JOINT REPORT BY THE EXPERTS ON THE INCLUSION OF A LICENSED STUDY PROGRAMME ON THE ACCREDITATION FORM

University of Latvia

STUDY FIELD

Wildlife Sciences

STUDY PROGRAMME

Academic bachelor study programme "Biotechnology and Bioengineering"

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Table of contents

I. Summary of the Assessment

Concise summary of the assessment of the study programme to be included on the accreditation form and its compliance with the requirements set forth, as carried out by the experts. Specify the positive and negative aspects identified.

Summary

The academic bachelor study programme "Biotechnology and Bioengineering" (the study programme) is jointly administered and run by the University of Latvia (UL) and Riga Technical University (RTU). This multidisciplinary study programme is currently offered in Latvian but work is under way to implement it in English. Currently 70 students are enrolled and the student number is expanding. The main goal of the study programme is to strengthen the educational base of biotechnology and bioengineering in Latvia and thereby improve the competitiveness of the universities and Latvia.

Positive aspects of the program provision can be listed:

* This study programme is much needed for Latvia's educational landscape. There isn't a competing study programme in terms of scope and focus in Latvia and its importance is therefore undisputed. It allows Latvian students to study this major direction in today's science and engineering in their own country.

* The study programme clearly improves the competitive position of Latvia, both academically and economically. Biotechnology and bioengineering are growing and integral parts of modern economies. More companies are created every day by this growing industry world-wide. The current study programme supports starting new companies and also finding jobs within the existing companies. The demand for highly qualified and skilled people in biotechnology is far greater in Latvia than even this study programme can produce.

* The study programme is jointly offered by the two higher education institutions in the country. This demonstrates cost effectiveness and synergy in quality.

* The academic staff of the study programme is well qualified and has the necessary experience. A wide level of expertise is represented among the staff. The academic staff is highly motivated to constantly improve but also to hear and use the feedback from students to develop the study programme further.

* The students are motivated and they have a quite clear vision of the future. The students' approval of the study programme and the level of energy and excitement about the study programme seems to be very high.

* The study programme is well planned and carefully conducted. The interdisciplinary nature of the study programme is well addressed by incorporating deep courses from all supporting basic sciences. The foundations are strong and will help the students face the real world and labour market challenges very well.

* The material base for the study programme is excellent. This includes very modern lecture rooms, practical work laboratories, a library etc.

* There is a good balance between the mandatory and elective courses. It is not too liberal to sacrifice the quality of the basic sciences taught but at the same time liberal enough to let each student find their own special direction. The students do not need to choose the final specialisation direction immediately when they start but they can figure it out in the course of their studies.

* Careful comparison of this study programme with other similar study programs in other countries has been conducted. This has led to adopting the best fitting parts from the other study programmes.

* There are active efforts by the study programme representatives to make contact and establish ties with other institutions and the industry. The study programme leaders clearly understand the importance of interaction with the industry partners to ensure that the study programme steers in the direction of real-world requirements.

Risks identified:

* The study programme is quite new and still in the phase of getting established. One would therefore expect certain changes as the feedback from staff, students and other involved parties is being analysed and suggestions incorporated.

* There is some uncertainty regarding the opening of the English language version of the study programme. The experience with running this study programme in English is lacking and it isn't clear how popular the study programme will be among the English speakers.

* The current plan is to switch the language of instruction to English. Provided that enough English speakers are interested, the entire course-work will switch to English only. The experience of the staff to teach in English is limited.

* Despite the increase in the number of budget places, the number of state-financed budget places is insufficient to meet the needs of the industry.

II. Description of the study programme

1. Indicators describing the Study Programme

1.	Name of the higher education institution/college	University of Latvia and Riga Technical University
2.	Name of the study field corresponding to the study programme	Wildlife Sciences (UL)
3.	Name of the study programme	Biotechnology and Bioengineering
4.	Code of the study programme in accordance with the Latvian Education Classification	43421
5.	Language of study programme implementation	Latvian and English
6.	Amount, duration, form and type of the study programme (also distance-learning)	6 semesters (3 years) full time regular studies
7.	Admission requirements	For the study programme in Latvian: 1. Secondary education 2. The secondary education document must have a successful (not lower than 4) annual mark 1) in biology or nature science, 2) in maths (or average algebra and geometry) or chemistry or physics 3. Evaluations in central examinations in Latvian, foreign language, maths, biology or physics, or chemistry For the Study programme in English: 1. Secondary education 2. The secondary education document must have a successful (not lower than 4) annual mark 1) in biology or science, 2) in maths (or average algebra and geometry) or chemistry or physics. 3. Evaluations in central examinations in Latvian, foreign language, maths, biology or physics, or chemistry 4. Having acquired secondary education in foreign countries: 1) the secondary education document must have a successful assessment (1) in biology or science; 2) in maths or chemistry or physics

		(markings must be no lower than 6 (10 on a scale) or "almost good"); 2) English proficiency according to paragraph 1.15 of the General Conditions for UL.
8.	Address of the study programme implementation, indicating whether the study programme is implemented in the **branches** of the higher education institution / college	UL Faculty of Biology, Jelgavas iela 1
9.	Degree, professional qualification or degree and professional qualification to be awarded	Bachelor of Natural Sciences
10.	Date of study programme licensing	01.07.2020.
11.	Date of starting the implementation of the study programme	2020./2021. ac.year
12.	Accreditation term of the study field	31.12.2023.

Analysis

1.1. Compliance of the study programme with the study field

The University of Latvia offers a broad academic bachelor study programme "Biology" as part of the study field "Wildlife Sciences". This study programme alone is limited in scope and could not offer all required knowledge and skills in the emerging biotechnology direction. A new study programme was needed to address the labour market requirements more accurately and also more narrowly. This led to the implementation of the study programme "Biotechnology and Bioengineering" (the study programme) that is being offered jointly by the University of Latvia (UL) and Riga Technical University (RTU). This joint effort of two leading higher education institutions is not only a good and cost-effective example of how to collaborate but it increases the quality of the study programme. The two universities have different and complementing knowledge and resource bases that achieve a special synergy when combined.

The study field "Wildlife Sciences" in the UL includes four study programmes on different levels: academic bachelor study programme "Biology", academic master study programme "Biology", doctoral study programme "Biology", doctoral study programme "Natural Sciences" (SAR, Page 5). The study programme "Biotechnology and Bioengineering" complements the existing structure of the study field well, as it ensures the interaction between theoretical and applied science. The content of the study courses in Part A and Part B corresponds to the "Wildlife Sciences" study field with an emphasis on topics specific to the field of biology and biotechnology sciences (SAR, Annex 10). Students also have the opportunity to continue their studies at the master's and doctoral level in the study field "Wildlife Sciences" at UL.

The study programme is designed to align with the scope of UL and RTU, strategic development directions, societal and economic development needs and the development trends. It fits into the

"Wildlife Sciences" study field of UL and strengthens it considerably. It helps to integrate the traditional biological studies with other natural sciences and engineering.

The study programme teaches biotechnology at least to some extent in all essential directions: medicine, virology, agriculture, environment, marine biology, industry. The courses offered as part of the curriculum are adequate. They offer a wide general scientific basis as well as a multitude of elective directions. Experts particularly appreciate the emphasis on mathematics and physics along with chemistry and biology (SAR, Annex 10).

There is a good integration of different courses offered. For example, data collected in one course is analysed in another course in order to integrate different fields better (meeting with the academic staff of UL). The need for biotechnology and bioengineering specialists is increasing. By integrating life sciences with technical disciplines and mathematics the study programme provides a good educational foundation for young people to enter the labour market.

The selection of computer programming courses is fitting. At the same time several of the currently enrolled students (meeting with the students) indicated that computer programming "did not stick with them". Experts therefore recommend an improved integration of the programming courses with the other courses offered because experts believe the students do not see the full benefit of learning computer programming. The intent should be to demonstrate the practical value of computer programming in addition to its technical capabilities.

Students additionally indicated that they would like to see even more interactions with the industry side and also more exposure to learning soft skills such as giving presentations and making their ideas more understandable to the others. Students would also like to learn about the everyday activities of academic scientists in addition to the academic work they conduct. Students told the experts that they did not have a clear idea of what it would be like to be an academic scientist. They would like to see the problems scientists encounter, science financing options, writing grant proposals, teaching requirements, building academic laboratories, everyday activities of scientists, negative emotions/situations encountered etc. so that they could better decide between academia and industry. This will help them in deciding their future plans after graduation.

A comparison with similar study programmes at Vytautas Magnus University (VMU) and the University of Tartu (UT) has been carried out (SAR, Page 13). The VMU study programme "Biotechnology and Bioengineering" is 4 years long. The UT study programme relies on offering more courses in the form of modules. Experts believe that the UL is well positioned relative to the VMU and UT similar programmes and will prove to be very competitive. Experts would like to suggest (as an option to consider) an implementation of flexible study modules for the first part of the curriculum to ensure that the students always take the courses in logical sets and do not skip important parts of their curriculum. This is merely space for improvement. Experts don't recommend structural changes in the study programme but rather call for greater integration between different courses where completion of one course will automatically suggest the next complementary course for the chosen direction.

1.2. Compliance between the title of the study programme, the degree to be awarded

The study field is broad and as a result a wide basis in several basic sciences is provided by the study programme with a strong emphasis on biotechnology and bioengineering. (The biology courses fill 40% and engineering courses 20% of the content, the other topics account for 40% of the content (SAR)). Currently the study programme of "Biotechnology and Bioengineering" awards a degree of Bachelor of Natural Sciences. This degree name does not fully describe the study field. Based on Cabinet Regulation No. 240 "Regulations on the National Academic Education Standard" and Cabinet Regulation No. 322 "Regulations regarding the classification of Latvian education", the name of the awarded degree should be changed to Bachelor of Natural Sciences in Biochemistry.

1.3. Compliance of the study programme indicators (study programme code, amount, implementation duration) with the learning outcomes defined for it.

The study programme code is 43421. However, it should be changed to 43422 according to Cabinet Regulation No. 322 "Regulations regarding the classification of Latvian education" that since licensing of the study programme has changed. New code corresponds more precisely to the study programme as the end part of the code "422" is for Biochemistry that includes Biotechnology.

The study programme is offered jointly by UL and RTU and has a duration of 3 years - 6 semesters and an amount of 120 CP - 180 ECTS. The duration of the study programme and the amount of coursework are the same or very similar to the corresponding study programmes at the other leading universities - UT, VMU in the region (SAR, Page 13-16). The students will acquire a level 6 competence according to the European Qualifications Framework (EQF). It will ensure a favourable position for the graduating students at the labour market.

A relatively high competition to get accepted into the study programme is essential for maintaining the high standards among the graduates. Admission requirements for studies in Latvian and English are indicated in Table 1 (SAR, Page 8, Parameters describing the study programme) and are appropriate and clearly defined. Applicants from other countries have to demonstrate English proficiency according to paragraph 1.15 of the General Conditions for UL.

The management of the study programme is making active efforts to establish collaboration with the industry. It was verified during the meeting with industry representatives from LLC "SilvEXPO", LLC "Rīgas Water", Latvian Biogas Association. This is essential for updating the outcomes of the study programme.

Mapping of the learning outcomes are presented in SAR, Annex 4. Applied methodology of learning outcomes is recognizable in terms of specified taxonomy of knowledge, skills and competences.

The feedback of the currently enrolled students has been overwhelmingly positive (meeting with the students). It was highly valued by the students that the curriculum was built in such a way that they do not have to think about specialising immediately but can think about it for a longer period while studying the core scientific disciplines. Several students currently enrolled in the study programme indicated that some of the courses were administered in the form of rather long lectures that exceeded a reasonable attention span (meeting with the students). At the same time the

students agreed that the management of the study programme has been very accessible, always listened to their feedback and made every effort to address any issues.

Conclusions, strengths and weaknesses

***Conclusions*:**

The study programme complies well with the study field, both in terms of the courses offered and the general aim. Overall the study programme is implemented to meet both the regulations of the university and higher education in general. It also meets and, in some aspects, even exceeds the expectations of the students. The level of preparedness for finding professional jobs after completing the study programme is expected to be sufficiently high. The distribution of courses across various fields of sciences is adequate. Experts suggest increasing the importance and integration of computer programming courses and also to include a "soft skills" course for communicating ideas and interacting with industry (as an option to consider).

Based on Cabinet Regulation No. 240 "Regulations on the National Academic Education Standard" and Cabinet Regulation No. 322 "Regulations regarding the classification of Latvian education", the awarded degree should be changed to Bachelor of Natural Sciences in Biochemistry. The study programme code 43421 should be changed to 43422 according to Cabinet Regulation No. 322 "Regulations regarding the classification of Latvian education" because since licensing of the study programme regulation has been changed. New code corresponds more precisely to the study programme as the end part of the code "422" is for Biochemistry that includes Biotechnology. Other indicators of the study programme such as study programme field "Wildlife Sciences", name of the study programme "Biotechnology and Bioengineering", duration 6 semester and admission requirements are appropriate. The study program indicators and learning outcomes do not has problems.

***Strengths*:**

* The set or courses offered is competitive and adequate for the aim of the study programme and the mathematics-oriented courses offer essential foundations.

* The study programme is able to provide the graduates with the necessary skills and knowledge to be successful at finding jobs.

Weaknesses:

* The code of the study program does not comply to Cabinet Regulation No. 322 "Regulations regarding the classification of Latvian education"

* The awarded degree does not comply with the Cabinet Regulation No. 240 "Regulations on the National Academic Education Standard" and Cabinet Regulation No. 322 "Regulations regarding the classification of Latvian education".

* The computer programming courses should be better integrated with other study courses and additional "soft skills" courses should be warranted.

2. Topicality of the study programme

Analysis

2.1. The topicality of the study programme and the compliance of the content with the tendencies of the industry (area), the changes made since the licensing of the study programme

The study programme covers the area borderlining biological sciences, engineering and industry. The wide scope means that a multitude of topics need to be covered in the courses, ranging from basic mathematics to advancing social skills. Therefore, there is always a question about covering a wider basis versus going deeper into details. This balance seems to be well achieved, it is well reflected in the distribution of courses offered. “Biophysics”, “General and Physical Chemistry”, “Mathematical Basis of Biotechnology”, “Information Technology” are core courses that set the foundations. This is well balanced with “Principles of Entrepreneurship”, “Basics of Economics and Management” as bridges to the industry side. More specialised biology courses e.g. “Metabolism” will cover the essential parts of the biological sciences. Courses like “Electrical processes and equipment in biotechnology”, “Biological reactors” represent the bioengineering direction (Annexes/Study Course Descriptions).

The objectives of the study programme are based on high-level documents such as "Latvia's National Development Plan for 2021-2027". This includes points like Excellence in Science for Public Development, Economic Growth and Security, and Productivity and Innovation, promoting developments in smart specialisation areas (SAR, Chapter 1, Page 3).

Experts agree that the study programme is well aligned with the above-mentioned general aims. Knowledge-based economy is becoming overwhelmingly important. The study programme provides opportunities to prepare highly educated specialists. That in turn will cause an additional influx of these specialists and growth of the industry, thereby fuelling the need for more higher education opportunities in the field. This cycle will benefit Latvia's education and economy.

The study programme aims to fill the void that previously existed in Latvia while similar programmes already have been offered at the other competing universities such as VME and UT. Biotechnology and bioengineering are growing and emerging fields of economy. This sector of knowledge-based industry is among the fastest growing and most profitable (Nature Biotechnology volume 39, page 249, 2021). Without the current study programme Latvia’s economy would have a clear disadvantage and would direct interested students to go abroad because this study programme is unique in Latvia. Currently the interest to hire and involve workers with a bioengineering background is greater than the study programme can supply (meeting with the employers). This clearly shows the need for the current study programme for state economy and also its relevant topicality as well as its compliance with the industry needs. That is why experts support expanding the study programme and enrolling more students. These efforts are already under way as the English language version of the study programme will be launched in the future (SAR, Chapter 2.3, Page 20).

Since the licensing of the study programme, the following changes have been made (SAR, Chapter 2.3, Page 19): 1) Reduction in the number of study results to be achieved in the study programme to nine. The most important study results have been reasonably determined, appropriate changes have been made in the mapping of the study courses (Annex 4); 2) The content of the study course Valo1051 English I has been modified, emphasising specific topics in the field of biology and biotechnology sciences (Annexes/Study courses descriptions).

2.2. Dynamics of the student number and prospects of employment for graduates.

The number of accepted students is on the rise and the projected long-term dynamics are positive. In 2020/2021 the number of enrolled students was 27 (2 state funded, 1 RTU funded, 24 private funding). In 2021/2022, the number of enrolled students was 26 (2 state funded, 24 private funding) (SAR, Annex 2). In September 2022, there are 70 students in the study programme (30 first year, 19 second year and 21 third year students). Eighteen students are state-financed and 52 private funding places (written response of the UL staff to the additional questions of the experts). Experts acknowledge the importance of introducing the study programme in English in 2023 (meeting with the study programme management) because it adds to the visibility, viability and competitiveness of the study programme.

As the need for graduates with a bioengineering background is constantly increasing experts underline that finding ways to accept more students would be beneficial. Experts think that the best way to increase the number of students in the study programme is by trying to increase the number of state-funded study places.

Biotechnology and bioengineering are among the fastest growing directions of the high-return knowledge-based economy (Nature Biotechnology volume 39, page 249, 2021). The need for specialists in this field is beyond doubts. While meeting with the industrial employers of the bioengineering field in Latvia (meeting with employers) experts were convinced that the available positions for the graduates of the study programme greatly outnumber the potential applicants.

The employment prospects of the graduates are well above average compared with traditional study fields such as green biology (Nature Biotechnology volume 39, page 249, 2021). The modern economy needs more specialists who are able to cross the line between disciplines that have been traditionally mostly separated. A high-level competition between students to get into the study programme - currently at about 1:5 (meeting with academic staff) helps to ensure that the graduating students have a better chance at the labour market because students that are accepted in the study programme will have higher knowledge base and higher motivation. This competition is favourable for the future of the study programme.

Currently the interest to hire and involve workers with a bioengineering background is greater than the study programme can supply (meeting with the employers). Experts emphasise that the employment opportunities for the graduates are not limited to the existing companies and academia. The graduates are well positioned to start their own companies or to work in other

industries. Students can take advantage of the student business incubator programme of UL. The incubator helps students and their teams of all study levels and directions to start and develop a business, offering comprehensive support, which includes, for example, the opportunity to participate in trainings held by the incubator, receive support from mentors, gain access to office and production facilities, as well as the opportunity of financial support in the form of grants (meeting with the academic staff of UL and students). During the meeting with the students, experts were positively surprised that all four students who were interviewed had different plans for the future and different outlooks. The students' future interests ranged from laboratory work to administration and from academia to industry. This shows the wide scope and high quality of knowledge they get from the study programme.

The study programme has yet to be implemented in English although this is a clear plan for 2023. The COVID-19 situation in the world has postponed this plan so far (meeting with the study programme management). Experts were assured that the readiness to start implementing the study programme in English is in place. It will increase the number of students even further. However, the need for conducting practical laboratory work will set the limits to the total number of the students.

In 2020/2021 ac. year two state-funded study places; in 2021/2022 ac. year, two state-funded study places (SAR, Chapter 2.4 Page 19; SAR, Annex 2). However, in the 2022/2023 Study Year the study programme offers 18 state budget study places (SAR, Page 34). Despite the fact that the number of state budget places has increased, the future increase in the number of budget places is also important for the development of the study programme. An increase in the number of budget places could attract even more students, which is important for the industry as a whole. The existing number of budget places is insufficient to meet the needs of the industry (meeting with the employers).

The study programme needs more time to get fully established. The first students are yet to graduate and some analysis will have to wait for it so that graduates could provide feedback about their education quality after finding jobs. The English language version of the study programme is currently lacking information for analysis. The success of it will influence the quality and future prospects of the entire study programme.

Conclusions:

The study programme is up-to-date and corresponds to the modern requirements of the study field and the industry. Its topicality complies with the tendencies in the industry. The changes made since the programme was licensed are reasonable and appropriate. The number of students in the study programme is increasing, indicating the growing interest from potential students.

Strengths:

* The courses provide a very good fit for a broad academic education, for finding high-level jobs and for innovating in the field of bioengineering and biotechnology.

* The study programme is much needed for Latvia's educational system and economy.

* The study programme successfully follows the current trends in industry and tries to anticipate new trends.

Weaknesses:

* Despite the increase in the number of budget places, the number of state-financed budget places is insufficient to meet the needs of the industry.

3. Resources and provision

Requirement [R1]: Compliance of the study base, science base (if applicable), information base (including library), material and technical base and financial base with the conditions for the implementation of the study programme and for ensuring the achievement of learning outcomes.

Analysis

The study programme is jointly offered by the two leading higher education institutions in the country. This is not only a good and cost-effective example of how to collaborate but it increases the quality of the study programme. The two universities have different and complementing knowledge and resource bases that achieve a special synergy when combined.

The study programme from UL side is implemented by UL Faculty of Biology in cooperation with UL Institute of Microbiology and Biotechnology. Both academic and scientific staff from different departments of the Faculty of Biology e.g. The Department of Microbiology and Biotechnology, Department of Molecular Biology, Department of Botany and Ecology are involved in the implementation of the study programme. Other Faculties of UL e.g. Faculty of Medicine, Faculty of Chemistry, Faculty of Physics, Mathematics and Optometry and Faculty of Business, Management and Economics are also involved in the study process (SAR, Page 21-22, Chapter 3; Annexes/Study course descriptions). Representation of different structural units/departments in the implementation of the study programme makes it possible to attract highly qualified academic staff and ensure interdisciplinarity in the study process and research, as well.

The teaching staff appeared very motivated and capable. They are by no doubts the major asset of the study programme. The future plans are clearly developed and defined by the staff to steer the project in the optimal direction. The staff is very open about learning from the experience of the other universities (meeting with academic staff of UL and students).

The experts had a chance to visit the facilities at the UL and hear about similar facilities at the RTU. A tour of the lecture rooms, laboratories and the library of UL was given. The main building where instruction takes place is only a few years old. It is modern, functional and inviting to the

students. The state-of-the-art facilities help to make the study programme more attractive. The experts saw lecture rooms equipped with the latest technologies for teaching students. The main building is always open to the students and also gives options for resting and spending free time.

The lecture rooms and laboratories were equipped at the best level. For example, the microscopy laboratory had a separate state-of-the art microscope for each student. If anything, some of the laboratories were too well equipped in the sense that some of these resources could have been directed elsewhere, for example resources spent on other equipment or hiring staff. Experts understand that this is not often possible due to the restrictions posed by the funding sources. An example would be a bioreactor laboratory with eight bioreactors. While the current solution is a very good one indeed, the quality of laboratory work would not be much reduced if more students shared the same reactor. Some of the laboratories were so fresh that it was not obvious how efficiently they are used. For example, the state-of-the-art greenhouse on the roof had not seen much use yet and the experts were not convinced of its practical value or the necessity of that investment.

Experts asked about genomics research options such as sequencing and genotyping equipment and their availability to course work. Experts understood that this important part of biotechnology is not covered in hands-on laboratory courses and the only way to get exposure to these techniques is by collaborating with special laboratories conducting genome research.

Overall the technical base is certainly sufficient for implementing the study programme.

The library has been accredited as a State significance library. It appeared most inviting to the students and every effort has been taken to make it work maximally well for the users. The library offers around the clock access to its services, features 100 work-stations and many loaner laptop computers. The number of books and available journals is high and sufficient for implementing the study programme in Latvian and English. Books related to provision of various study courses can also be found in Latvian (on-site visit). In the collection of the UL Library, there are 2083 copies of the expenditure with the eligibility of the information resources for the study field. From November 15, 2019 to October 1, 2021 the UL Library collection has increased by 431 copies. For example, in the field of Molecular Biology 790 Books and 215 Periodicals and in the field of Gene Engineering 114 Books and 2 Periodicals are available in the library (SAR, Page 28, Table 1; on-site visit). UL Library provides its clients with the possibility to use the UL e-resources repository. In the study field "Wildlife Sciences" more than 47 004 publications are available. UL has subscribed to 42 e-resource platform, including e-books (*VLeBooks, ProQuest Ebook Central*), e-journals (e.g. *Scopus, ScienceDirect, Web of Science*), e-journals databases (e.g. C*ambridge Journals Online, Emerald eJournals Premier, STOR I-XII, XIV, XVand Life Sciences Collection, ScienceDirect, SpringerLink Contemporary Journals, Taylor & Francis Social Science & HumanitiesLibrary, Physical Review Journals, Westlaw, Wiley Online Library E-Journals Full Collection* etc.) (SAR, Pages 28-29).

In the Library of Naturals Science, UL staff have the possibility to use: free-access inventory, self-service books for home, extension and transfer of usage, computers, mobile phone chargers. In the House of Science Library, throughout the day, the UL staff can use: free-access stock, two self-

service facilities for issuing books at home, extending and trans-ferring usage times, and a self-service wall for using portable computers (SAR, Page 23; on-site visit).

Experts were convinced that implementing the study programme by two universities is not a limitation but rather an advantage because more resources become available to the students. The RTU offers access to its library with over 1.4 million printed documents, different expertise of their scientific staff, more teaching and scientific laboratories etc (SAR, Pages 23-24).

There is still some, albeit low level, uncertainty about the future financing of the study programme. Experts recognize that this is normal after launching a new study programme.

In 2020/2021 ac. year two state-funded study places; in 2021/2022 ac. year, two state-funded study places (SAR, Chapter 2.4 Page 19; SAR, Annex 2). In 2022/2023 the number of state-funded study places is 18 (SAR, Page 34; written response of the UL staff to the additional questions of the experts). It is expected that increasing them will lead to growth of the interest in the study programme even further.

At the moment the financial base of the study programme is formed from state budget funding and student fees. The study programme costs EUR 2705 EUR per student per year for the study programme in Latvian and 3103 EUR per student per year for the study programme in English. The calculation is made on the condition that an average of 83 students are studying in the study programme in Latvian (30 in the first year of study); ten of them are state-funded students and 75 students are studying in the study programme in English. In the 2022/2023 Study Year the study programme offers 18 state budget study places (SAR, Page 34). Compared to the previous years, when only two budget study places were offered, in 2022 the number of budget places increased. The costs of a study place in the study programme does not exceed the costs of other European countries. The management of UL indicated that the current number of students and financial status of the study programme is stable and complies with the needs for qualitative implementation, however an increase in the number of budget places in future is important for the sustainability of the study programme.

During the meeting with the management of UL and the study programme management, experts asked about the possibilities to provide research financing. Answer was that state base funding for research, internal grants and different international projects are mostly used for the development of scientific research for academic staff and students.

It is not clear how well the English language version of the study programme is going to launch. If not enough interested applicants apply then the plan is to postpone or cancel the English version of the study programme. As there's no experience with the implementation of this study programme in English the problems will need to be solved as they arise. It must be noted that it can be difficult to immediately attract a large number of foreign students in the first year of implementation of the study programme. Regardless, the plan to offer studies in English is relevant and highly desired for the success of the entire study programme.

Conclusions:

All departments of UL Faculty of Biology and UL Institute of Microbiology and Biotechnology included in the implementation of the study programme provide the necessary support for the study programme. The teaching staff is very motivated and capable.

The library offers a wide range of resources to the users. Full-text database of scientific articles published is also available. The number of books and available journals is high and sufficient for implementing the study programme in Latvian and English. The library offers many services that help students and academic staff work with necessary resources.

The teaching-learning areas have a modern environment and equipment for the implementation of the study programme. The facilities are new and are on top level. The laboratories and library are well equipped and the facilities are modern and spacious. The material base is much better than adequate minimum requirements and experts don't foresee that it could limit the study programme in any way. Overall impression was very good and it is clear that the facilities support the learning outcomes and comply with the requirements.

The financial support provided for the study programme includes the financing of the national budget and private funding. The costs of a study place in the study programme does not exceed the costs of European countries, for the preparation of one student in a similar specialisation. The current finances are sufficient to implement the study programme.

Strengths:

* Modern state-of-the art facilities.

* Very well-equipped lecture rooms and laboratories.

* Infrastructure is accessible and inviting for the students.

Weaknesses:

None.

Evaluation of the requirement [R1]:

Requirement	Compliance			Justification
Compliance of the study provision, science provision (if applicable), information provision (including library), material and technical provision and financial provision with the conditions for the implementation of the study programme and for ensuring the achievement of learning outcomes.	Fully compliant	Partially compliant	Non-compliant	Material and technical provision are compliant with the study programme profile and correspond to the successful programme implementation. Information provision (including library) corresponds
	X			

				to the successful implementation of the programme. The current finances are sufficient to implement the study programme.

Requirement [R2]: Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements of the laws and regulations.

Analysis

The study programme engages academic staff from the UL and RTU. The staff consists of 39 people, 31 with PhD and 8 with MSc. Of them 24 are affiliated with UL and 12 are affiliated with RTU. Most are native Latvian speakers, 25 are qualified at English level C1 and C2 (Annexes/CV; Annex 3).

Latvian language proficiency of the academic staff of the UL involved in the implementation of the study programme is sufficient according to the Regulations Regarding the extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official language for the performance of professional duties and duties of office (Annexes/CV; Head of Study field declaration, Annex 11). English language proficiency of the academic staff is at least B2 level of the Common European framework (Annexes/CV; Head of study field declaration, Annex 11).

Academic staff continue to improve their English language skills in the framework of the specific support project 8.2.2 "Renewal of academic staff and capacity building at the University of Latvia" (SAR, Page 34).

Academic staff improve their qualifications by participating in mobility programs (including teaching at foreign universities), international scientific conferences, international research projects, preparing joint publications etc (Annexes/CV; meeting with academic staff of UL). Data of mobility of the teaching staff presented in Annex 6 show that three persons from the academic staff were in outgoing mobility in the 2020/2021 Study Year in different countries: Spain, Finland, Mongolia. It was noted that the international experience at the top-level research and educational centres of the world is somewhat limited. Majority of instructors have earned their highest degrees in Latvia. A competitive study programme should use guest lecturers from the leading universities of Europe that run similar programmes, for example Lund University, Imperial College, Technical University of Munich. The plans to engage additional guest lecturers from other leading scientific institutions - appearing in person and spending some time at the UL are developed. A new lecturer is joining from Portugal (meeting with the academic staff). At the same time the basis on engaging

these lecturers is not clear - whether the guest lecturers represent the leading edge of the field or they were chosen based on other criteria.

One of the possibilities to potentially improve the study programme could be to attract staff who received their PhD abroad.

The academic staff demonstrated understanding of the national specifics of the educational system. The academic staff is well aware of the internal rules that regulate the course of the study process at the UL (meeting with the academic staff of UL).

The staff is well qualified for the task and highly motivated based on the discussions with the experts. The experts were assured that, if needed, each course could be instructed by more than one well qualified lecturer (meeting with the academic staff of UL). Overall the qualities of the teaching staff fit well with the requirements of the study programme.

Conclusions:

The academic staff is highly qualified and motivated. The prominent number of academic staff who are involved in the implementation of the study programme have a doctoral degree - 79%.

The study programme is well managed in terms of compiling capable academic staff. The staff members have experience with teaching and they are also capable of doing it in English. Their international experience has been somewhat limited. Hiring more staff with their scientific degrees from abroad would strengthen the study programme further.

Academic staff is active in the field of outgoing mobility; incoming mobility could be more intense. However, the study programme has experience in attracting foreign academic staff.

Strengths:

* The qualification of the academic staff of the study programme comply with the requirements of the laws and regulation. The study programme is well managed.

* The lecturers are qualified and motivated, which stimulates the growth of student personalities, their academic perfection and interests in the field.

* The lecturers have been active in outgoing mobility programmes.

Weaknesses:

* Somewhat limited international exposure of the staff (small number of staff have their scientific degrees from outside of Latvia)

Evaluation of the requirement [R2]:

Requirement	Compliance	Justification

Compliance of the qualification of the academic staff and visiting professors, visiting associate professors, visiting docents, visiting lecturers and visiting assistants with the conditions for the implementation of the study programme and the requirements of the laws and regulations.	Fully compliant	Partially compliant	Non-compliant	The qualification of the academic staff of the study programme comply with the requirements of the laws and regulations, but there is slightly limited international exposure that can be supplemented with incoming and outgoing mobility.
	X			

Requirement [R3]: The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or artistic creation (if applicable).

Analysis

Not applicable.

Conclusions:

Not applicable.

Strengths:

Weaknesses:

Evaluation of the requirement [R3]:

Requirement	Compliance			Justification
The study programme for obtaining a master's or doctoral degree is based on the achievements and findings of the respective field of science or artistic creation (if applicable).	Fully compliant	Partially compliant	Non-compliant	Not applicable.

Requirement [R4]: Compliance of the study programme with the requirements of the Law on Higher Education Institutions and other laws and regulations.

No.	Requirement	Fully compliant	Partially compliant	Non-compliant	Justification
1.	The study programme complies with the State Academic Education Standard or the Professional Higher Education Standard, including the minimum requirements for the content of the compulsory civil protection course and the content of civil protection training for employees specified for the implementation of the study programme. The study courses of the professional study programmes include a module for the development of professional competence of entrepreneurship in the amount of at least 6 CP, if it has not been acquired in the previous professional study programme or is not included in the theoretical basic courses of the study programme branch (field of professional activity).	X			The study programme complies with the State Academic Education Standard, as evidenced (See Annex 9): the goal of the study programme, programme outcomes, volume 120 CP, duration - six semesters, parts of programme - compulsory part 82 CP; restricted elective part 22 CP; Bachelor Thesis 10 CP, number of contact hours - 40%; mandatory content - "Environmental protection for biotechnologists" (1 CP) and "Civil protection" (1 CP) courses, Principle of openness of evaluation, Principle of the minimum level of assessment, The assessment of study courses based on different types of testing.
2.	The study programme complies with a valid professional (occupational) standard, or with the requirements of professional qualification (if it is not necessary to develop a professional standard for the profession), if a professional qualification is awarded after acquisition of the study programme				Not applicable.
3.	The code of the study programme complies with the Cabinet		X		The study programme code is 43421. However, it should

	regulations on the Latvian Education Classification				be changed to 43422 according to Cabinet Regulation No. 322 "Regulations regarding the classification of Latvian education" that since licensing of the study programme has been changed. New code corresponds more precisely to the study programme as the end part of the code "422" is for Biochemistry that includes Biotechnology.
4.	The qualification of the teaching staff [1] complies with the conditions and requirements set for the implementation of the study programme, which are specified in the regulatory enactments in the field of education including the participation in the implementation of an academic study programme of at least five professors and associate professors together who have been elected to academic positions in the respective higher education institution, except in the cases provided for in Section 55, Part two of the Law on Higher Education Institutions.	X			The qualifications of the teaching staff is appropriate: -Teaching staff CV (Annexes CV) -Research directions and publications of academic staff (Annexes CV) -Language skills of academic staff (Annexes CV, Annex 11)
5.	Confirmation of the higher education institution/college that the teaching staff members to be involved in the implementation of the study programme have at least B2-level knowledge of a related foreign language, according to the European Language Proficiency Assessment levels (the division of	X			-CVs of the teaching staff (Annexes CV) -Confirmation of UL (Annex 11) Latvian language proficiency of the academic staff of the UL involved in the implementation of the

[1] *As used in this document, the term "teaching staff" refers to the academic staff and visiting professors, visiting associate professors, visiting lecturers, visiting lecturers, and visiting assistants of the corresponding higher education institution / college.*

	levels is available on the website www.europass.lv), if the study programme or any part thereof is to be implemented in a foreign language **or** proficiency of the Latvian language at least on the B2 level, if the study programme or a part thereof is intended to be implemented in the Latvian language and the lecturer has not acquired secondary or higher education in the Latvian language.				study programme conforms to the Regulations Regarding the extent of the Knowledge of the Official Language, the Procedures for Examining the Proficiency in the Official language for the performance of professional duties and duties of office (Head of Study field declaration, Annex 11). English language proficiency of the academic staff corresponds to at least B2 level of the Common European framework (Head of study field declaration, Annex 11)
6.	The study programme, which is intended to be implemented in a foreign language, complies with the requirements of Section 56, Part three of the Law on Higher Education Institutions	X			The programme is well structured The programme report certifies compliance with the requirements
7.	The sample of the study agreement complies with the mandatory provisions to be included in the study agreement (if applicable).	X			*Information has not changed since licensing procedure*
8.	The sample of the diploma to be issued for the acquisition of the study programme complies with the procedure by which state recognised documents of higher education are issued (if applicable).	X			The sample of diploma complies with the procedure by which state-recognized higher education documents are issued (Annex 14)
9.	The higher education institution/ college has confirmed that it will provide the students with the options to continue the acquisition of education in another study programme or at another higher education institution/ college (a contract with another accredited higher education institution/	X			*Information has not changed since licensing procedure*

	college), in case the implementation of the study programme is discontinued (if applicable).				
10.	The higher education institution/ college has confirmed that it guarantees to the students a compensation for losses if the study programme is not accredited or the licence of the study programme is revoked due to the actions of the higher education institution/ college (actions or omissions) and the student does not wish to continue the studies in another study programme (if applicable).	X			*Information has not changed since licensing procedure*
11.	At least five teaching staff members with a doctoral degree are among the academic staff of an academic doctoral study programme, at least three of which are experts approved by the Latvian Science Council in the respective field of science. At least five teaching staff members with a doctoral degree are among the academic staff of a professional doctoral study programme in arts (if applicable).				Not applicable.
12.	The scientific and pedagogical qualification of doctors of science complies with the criteria specified in the regulatory enactments regarding the evaluation of the scientific and pedagogical qualification of a candidate for the position of a professor and an associate professor (if applicable).	X			The programme report certifies the scientific and pedagogical qualification of doctors of science CV of the academic staff Academic staff research directions Publication of the academic staff
13.	The joint study programme complies with the requirements prescribed in Section 55^1, of the	X			The programme complies with the requirements prescribed in Section 55^1, of

	Law on the Higher Education Institutions (if applicable).				the Law on the Higher Education Institutions (Head of the Study Field Declaration, Annex 12)

Evaluation of the requirement [R4]:

Requirement	Compliance			Justification
Compliance of the study programme with the requirements of the Law on Higher Education Institutions and other laws and regulations.	Fully compliant	Partially compliant	Non-compliant	After assessment of the study program's compliance with the requirements of the Law on Higher Education Institutions, and other laws and regulations, experts concluded that the study programme fully complies to all of the criteria.
	X			

4. Implementation of the recommendations received during the licensing of the study programme

Assessment of the implementation of the recommendations provided by the licensing experts of the study programme.

Analysis:

The recommendations by the licensing experts of the study programme are detailed in the "Biotechnology and bioengineering self-assessment report" (SAR, Annex 7). Total of six recommendations are listed and the status report is provided in the document. Overall the recommendations were adequately addressed and implemented. Recommendation 4 - obtaining feedback from international students was not implemented because the international students have not yet arrived - started studies. At the moment the study programme is implemented only in Latvian. At the same time the study programme coordinators have been actively collecting and addressing feedback from the current students. Recommendation 6 involved implementing personality-forming courses for the students. This work is still in progress and the plans have not been finalised. Experts of this report also stress the importance of these courses along with other "soft skills" to improve presentation skills, negotiation skills, giving concise "elevator talks" etc. All other recommendations were fully and adequately addressed.

Conclusions:

The recommendations from the licensing experts have been dealt with care and attention to detail. Two recommendations were not fully addressed. In one case this was not possible, in another case

the work is still under way. It is clear that the study programme management are well on track with their implementations.

***Strengths**:*

* Previous recommendations have been successfully integrated into the study programme.

Weaknesses:

None.

III. Assessment of the study programme

X	Excellent
	Good
	Average
	Poor

IV. Recommendations

X	experts recommend that the study programme be included in the accreditation form within this study field
	experts do not recommend including the study programme in the accreditation form within this study field

Short-term recommendations:

1. Update the degree awarded in the study programme until the Study Quality Committee meeting.
2. Solve the issue of changing the study programme code according to the current regulation until the Study Quality Committee meeting.

Long term recommendations:

1. Despite the increase in the number of budget places, the number of state-financed budget places is insufficient to meet the needs of the industry. Changing this is a complicated procedure outside the direct scope of the universities therefore experts don't expect immediate results.
2. Experts suggest small changes in the curriculum. Computer programming should be better integrated with the other courses. Experts also suggest to include a "soft skills" course in the curriculum concentrating on learning how students can make themselves better

understandable, how to effectively communicate their ideas to the others, how to negotiate deals, how to be successful in the social setting of the industry world etc.

3. The study programme could benefit from further internationalisation of the teaching staff. This includes hiring Latvian specialists with significant international experience and top-level specialists from abroad.