Reactor Designing, Thermodynamics) in first and second cycle of Biotechnology are missing from course content, probably due to lack of Teachers who could teach these subjects; 4. Absence of hot topics: Circular Bioeconomy, Biosustainability, Waste Valorisation, Synthetic Biology, System Biology, Metabolic Engineering, Directed Evolution in first and second cycle of Industrial Biotechnology;
Links between science (art) and studies	1. The motivation and communication methods for student involvement into research activities should be improved via learning the reasons behind the lack of interest.
Student admission and support	1. None
Teaching and learning, student performance and graduate employment	1. There should be an improvement of emotional intelligence knowledge and skills formation from the first circle of study semester through its emphasis on intercultural awareness, empathy, self-awareness and social skills can enormously aid intercultural communication competences.
Teaching staff	1. More faculty members with first degree in Chemical/Biochemical Engineering should be recruited for teaching and research into engineering aspects of biological systems. 2. Teaching qualifications should be mandatory to improve pedagogical skills. 3. The students from the second cycle programme should be encouraged for PhD and some integrated programme in this regard should be initiated.

Learning facilities and resources	1. More infrastructure needs to be developed in the area of upstream and downstream processes including analytical facilities and developing a Metabolic and Bioprocess Engineering laboratory. 2. The Department should have software facilities for teaching courses related to sustainability assessment of bioprocesses.
Study quality management and public information	1. The assessment of effectiveness of a complex of quality assurance measures is recommended to be carried out periodically.

V. SUMMARY

Main positive and negative quality aspects of each evaluation area of the study field *biotechnology* at Kaunas University of Technology:

Industrial Biotechnology is a rapidly growing field, and the market has significantly gone up in the last two decades. KTU is a top ranked University in Lithuania and runs the first and second cycle of the programme in Industrial Biotechnology which was initiated in 2018. Both the programmes have been implemented as per the requirement of the European standards. The Faculty of Chemical Technology (CTF) implements these two programmes and prepares next generation Biotechnologists who would immensely contribute to the growth of the country through the Bioeconomy sector. In 2019, the Centre for Bioprocess Research was established at CTF equipped with modern facilities for high quality research in the field of Molecular Biology, Genetic Engineering and Microbial Biotechnology.

Industrial Biotechnology has strong commercial potential in Lithuania and most of the research projects done by the students from both the cycle of programs aligns nicely with national need and requirements of the social partners. The active participation of social partners helps the students to connect with the real world and strengthen their chances to get a job in industry. However, the teaching and research staff involved in the first and second cycle of the programme in Industrial Biotechnology are scattered over many disciplines and Biotechnology as a separate Department does not exist.

The teaching staff is highly efficient with a good student to teacher ratio and has a strong research profile as evidenced by their publication record and involvement in national/international projects. The University runs a good number of courses for professional development of teaching staff; however, the number of academic staff participation in mobility visits is less and needs to be encouraged. Somehow, student engagement in research is less and needs to be enhanced through proper motivation and communication methods.

Industrial Biotechnology is an interdisciplinary field and encompasses several disciplines. The content of both cycles of programs is more Science based with less components from the Engineering side. The current syllabus contains topics on Chemistry, Biochemistry, Microbiology, Molecular Biology, Physics, Mathematics but lack core Chemical/Biochemical Engineering topics. Further, the syllabus lacks advanced topics such as Circular Bio-economy, Bio-sustainability, Waste Valorisation, Synthetic Biology, System

Biology, Metabolic Engineering, and Directed Evolution. Alumni and employers noted the need to strengthen knowledge of Emotional Intelligence (EI) and start systematically forming EI skills from the first semester of the first learning cycle. Therefore, the syllabus should be thoroughly revised to include such topics, accordingly teachers should be recruited and infrastructure should be developed.

KTU provides mentorship and guidance to students on their study program and future aspirations. The students are also supported and encouraged through a wide range of scholarships. Currently, all the information available for students is not available in English and this need to be done to attract more students from overseas. The student experience is very good and they are quite happy with the quality of the programmes in terms of teaching, research and mentorship. The University also has a holistic approach for study quality assurance and major stakeholders are involved in quality assurance.

KTU is also equipped with all the facilities necessary for taking good care of students with special needs. Both the study programs ensure the fairness, transparency and quality of student assessment using effective and transparent methods. A good number of the students from first and second cycle study programmes are getting employed but the number needs to be increased with proper guidance. More and more students should be encouraged for mobility visits to gain international exposure.

Expert panel chairperson signature:

Dr. Vinod Kumar **(signature)**