CENTRE FOR QUALITY ASSESSMENT IN HIGHER EDUCATION

EVALUATION REPORT

STUDY FIELD of BIOTECHNOLOGY

at Vytautas Magnus University

Expert panel:

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

Evaluation coordinator – *Mr. Gustas Straukas*

Report language – English

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Study Field Data

Title of the study programme	***Biotechnology***	***Applied Biotechnology***	***Biotechnology and Pharmaceutical Analysis***
State code	6121FX008	6211FX013	6211FX022
Type of studies	University studies	University studies	University studies
Cycle of studies	First	Second	Second
Mode of study and duration (in years)	Full time (4 years)	Full time (2 years)	Full time (2 years)
Credit volume	240	120	120
Qualification degree and (or) professional qualification	Bachelor of Technological Sciences	Master of Technological Sciences	Master of Technological Sciences
Language of instruction	Lithuanian, English	Lithuanian, English	Lithuanian, English
Minimum education required	Secondary education	Bachelor degree	Bachelor degree
Registration date of the study programme	2011-08-22	2016-07-21	2020-08-12

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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 *18th 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. Gintas 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.	-

1.4. BACKGROUND OF BIOTECHNOLOGY FIELD STUDIES AT VYTAUTAS MAGNUS UNIVERSITY

Vytautas Magnus University (VMU) (Lithuanian: Vytauto Didžiojo Universitetas (VDU)) is a public university in Kaunas, Lithuania. The university was founded in 1922 during the interwar period as an alternate national university. VMU is a comprehensive university devoted to excellence in teaching, learning, research, arts and innovation, and fostering critical thinking, imaginative response as well as the desire and capacity for lifelong learning of our students who will have an impact on the world, locally and globally. There are 14 academic divisions at VMU: Faculty of Arts, Faculty of Catholic Theology, Faculty of Economics and Management, Faculty of Humanities, Faculty of Informatics, Faculty of Law, Faculty of Natural Sciences, Faculty of Political Science and Diplomacy, Faculty of Social Sciences, Agriculture Academy, Education Academy, Music Academy, Institute of Foreign Languages, Botanical Garden. As the focus on life sciences, biology, biochemistry, genetics, biotechnology, environmental protection, ecology, alternative energy sources, climate change, and other issues grows, the popularity of study programmes at the Faculty of Natural Sciences has also grown significantly in recent years. The Faculty of Natural Sciences boasts modern and constantly updated study premises, which are constantly renewed with the help of the EU Structural Funds. Students can conduct research not only in modern VMU laboratories, but also in research centres of other Lithuanian science and education institutions. Graduate and doctoral students may contribute to research projects conducted by Professors in their departments.

Curricula are updated to take into account the experience and research innovations of Western European and US universities. The self-analysis was carried out in accordance with the Procedure for External Evaluation and Accreditation of Studies, Assessment Areas and Indicators approved by the Minister of Education, Science and Sports of the Republic of

Lithuania (Order) No. V-835, released in 2019, 17 July) and the Methodology for External Evaluation of Study Areas, signed by the Director of SKVC (Order No. V-149 of 31 December 2019). Vytautas Magnus University Biotechnology study programme (6121FX008) was registered on August 22, 2011 by order No. SR-3931. After 2016 at the suggestion of experts of an international external evaluation, the Biotechnology programme was accredited for a period of 6 years (until 20-08-2020). All evaluation areas of the bachelor's programme received a good evaluation, the overall score was 18, and none of the evaluation areas was rated "unsatisfactory". In the conclusions of the evaluation report, international experts provided 6 recommendations to the Biotechnology study programme, all of which have been taken into account while improving the content of the programme and its implementation over the last five years (2016-2021). Applied biotechnology was accredited in 2016 without the expert evaluation procedure, therefore there are no expert recommendations for this study programme and the implementation of the recommendations in connection with this study programme will not be discussed in the self-assessment. Biotechnology and Pharmaceutical Analysis was accredited in 2020 and the recommendations were presented as for the intended study programme, therefore their implementation will be discussed in more detail at the end of each evaluation area.

II. GENERAL ASSESSMENT

Biotechnology study field and **first cycle** at Vytautas Magnus University 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	3
2.	Links between science (art) and studies	4
3.	Student admission and support	4
4.	Teaching and learning, student performance and graduate employment	4
5.	Teaching staff	3
6.	Learning facilities and resources	3
7.	Study quality management and public information	4
	Total:	**25**

*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 Vytautas Magnus University 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	4
4.	Teaching and learning, student performance and graduate employment	4
5.	Teaching staff	3
6.	Learning facilities and resources	3
7.	Study quality management and public information	4
	Total:	**26**

*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 programmes both at first and second cycles are oriented toward needs of the labour market and society. It is very well aligned with the strategic goals of Lithuania as they are described in a number of recent strategic documents, including the Smart Specialisation programme, the Roadmap for the Development of Lithuanian Life Sciences Industry, and in more general perspective, to the Plan of the National Progress 2022-2030 and its constituent part - the Science Development Programme, which emphasises the increasing need of research based study programmes at universities. Currently, the Lithuanian Roadmap for the Life Sciences Sector 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 by 2030 5% of GDP from the Life Sciences industry is obvious. The evaluated programmes fully fit into a wide spectrum of societal needs stemming out of these strategic objectives of Lithuania.

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 Vytautas Magnus University is a wide scope university which according to its mission statement implements academic activities under what is called *Artes liberales* principle aiming at ensuring liberal condition for education, strengthening partnership, to actively participate in the socioeconomic life of the country, and to contribute towards advancement of culture and science. The VMU study programmes are very much in line with the strategic plan of the University and significantly contributes to the implementation of Chapter 3 "Studies 360" of the Strategic plan. From the SER and the meeting sessions with academicians, students and social partners of university, it became clear that all 3 study

programmes aim to significantly contribute towards strengthening of the *Artes liberales* principles of the studies, making them more flexible and more oriented towards student needs, also, the development of new forms of studies, including the remote modules, expanding international dimension, as well as ensuring and widening the study quality assessment system "360 degrees". The programmes, especially the second cycle programmes, have visible aims at widening participation in the vocational, life-long learning sector of the studies. In summary, all study programmes under consideration complies well with the mission and the strategic plan of VMU.

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

Table No. 1 *Study Programme's 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 for the study field	*No less than 120 ECTS*	*170*
ECTS for studies specified by University or optional studies	*No more than 120 ECTS*	*48*
ECTS for internship	*No less than 15 ECTS*	*15*
ECTS for final thesis (project)	*No less than 15 ECTS*	*15*
Contact hours	*No less than 20 % of learning*	*>42%*

Individual learning	*No less than 30 % of learning*	*>58%*

Table No. 2A *Study Programme Applied 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 for the study field	*No less than 60 ECTS*	*70*
ECTS for studies specified by University or optional studies	*No more than 30 ECTS*	*20*
ECTS for final thesis (project)	*No less than 30 ECTS*	*30 ECTS*
ECTS for practice	*No less than 5 %*	*20 %*
Contact hours	*No less than 10 % of learning*	*20.5 %*
Individual learning	*No less than 50 % of learning*	*79.5 %*

Table No. 2B *Study Programme's Biotechnology and Pharmaceutical Analysis 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 for the study field	*No less than 60 ECTS*	*60*
ECTS for studies specified by University or optional studies	*No more than 30 ECTS*	*12*
ECTS for final thesis (project)	*No less than 30 ECTS*	*30*
ECTS for practice	*No less than 5 %*	*15 %*
Contact hours	*No less than 10 % of learning*	*20.5 %*
Individual learning	*No less than 50 % of learning*	*79.5 %*

The expert panel can conclude that the legal requirements for the programmes are met.

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 *Biotechnology* aims at preparation of competitive, qualified biotechnology specialists with the knowledge and skills in classical and modern chemistry, physics, biology, biochemistry and other basic sciences and applied biotechnology subjects (bioinformatics, plant, animal biotechnology, pharmacy, bioengineering and molecular biotechnology). The programme aims at providing skills in applied biotechnology, its methods and applications and professional activities, in developing new products and technologies, as well as starting their own business or pursuing further studies. According to SER, the expected outcomes of the first study cycle are (p.25) knowledge and applications, ability to conduct research, special abilities, social and personal skills (Table 3, SER). According to the "Description of the technology field study programmes" (Executive order of the Minister of Education and Science of Lithuania, 2015-08-27, No. V-922) the graduates of the first cycle study programmes should have skills in analysis of technologies (p. 12.3), and

design (p.12.4) of technological processes. Both groups of skills should include abilities of graduates to apply the acquired knowledge for solving technological problems, for choosing both analytical and technological solutions, and to apply both analytical and modelling methods in biotechnology. While the consistency between most of the required skills and expected outcomes are implemented through various study subjects, the expert panel does not see where (in what subject, if such exists) an integrative approach to those important methodological skills is being implemented. For example, one of the most important skills in Biotechnology is the knowledge and skills in the field of design and modelling of biotechnological processes. While Table 3 in the SER contains subjects related to molecular modelling, we did not find any indication of the presence of the modelling of biotechnology processes subjects in the SER. The only course which may be presumably covering these topics is included in the last semester of the studies. So that throughout the studies students are acquiring specialised knowledge in various fields of biosciences without having any general perception of the industrial principles of modern Biotechnologies.

The aforementioned Executive order No.V-922 also defines practical knowledge which graduates need to acquire during studies, among which the understanding of the organisational principles of biotechnology activities as well as basics in work safety are recommended. In our opinion, these aspects of the requirements as defined by the Executive order No. V-922 are not properly covered, either.

These before discussed aspects are much better covered in the second cycle programmes "Applied Biotechnology" and "Biotechnology and Pharmaceutical Analysis" (especially the latter one). Specifically, the lists "Technological analysis" and "Biotechnology design" of expected outcome blocks (Tables 5 and 7, SER) which are absent in analogous description of expected study outcomes for the first cycle programme.

The outlined aims of all 3 study programmes 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 in general consistent and logically interconnected as it is explained and justified in SER. However, in the panels' opinion, the undergraduate course should be updated so that the aims of the study and expected outcomes would match the requirements of the executive order No. V-922, chapter III, paragraph 13.

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 Natural Science of VMU. In general, the framework of the study modules in all 3 programmes covers many modern biotechnology fields, such as bio products and purification, process design and engineering, applied genomics and bioinformatics. The assignment of the courses to either group of core and elective subjects, in general, is done logically. However, the expert group needs to emphasise that there is an only course in the first cycle "Biotechnology" programme which can potentially provide practical skills defined by the Executive order No. V-922, Chapter III, p. 13.5.3 and 13.5.4 is provided by the elective, but not mandatory, course GMF0301, which in our opinion, is a methodological weakness of the study programme framework.

The programmes of the 2nd cycle seem more consistent and well-balanced towards the technology subjects, they have very strong subjects related to the design and modelling of Biotechnology modules, which is a strong advantage as one may expect for highly specialised programmes. The expert panel still would argue, given relatively low admission numbers that 2 closely related Biotechnology programmes, which have considerable amount of overlapping disciplines: "Applied Biotechnology" and "Biotechnology and Pharmaceutical Analysis" potentially can be merged into one 2nd cycle programme with a solid list of elective courses allowing students to choose and specialise in the subjects (directions) related to the specific industrial biotech topics, such as biopharmaceutical analysis, and others.

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

As it follows from SER, the University provides students with ample possibilities to study according to an individual study schedule in order to meet their specific learning needs. The schedule is designed on the basis of offered study programme framework and/or individual study plans. An individual study schedule determines the distribution of the courses taken at a certain time, the number and time of consultations, the form and order of assessment, the beginning and end dates of the examination session. Studying according to the individual study schedule is regulated by the Procedures for Providing the Individual Study Schedule offered by the University.

The Annex 1 of the SER presents an exemplary study plan and a framework of subjects that include a number of elective courses. So, on paper all 3 study programmes are well suited

for targeting different student needs, and are well positioned to offer changes in the rapidly changing life sciences business environment of Lithuania. However, during the meeting with alumni some hints were passed over to the expert panel that not always the elective courses are available to students because of relatively small groups. So, in reality, the situation is probably less favourable from the perspective of the students, because if not enough students are choosing one or another elective course, the course is being withdrawn from the elective course list and students are "oriented" towards another available elective course which has more students. This is clearly the consequence of relatively low admission numbers. Such problems can be fixed by offering consultations to individual students instead of lectures, and consequently increasing the load of self-learning studying.

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

There is a broad selection of final project themes offered by the University both at first and the second cycle of programmes. From the SER it follows that the final projects are carried out in the departments of the Faculty of Natural Sciences and sometimes in collaboration with social partners, including those in enterprises engaged in biotechnology production. 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 note – in some cases (see for example Annex 8, SER, positions of Graduate project for the first cycle studies No. 5, 6, 7, 13, 16, 18 and others), in the panels' opinion, the final projects are more aligned with the competences and thematics of the supervisors than to the needs of students who are aiming at competences in the field of biotechnology. Some of those themes (if judging from the titles presented in Annex 8 only) are more related to plant or cell biology than biotechnology. In the future, we would recommend the students to have possibilities choosing their final project themes more closely aligned with the technology and biotechnology field. We are sure such adjustment would increase the competitiveness of the programmes as well.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. All study programmes are very well aligned with the strategic goals of the country;
2. All study programmes fit well and strongly contribute to the University strategic development plans.

(2) Weaknesses:

1. The technology field subjects in the first cycle programme, especially those providing practical skills, should be updated in accordance with the Executive order of the Minister of Education and Science V-922;
2. Students at the first cycle programme should be introduced to subjects covering biotechnology processes, equipment and biotechnology design at earlier semesters, not on the last semester of the studies.

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

VMU is making a healthy progress according to their Self-evaluation. Also the interviews with leadership of the university and with academic staff reflected both their strengths and areas of improvement in a healthy manner. As other higher education institutions VMU has been evaluated yearly by the Research and Higher Education Monitoring and Analysis Centre and according to that evaluation it is making positive progress, its flexibility and openness in research management, and its attractiveness to society (including prospective students) are growing. Yet, the international visibility could still be increased. More research could also be published in higher quality journals. Development is needed to retain the best young researchers.

Research topics in the field of Biotechnology are relevant both in terms of local and international trends. The projects aim to multidisciplinary research (e.g., in Molecular Ecology). The overall number of high-level publications is good (80) yet the quality of the target journals could be even better; the number of citations could be higher. International cooperation is well functioning, which by the expert panel was found as intensive and adequately funded. The structure of the research teams provides an excellent, adaptable research environment.

The Natural sciences faculty itself finds that they could be better organised in terms of gender equality, strengthening the career development of women researchers – a self-criticism which builds trust in their ability to develop.

Physical infrastructure is in good condition and the experimental and computational tools are excellent. The university library is comprehensive and offers good opportunities to find relevant research papers. This is crucial for maintaining flexibility, and especially for a multidisciplinary research approach. However, limited access to the Web of Science is a major problem that needs to be addressed.

Research projects at VMU Faculty of Natural Sciences are closely related to the Biotechnology study programmes and influence their course. For example: research of environmental processes is reflected in the course of Environmental Engineering, Studies on molecular biology or on genetically modified organisms adds new knowledge into courses like Food Biotechnology, Plant Biochemistry, Plant Physiology and Biotechnology, etc. Students of the field study programmes are constantly acquainted with the research and the obtained results during the laboratory work of the mentioned study courses. Students are introduced to the research results obtained in the research clusters during laboratory work, talked about the new available technologies, the most advanced research opportunities, etc. The methods of analysis use advanced technologies and interdisciplinary expertise. For example the state of art analytical methods are used to solve problems related to environment or health – these are challenges which need a team from different fields to combine their competences.

3.2.2. Evaluation of the link between the content of studies and the latest developments in science, art and technology

Research-based studies are developed at the University in the following ways: students use the elements of research in laboratory work, exercises and practices; teachers use research results in the content of study courses; students prepare and publish scientific articles.

The contents of the study programmes (Biotechnology, Applied Biotechnology, and Biotechnology and Pharmaceutical Analysis) reflect the latest developments, achievements and results in the fields of biology, biochemistry, chemistry, physics, and genetics.

Almost all courses are updated and modified during the semester, with the addition of new examples, related scientific discoveries or even current events of public importance (e.g., vaccine development, immune response, etc.).

The courses are increasingly using the latest electronic textbooks and databases to which the University has permanent or temporary open access (e.g., ScienceDirect, SpringerLink, Taylor & Francis, Wiley Online Library, etc.).

Students study of new and relevant scientific articles during their courses (in Biotechnology first cycle study programme the courses are e.g. Bionics and Bioengineering, Genetically Modified Organisms, Control of Pharmaceuticals, Food Quality and Their Toxicity; in Applied biotechnology it involves study courses like Environmental Engineering, Advanced Analytical Methods in Pharmaceutical Biotechnology, Cell and Tissue Culture Technology).

During the classes, students visit facilities and public or private institutions to get acquainted with the latest research, technologies, projects of public importance and other relevant issues. Excursions are organised every semester. They visit e.g. the Department of Environmental Protection (Kaunas Branch), Nature Research Centre, Lithuanian Agricultural and Forestry Research Centre, National Institute of Food and Veterinary Risk Assessment, Centre for Innovative Medicine (CIM), ThermoFisher Scientific etc.

Bachelor and master degree students are trained to use both basic laboratory equipment (e.g., spectrophotometers, centrifuges, scales, microscopes, automatic pipettes, cell culture, chromatography, and microscopy) as well as state-of-the-art equipment (capillary electrophoresis, portable dry blood chemistry equipment).

The students told during the interviews that instrumentation should be upgraded. The students thought that they study too much basics and would need to learn more of the higher end instrumentation.

During the interviews there were opinions both amongst researchers and students that the first cycle study programme should contain more biotechnology subjects (at the expense of physics). The focus is to keep the programmes up-to-date and provide students with knowledge and skills they can successfully apply in their future work.

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

The teachers of the field study programmes introduce themselves and their research both during lectures/seminars and on the University's website or in the student organisation “Modusas”. Teachers announce their research topics annually, in addition, students are encouraged to choose and suggest their own research topics. Students are also invited to participate in the projects of the teachers. 16% of students who studied in years of 2017–2020 participated in research projects for the preparation of the bachelor's thesis: e.g. E.L., student of the second cycle study programme of Biotechnology and Pharmaceutical Analysis) – prepared the final work on the topic “Development and research of gels for chiral capillary

electrochromatography" (research project No. 09.3.3-LMT-K-712-25-0194). University holds scientific conferences: "Human and Nature Safety", "Vital Nature Sign", "Smart Bio" and others, in which students have the opportunity to participate free of charge. During the last 5 years - 14 students of the first cycle study programme "Biotechnology" took advantage of this, 6 students of the second cycle study programme "Applied Biotechnology" took the opportunity to prepare presentations with co-authors at these conferences. For example, P.D., the student of the first cycle study programme of Biotechnology, participated in the 3rd international conference Smart Bio: ICSB and presented a stand report in topic "Investigation of Babesia microti in small rodents in Europe" in 2019.

However, the need to find way to motivate talented young students to stay in academic circles is still present. Still to those active and interested there are plenty of possibilities to get involved into the scientific projects of their supervisors as well as offered possibilities to present their results at conferences.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Research topics in the field of Biotechnology are relevant both in terms of local and international trends;
2. International cooperation is well functioning;
3. The overall number of high-level publications is good;
4. The contents of the study programmes reflect the latest developments, achievements and results in the fields of biology, biochemistry, chemistry, physics, and genetics;
5. Courses are updated and modified during the semester, with the addition of new examples and related scientific discoveries.

(2) Weaknesses:

1. More research could also be published in higher quality journals.
2. Web of Science has limited access
3. The BA study programme "Biotechnology" should contain more biotechnology subjects;
4. Development is needed to retain the best young researchers.

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

Admission to the first and second cycle studies is depicted by national and University regulations. Study Regulation, which regulates Admission process in the University, is available in Lithuanian and English languages, which gives an opportunity to foreign students to get acquainted with regulations. 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 curriculum, admission requirements and other information about study programmes as well as the application possibility is available on the Website of Vytautas Magnus University.

Concerning the admission rates, the tendency of admitted students drop is observed. What is more, it is visible that the average competitive score of first-cycle students, who were admitted to state funded places, were lower than the scores of students, who admitted to state non-funded places. This phenomenon is not characteristic of second-cycle students.

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 Vilnius Magnus University Description of Procedures for Assessment and Recognition of Competencies Acquired through Non-formal and Informal Education. The information about the recognition of learning outcomes is available in Lithuanian and English languages on the website of the University.

The University has the standard and well-functioning system of foreign qualification recognition and application system. The expert panel has seen no shortcoming during the visit.

3.3.3. Evaluation of conditions for ensuring academic mobility of students

Students of Vytautas Magnus University can participate in the Erasmus + internship programme as well as various exchange programmes, such as Erasmus, VMU partnership programmes with non-EU / EEA countries, etc. These mobility opportunities benefit the study

programmes. Information about the academic mobility is posted on various platforms of the University, that way ensuring the students are acquainted.

During the evaluated years (2017-2022), students have gone abroad and there were students coming into VMU and to the study field. Student mobility opportunities are ensured and the information given to the students is clear and they know where to find the information about the mobility programmes. On the other hand, the numbers of outgoing students are not that high as the expert panel would like it to be and the University should figure out how to invite more students to participate in exchange programmes.

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 Vytautas Magnus University can depend on Financial, Social, Academic, and Career support. Social support is coordinated by a responsible unit in the University (Student affairs department), which is advantageous to students, who can receive all the needed information. Students, who are involved in scientific activities, can get financial benefit, that way supporting students' interest in scientific research. This financial support for students that participate in scientific research

A lot of information can be found on their website with detailed information about social, financial, etc. support. The students during the visit did not find anything to be wrong with the support system of students. Also for the students the amount of support seems reasonable and gives students the support they need. The expert panel finds that the support system is good and VMU should maintain this path as students are more or less happy.

3.3.5 Evaluation of the sufficiency of study information and student counselling

Students of Vytautas Magnus University are introduced to student support during the annual events, introductory week at the beginning of the academic year, and newsletters. Information is provided on the website of VMU and internal students' system. As mentioned before, students can receive all the necessary information in the Students affairs department. It is praiseworthy that all the full-time lecturers provide consultations to students in their academic field.

The expert panel has found evident that the study information and student counselling is ensured and in general has found it as very good.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Financial support for students, who participate in scientific activities;
2. Big variety of information and communication tools.

(2) Weaknesses:

1. Dropping admission numbers.

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 University applies an accumulative score assessment system. Study achievements are assessed using colloquia, other interim assessments, and the defence of an exam or students' independent work (project). Different assessment methods are selected for various tasks related to the study methods. Independent assignments can be assessed by teachers and other students in the course, and the results are discussed in an open discussion to find out the disadvantages and advantages of the work. The final grade integrates intermediate grades and exam grades. The cumulative score's structure is presented in each study course's description. The University provides good opportunities for distance learning. Instructions on how to use the mentioned tools and their possibilities are described in the user manuals for the organisation, implementation, and evaluation of distance learning prepared by VMU Institute of Innovative Studies (ISI) for teachers. Independent learning in the programmes consists of students' preparation for classes, laboratory, practical work, seminars, and completion of individual tasks and presentations. The development of skills and abilities is significantly influenced by the study courses intended to perform research work. They are spread over all four semesters and cover 29 credits in the Biotechnology

programme, 48 credits in Applied Biotechnology, and 54 credits in Biotechnology and Pharmaceutical Analysis.

Achievement assessment methods must be coherent to study methods and meet the learning needs of students, and in all cases, the student must understand the objectivity of the assessment.

Upon successful completion of the Bachelor's study programme in Biotechnology, students can study in the Master's programme programmes in Applied Biotechnology, Biotechnology, and Pharmaceutical Analysis, in the study programme Molecular Biology and Biotechnology, or in other study programmes in Lithuanian and foreign universities.

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

In 2021 the VMU Disability Policy Document of the University of Inclusive Opportunities was presented and approved at the Senate meeting: (https://www.vdu.lt/wp-content/uploads/2021/12/VMU-disability-policy-University-of-inclusive-opportunities-2.pdf), focused on increasing the accessibility of studies and work by appropriately adapting research and working conditions for persons with disabilities. Socially vulnerable groups and students with special needs are allowed to study according to an individual study schedule regulated by the Description of the Procedure for Providing the Individual Study Schedule approved by the Rector. Vulnerable groups (orphans, the disabled, students from large families, low-income families, and low-income families) are entitled to various reductions in tuition or dormitory fees. Students with disabilities are advised on a range of issues by a disability coordinator. These students have access to parking near the University; the entrance to the buildings is maintained and updated; equipment for disabled people in libraries, creating jobs for them; classrooms are equipped with furniture adapted for students with special needs; students have the opportunity to stay only in dormitory rooms adapted to them. If necessary, with an accompanying person, the study process is organised according to students' individual needs; disability education campaigns (Students with disabilities are advised on a range of issues by a disability coordinator. Content includes accessibility to specific needs for everyone as needed); data on students with disabilities are integrated into the systems' databases, thus facilitating the whole study process of students with disabilities. In addition, the University organises various educational events for the disabled.

The Description of the Procedure for Providing Financial Assistance Measures to Persons with Disabilities Studying in Higher Education Institutions sets out the measures and amounts of financial assistance provided to persons with disabilities studying at higher education institutions; the procedure for financing and reporting on the use of the funds received for the financial assistance measures.

During the analysis period – one student from the Biotechnology study programme had BPO2014 NP No.1132624 motion + vision disability. The student was given financial support.

During the assessment, the experts formed the opinion that the university administration ensures students their ergonomic study process, taking into account the specific needs of each.

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

Monitoring of students' study progress is regulated by the Study Regulations and the Description of the Procedure for Student Learning Achievement Monitoring and Assistance.

Monitoring students' achievements and assisting is divided into interrelated processes, which consist of the following stages: 1. An analysis of student enrolment in studies and learning situation in study courses; 2. analysis of the reasons for students' non-participation in the interim and final examinations; 3. Analysis of students' assessments of intermediate and final evaluations; 4. Improving the organisation of studies and implementing preventive measures to manage students' progress.

Students themselves are also invited to monitor their progress in studies independently and follow the study processes: register for studies, revise study plans, watch the assessment of learning achievements and make improvements, get acquainted with the results of surveys aimed at improving quality, etc.

Teachers are responsible for monitoring student achievements, informing students, providing assistance based on the assessment of mid-term and final exams, and improving the quality of teaching. Students have the opportunity to connect to the Student Portal (http://studentas.vdu.lt), where they can follow their intermediate and final assessments. In addition, student study material and other relevant information related to studies can be found in the VMU virtual learning environment Moodle (ttps://moodle2.vdu.lt/).

After evaluating the results of the assessment of the intermediate evaluations, the students with lower scores are invited to individual interviews with the course teacher to solve the problems and improve the situation.

In the Moodle virtual learning environment, each course in the biotechnology programmes has a line, "Graduation Progress" where students and faculty can see the learning progress.

All evaluation results are stored in an electronic database for seventy-five years.

When evaluating the written work of the exam, the teacher points out the main errors and the completeness of the answer and writes down the evaluation of the exam and the final evaluation. Suppose the student is not satisfied with the examination grade. In that case, they have the right to get acquainted with the assessments of the exam answers to the questions and to discuss the objectivity of the evaluation with the teacher. If no compromise is reached, the student has the right to file an appeal with the Dean's Office.

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

Cooperation with VMU graduates mainly occurs through graduate clubs and separate units of the University. Newsletters with periodic information are sent to graduates periodically and are consulted by the graduate coordinator on cultural and educational issues. VMU Alumni Club is active at the University, the main goal of which is to unite VMU graduates and maintain close relations with the University. Every year, the club members participate in the University's events dedicated to developing students' professional skills and abilities necessary for employment and getting acquainted with career opportunities. Also, the members of the alumni club themselves organise club meetings and various events (lectures, discussions, informal seminars, trips, excursions to different companies where university alumni work, etc.), actively participate as consultants and experts in study programme committees, study quality assessment groups. Every year, with the help of the University, the club organises the VMU Alumni Day, the aim of which is to bring together people who have graduated from the University. Graduates are invited to various events to share their experiences, insights, and so on. In September 2019, Vytautas Magnus University joined the career mentoring platform idialogue (ttps://www.idialogue.lt/), where VMU graduates are invited to register and become career mentors.

To ensure the quality of studies and provide career planning services that meet the needs of students, the University monitors the employment and career of VMU graduates. The

primary sources of information are the survey of graduates conducted by Vytautas Magnus University, statistics provided by the Employment Service, and information provided by the Government Strategic Analysis Centre.

VMU Career Center conducts an electronic survey of graduates in May-June every year, one year after graduation. During it, graduates are asked about their current work situation and satisfaction with their studies. Unemployed graduates are asked if they have work experience or are looking for work. All graduates, i.e., employed and non-employed, are asked to give their opinion on how satisfied they are with their current career situation, what has been most helpful in preparing for a career, and how they assess VMU's contribution to the labor market. The summarised summary of the survey data is published on the website vdu.lt and the website of the Career Center.

There is a visible interest in bachelor's students to continue their studies at the University - Master's degree. However, the lure of graduates with a Master's degree in Applied Biotechnology to continue their doctoral studies is relatively low. Still, the results of SODRA data show that acquiring a master's degree increases employment opportunities (employment of second-cycle graduates reaches 75.6). Postgraduate studies graduates usually refer to their positions as highly qualified work. Graduates also value the University's contribution to their preparation for the labour market reasonably well: most postgraduate studies graduates rate the University's contribution more or less well. Students place particular emphasis on the assistance of faculty and professional practice. Their significance scores are 40 and 30, respectively, which is influenced by the research work in the studies, during which students are more exposed to practical activities, and at the same time encouraged to cooperate more with supervisors, participate in discussions and make a significant contribution to professional development and labour market preparation. The study programme in Biotechnology and Pharmaceutical Analysis has no graduates yet.

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

During our evaluation, we were convinced that during the analysed period, no cases of violation of the principles of academic integrity, tolerance, and non-discrimination were recorded in the study programmes of *Biotechnology, Applied Biotechnology,* and *Biotechnology and Pharmaceutical Analysis.*

We believe that these results have been achieved through principles of integrity, which are defined in the VMU Statute, Code of Academic Ethics, VMU Regulations on Plagiarism Prevention, in preparing students' written works, and the Study Regulations. Measures to prevent discrimination are regulated by the Vytautas Magnus University Code of Academic Ethics. In case of unfair student behaviour observed during the exam or other assessment, the teacher terminates the student's examination and notifies the dean of the faculty and the Department of Studies. A final grade of 0 is written in the journal of learning achievements for dishonest behaviour during any assessment. University Regulations on the Prevention of Plagiarism in the Writing of Students' Written Papers identify the types of plagiarism, methods of determining the plagiarism, and consideration procedures, as well as recommendations for teachers and students on how to avoid plagiarism in written papers.

All bachelor's and master's theses of the faculty are screened by the internationally recognized and recommended university plagiarism screening system iThenticate, which indicates the percentage of the text overlapping with other sources and marks the overlapping text. In addition, in 2019, the university acquired Oxsico's text matching system, which allows 20% of the written work to overlap with other work. This system is available to all VMU teachers, students, and researchers.

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

During our evaluation, we were convinced that there were no appeals and complaints in the study programmes about cases of dishonesty during the analysed period. We hypothetically describe the procedure as appropriate and, if necessary, it will allow us to achieve the result with the help of the mediation process. We provide a summary of it.

Issues of appeals, complaints regarding the submission of the study process, and examination procedures are regulated by the Vytautas Magnus University Regulations on the Submission of Appeals; VMU Regulations on Plagiarism Prevention; VMU Study regulations. The student has the right to file an appeal: regarding the assessments of learning achievements or assessment procedures when they disagree with the teacher's assessment and/or identify the violation of assessment procedures.

The appointed Appeals Board analyses the information related to the appeal and decides within five days of receiving the request. To ensure the transparency of the assessments, all colloquia and examinations are written only and the assignments are the

same for all students. When the learning achievements are evaluated by a commission of at least three members, the mark is not appealed.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. The University applies best practices in collaboration with alumni through the Cooperation of the Biotechnology field with social partners and members of the Alumni Club, who help carry out the study process, advertise the study programmes, and provide students with internships and jobs.
2. Interested employers - market leaders help the university to ensure the integrated implementation of the development of biotechnology study programmes by providing a technical basis for study programme participants, students, and lecturers.

(2) Weaknesses:

1. To encourage teachers and expand the use of distance learning methods and tools in the study programme implementation process.

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

The weekly workload of a teacher is 36 hours where contact hours with students is not more than 50% and at least 33% of the work is dedicated to research. The composition of the teaching team is as follows: 10 Professors, 14 Associate Professors and 14 Lecturers with a PhD degree with an average pedagogical experience of 20 years and minimum three years of research experience in Biotechnology, Pharmaceutical analysis or close fields. Most of the teaching staff have a good track record of publishing articles in peer reviewed journals. The academic staff is well qualified to ensure a high-quality teaching which is also supported by parallel research in the field.

About 70% of teachers have proficiency in English language at B2 or higher levels. All the staff should be able to teach in English as without learning the subject in English, students cannot make progress and impact at international levels. The higher proficiency of teachers in English along with subject knowledge will benefit the students in multiple ways. This will also help in fetching more students from around the world and create an international brand for the first and second cycle of programmes.

The section describes recruitment of new faculty members but does not say anything about how frequent recruitments are done. Most of the teachers have a background in Science subjects including Physics, Chemistry, Pharmaceutical and Biological Sciences. The Department need to recruit more teachers with a background in Chemical/Biochemical Engineering who could teach topics like Thermodynamics, Kinetics, Mass/Heat transfer, Material/Energy balance, Reactor engineering, Downstream processing, etc. which are currently missing in the syllabus of first cycle (Biotechnology) and second cycle (Applied Biotechnology) programmes. Fermentation is at the heart of Biotechnology, but the panel could not find any course on Fermentation Technology, Metabolic pathways and their exploitation using Metabolic engineering and synthetic biology tools. Advanced topics Sustainability assessment, Circular economy, Biorefineries, Waste valorisation etc should be part of the syllabus. It may be due to the lack of suitable teachers. There is no information on the number of students graduated in the first and second cycle of programmes in past academic years and teacher: student ratio is also not provided.

Biotechnology is a non-classical Engineering and cannot be compared with other Engineering degrees and one can have a great future after a PhD degree. The Department should initiate some schemes where meritorious Master students could be offered scholarships to pursue a PhD degree. This will also help in getting future faculties.

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

The academic staff at VMU actively participates in mobility schemes and about 180 staff members participate in staff mobility for training in a year. Every month, VMU holds competitions for Erasmus + visits for the professional training of teachers in the form of events in foreign centres or in the form of study or research internships (observing work and participating in activities) in higher education institutions (under the Erasmus Charter for Higher Education) or other companies and organisations. But, it is not clear that on what basis

(selection criterion) teachers are selected. During the analysis period, the teachers of the biotechnology study field won 24 teaching and training visits.

It is good to know that during years of 2017-2021, ~40% of teachers of the programmes' specialty courses have gone abroad to teach or study at universities, both inside and outside the EU, to improve their didactic and/or research competencies, to give lectures, and to conduct research at various foreign research and education institutions.

VMU also receives a large number of Visiting Professors from other universities every year. Teachers from abroad usually come for short visits through the Erasmus + mobility programme and give open lectures to Undergraduate and Postgraduate students. Several teachers from partner institutions came to carry out joint research projects. During 2017-2021, the Faculty of Natural Sciences was visited by 47 Visiting Professors from France, Poland, Slovakia, Turkey, the Czech Republic, the USA, Japan and others.

Teachers of the Biotechnology field who are members of research groups are allowed to use cluster funding to finance mobility-related costs. Teachers have access to bilateral agreements, other international mobility programmes and projects to exchange teachers with institutions inside and outside the EU. The university has a research fund, which aims to promote transnational mobility. The Foundation organises research competitions, doctoral study visits, as well as competitions for research priority projects (which can also be used to fund travel and internships for members of research teams). Every year, VMU together with other Santaka Valley Association publishes a call for research projects and the funds may also be used for mobility. Teachers can also participate in academic travel competitions organised by the Lithuanian Science Council (Funding of Research Visits), the Lithuanian Culture Council (education and individual scholarships) and other foundations. Teachers from the biotechnology study field, together with researchers from other countries in the same field, participate in international organisations, networks, editions of scientific journals, and international projects. All these activities also promote academic mobility, especially for international conferences.

As mentioned above, the ambience for mobility of academic staff is highly conducive. More and more staff involved in teaching and research in the discipline of Biotechnology should participate in mobility schemes and visit reputed institutes worldwide to gain more exposure and experience and enhanced learning.

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

In order to improve the pedagogical skills of the University teachers, a lot of attention has been paid in recent years to training teachers on more active involvement of students in studies, distance teaching and learning, providing feedback to students, as well as other relevant training. Teachers are encouraged to participate in professional development seminars from all eight competency groups (higher education didactics competences, digital competencies, research competencies, management competencies, foreign language competencies, intercultural competencies, subject-related competencies, personal competencies) which are free of charge. In 2019, two topics received particular attention from teachers: "Active Learning Methods and Student Involvement" and "Feedback for Students: How Can We Help Them Learn Better?" The training was organised several times a year, using the internal resources of the University. To this end, VMU lecturers and external experts conducted training on the application of innovative teaching / learning methods, providing effective feedback and assessment of learning achievements, involving students in studies and research, renewal of curriculum and quality improvement. Further, training for honing English language skills are also provided to academic staff. The feedback received is implemented to further refine the quality of these training sessions.

The expert panel appreciates the efforts by VMU but more channelized efforts in a professional way is required as many higher education institutes do around the world. They should develop a proper teaching qualification leading to a diploma or certificate, mandatory for all the teaching staff. The staff developing innovative teaching methods/strategies should become part of the syllabus of this course. The course based on English language should be more seriously implemented for faculty members to have strong command on the language as growth in Biotechnology can be restricted due to limited proficiency in English. The number of people from the discipline of Biotechnology who attended training courses on improving didactical and English skills were 10 and 3, respectively. These numbers are too low and more staff should be strongly encouraged to attend such courses. In the end, more courses for professional development of faculty members such as writing a proposal, drafting a Manuscript, dealing with stress and difficult situations, etc. should be introduced.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Competent and highly qualified teaching staff;
2. Excellent mobility schemes;
3. Good effort for improving pedagogical skills of teaching staff;

(2) Weaknesses:

1. Low proportion of engineering topics;
2. Less participation of academic staff from Biotechnology in training sessions for ameliorating didactical and English language skills.

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

VMU has 222 classrooms for teaching and learning needs and many of these classrooms and laboratories are equipped with video display facilities (projectors), internet connection, computerised teaching staffs, training stands and layouts and other visual aids. The study process and research work is supported by 28 specialised laboratories for conducting research in the field of Biotechnology. Many of the laboratories have been refurbished through projects and contributions from university patrons with a total support of 1 million Euros. Renovation of laboratory equipment and technical means is usually carried out at the expense of the institute and faculty implementing the programmes. The funds were also used for the establishment of four new laboratories and the upgrading of laboratory equipment in existing laboratories.

The University strictly implements the guidelines and protocols for ensuring health and safety of staff, students, visitors and the general public. The infrastructure of VMU is well equipped to take care of students with disabilities: lifts, automatic doors, lifts, ramps, brightly marked stairs, etc. The equipment in the libraries is intended for the disabled to create working places for them, the auditoriums are with the furniture that meets the needs; disabled people have the opportunity to stay in dormitory rooms adapted for them, if necessary, with an accompanying person. The study process is organised according to the individual needs of students; disability education campaigns are organised; data on students with disabilities are integrated into the databases of the systems, thus facilitating the study process of students with disabilities. All departments of the library have workstations for visitors with special needs, where they can find: software JAWS 14 for Windows, Win Taker

Voice 1.6, Super Nova Magnifier, electronic Braille device ESYS 40, tactile printer, stationary magnifier TOPAZ XL XD 24, keyboard for the visually impaired, alternative computer mice, height-adjustable tables, ergonomic chairs.

VMU has 46 computer classes for independent work. The size of computer classes varies from 5 to 31 working places. Computer classes (Building III) are equipped with general programmes (Microsoft Word, Excel, PowerPoint, MS Access), specialised programmes (SSPS, MatLab, STATISTICA, Rstudio) used in the laboratory during lab works. Also, in the computer classes of the Faculty of Natural Sciences, students can use special-purpose programmes such as ArcGIS 10.4, ADMS-Urban, ALOHA and others. Students are given access to read full-text documents in databases licensed and tested by the University, VMU institutional repository, etc.

A virtual learning environment and collaboration system Moodle has been created for students and teachers. This environment allows teachers to create digital content of study courses, choose different forms of organisation of study courses, organise practical activities in various ways, share teaching and learning instruments, evaluate students' achievements and monitor their progress, receive and provide feedback. All the features necessary for teamwork have been implemented in Moodle.

VMU distance learning environment Moodle is updated every year, which expands the possibilities of the environment and ensures the selection of the latest features. Linux server and data storage operating systems are constantly updated. In 2021 VMU has 13 classrooms adapted for video conferencing, which are equipped with the necessary equipment to ensure smooth distant connection by creating suitable conditions for remote cooperation. The university provides good distance learning opportunities. Distance learning has led to the use of Adobe Connect video conferencing and BigBlueButton video conferencing tools to organise teachers' work with students. VMU Office 365 Teams is currently mainly used as a remote organisation tool.

Modern physical infrastructure of Library departments in VMU has been created in faculties and academies enabling effective responses to the research and study needs of academic units. Members of the University community can visit all departments of the library and use its services, regardless of the faculty or academy at which they study or work in. The library has created a total of 770 workplaces for them, visitors can work with 237 library computers, connect personal computers, use individual and group work rooms, workplaces for visitors with disabilities, discussion areas and recreation areas. The Library Fund in 2020 accumulated 1.1 million traditional (printed) documents. The university community has

access to almost 676 thousand electronic resources (410 thousand e-books, 38 thousand e-journals, 228 thousand conference presentations, audio recordings, etc.), 61 licensed databases. They can be accessed on the University premises and from remote computers (via EZproxy). Every year, the library's holdings are supplemented with printed serials of 220–260 titles. Approximately 2390 thousand publications have been accumulated for the study programmes of biotechnology (2100 thousand in the library of the Ministry of Agriculture), those textbooks and methodological tools are not only in Lithuanian, but also in foreign languages. 17200 electronic sources are suitable for studies in the field of biotechnology (1,016 e-journals, 15677 e-books, 507 ETD works). The latest and most relevant information required for studies and research is available to members of the VMU community in subscribed databases, in the science management system of VMU CRIS and in the VMU virtual library and catalogue.

CRIS is an open science infrastructure that has been in use since 2019. The system has accumulated over 65 thousand publications, almost 19 thousand records of final theses (ETD), almost 30 thousand e-documents: books, magazine articles, ETD and other documents, over 10 thousand external links to full-text documents. The CRIS repository of VMU contains 41 electronic scientific journals of the University.

The infrastructure and facilities for learning resources are excellent and connected with contemporary modern technology. The University and funds from running projects provides a good support for renovation and refurbishment of infrastructure and equipment. The facilities for disabled students or students with special needs are very good and lend a good support for enabling them to receive a quality and modern education. A modern library with availability of resources to support teaching and research activities. The laboratory facilities are very good but lack resources for teaching/research work in core areas of Biotechnology such as Pre-treatment, Fermentation, Scale up, Downstream Processing. Furthermore, software facilities for performing sustainability assessment such as SuperPro, SimaPro, Aspen plus, etc. are missing. The facilities and resources in these areas need to be developed as the world is witnessing a transition towards bio-based green products.

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

Laboratories of all study programmes have all the necessary equipment and material resources. In addition, additional investment in programme activities (in case of need to upgrade the material base of laboratories) is obtained from the available funds of the

department, new projects or targeted funding of programmes. Also, each year the study committee of the programmes prepares plans for the improvement of the infrastructure required for studies. Every year, VMU upgrades computers and acquires hardware, taking into account the resource development plans submitted by faculties and academies, which they prepare based on study needs. About 20% of computers are renewed annually and VMU computer network security systems are constantly being updated.

VMU uses a centralised system for monitoring and updating hardware and software, and only legal software is used in computer classrooms and other computerised workplaces. Every six months, the software is audited and updated or supplemented. The commercial software used in the study process is used with educational licences and is available to students free of charge. The curators of the faculties maintain regular contacts with the councils of individual faculties, institutes and academies, inviting them to participate in the development of information resource collections, offering to purchase new printed and electronic documents relevant to studies. The University community can order publications from Lithuanian and foreign libraries that are not available at VMU Library.

Most of the information about renovation of infrastructure, purchase of equipment and upgradation of resources is already provided in section 6.1. Laboratories, equipment, hardware and software are continuously updated and funds are provided by University and sourced from the projects. However, the section does not say anything about technical staff and if any laboratory engineers are hired by the department to maintain teaching and research laboratories. There is no mention about support of Social/Industrial partners towards establishing instrumentation facilities.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. Very strong infrastructure for maintaining a high standard of teaching and research;
2. Library with vast resources and annexed with modern e-technologies;
3. Strong support from VMU for renovation and upgradation of resources.

(2) Weaknesses:

1. Low or no participation of Social/industrial partners;
2. Lack of software facilities related to core teaching courses and research in Biotechnology;
3. No laboratory facilities for upstream and downstream of bioprocesses.

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 VMU in general and the Faculty of Natural Sciences in particular contains all major elements aiming at maintaining the highest standards in teaching. The main internal body responsible for the quality assurance is a Program committee, which acts based on external and internal University regulations, including: the European Higher Education Quality Assurance Regulations and Guidelines (2015) and VMU legal documents. Besides the standard set of top level documents such as the Statute of VMU 95 (2018) which describes the main principles of the quality of studies and research, and The Study Regulation (2021, new edition) which defines the study quality processes and the division of responsibility for study quality assurance, the VMU Study Quality Assurance Procedure Description (2021, new edition) describes in detail the study quality assurance processes and measures for planning, implementing and improving studies. Along with this document, the description of the procedure for improving the quality of feedback studies at Vytautas Magnus University (2021, new edition) regulates the process of collecting feedback from social stakeholders and using data for the purposes of evaluating and improving the quality of studies. All those documents are publicly available online.

In principle, the expert panel may state that the legal basis and the organisational structure to ensure quality of the studies in all 3 programmes are in place. 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.

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

Stakeholders are the most informed group of actors involved in assessment of the quality of studies acting as a main source of information of the success of any study programme. They can provide the most straightforward accounts on the bottlenecks in implementation of the programmes as well as offer advice on how to improve the situation, if such requires an update. 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 study cycles. Stakeholders in particular are involved in the quality assurance in such formats: - the Committee collects students' opinion about the studies through the direct discussions, interviews. Students submit proposals through the student representative to the Committee or communicate directly with the teachers. The representatives of employers participating in the activities of the Committee provide recommendations on the compliance of study programmes with the labour market needs, the suitability of the practical skills acquired by students, and other issues. Information from the social partners is also gathered during surveys, at the University Career Days, in special discussions such as to discuss student internships and research projects, opportunities for joint projects. Graduates of the programmes participate in surveys, sometimes meetings are organised to collect their retrospective view on the quality and drawbacks they see in content and organisational aspects of the programmes. The social stakeholders from industry discuss at the Committee meetings and decisions are made on how to use them to improve the quality of studies.

No doubt there is a wide range of objective information sources concerning quality of the programmes, however, it is not clear how this information is being processed in a systematic way, and if the more or less periodic presentations of the quality assurance results are being presented to the wider academic community. Also, from what the expert group learnt from SER and the meeting with preparers of SER, the factors which determine small admission numbers to the programmes were not systematically investigated. Those factors among others may also include issues related the quality of the studies in general as well as a satisfaction of graduates with the study quality from the perspective of participants of the labour market in Lithuania. Since there is a great need for specialists in Biotechnology industry in Lithuania, the admission numbers can be surely optimised through more systematic assessment of the quality of the programmes and their consistency with the labour market needs. The experts believe, more systematic approach towards quality management should be developed at the Faculty, which should involve periodic mini-conferences in which different social partners and university staff would give their opinions on quality issues with

the primary objective to elucidate factors responsible for better positioning of the programmes among competing ones provided by other Lithuanian Universities.

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 valuable information on studies in general and their quality in particular, it is still not fully clear how the outcomes of the quality of evaluation processes are being measured (in the analytical sense) and processed 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 now being recognised as one of the most effective ways to improve quality of the processes 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 the panel if collected 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. The latter recommendation can be considered by the programme managers to further improve the competitiveness of the programmes both nationally and internationally.

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 HEI

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 a clear response from the administration, which eventually led to major improvements in study subjects as well as infrastructure. It is not though clear if the data which is being collected periodically are of sufficient quality due to the limited number of responders in surveys, 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 address such problems in an unbiased way.

Strengths and weaknesses of this evaluation area:

(1) Strengths:

1. QA system is in place and it is regulated by all levels legal acts within the University;
2. All major stakeholders are involved in the QA process.

(2) Weaknesses:

1. Systematic QA information processing methodologies are not in place;
2. QA processes directed towards elucidating major factors responsible for the competitiveness of programmes are missing.

IV. RECOMMENDATIONS*

Evaluation Area	Recommendations for the Evaluation Area (study cycle)
Intended and achieved learning outcomes and curriculum	1. To update the first cycle programme with technology (engineering) modules to comply with the requirements of the Executive order of the Minister of Education and Science V-922 (2015-08-27). 2. To provide courses covering biotechnology processes, equipment, biotechnology analysis and biotechnology design at earlier semesters of studies.
Links between science (art) and studies	1. In order to increase scientific visibility the emphasis in publications should be rather on quality - targeting higher impact journals and higher rate of citations. 2. The emphasis on the BA study programme development should continue to increase the biotechnology subjects.
Student admission and support	1. Encourage even more students to participate in mobility programmes.
Teaching and learning, student performance and graduate employment	1. To encourage teachers and expand the use of distance learning methods and tools in the study programme implementation process.
Teaching staff	1. More Engineering topics should be included in the first and second cycle of programmes. 2. The teaching staff should be encouraged to gain some high quality teaching and research experiences in internationally reputed institutes via different schemes such as Humboldt, Marie Curie Fellowship. 3. The meritorious Master students should be encouraged and supported for PhD within VMU or other reputed institutes in Lithuania or outside who could become future faculty members of VMU. 4. The University should design a proper teaching qualification, English language and other career development courses for

	their academic staff.
Learning facilities and resources	1. Learning facilities and resources are in quite good shape with strong support from VMU. More Social partners should be on board to facilitate industrial teaching and research and support for instrumentation facilities. 2. Software for simulation-based teaching and research in the field of Biotechnology should be purchased. 3. Lab facilities for upstream and downstream research should be developed.
Study quality management and public information	1. Quality assurance processes which include systematic information processing should be implemented (this can possibly be the part of the "360 degrees" study quality assurance framework, mentioned in the University Strategic plan chapter "Studies 360"?).

*If the study field is going to be given negative evaluation (non-accreditation) instead of RECOMMENDATIONS main **arguments for negative evaluation** (non-accreditation) must be provided together with a **list of "must do" actions** in order to assure that students admitted before study field's non-accreditation will gain knowledge and skills at least on minimum level.

V. SUMMARY

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

Vytautas Magnus University (VMU) is a public higher education institution in Lithuania. VMU initiated a Biotechnology study programme in 2011, a discipline which has been contributing to modernisation of the European industrial sector and economy. VMU runs three study programmes in Biotechnology: first cycle of study in Biotechnology; second cycle of study in Applied Biotechnology and Biotechnology and Pharmaceutical Analysis. The rapid development of Biotechnology in the country is dictated by several companies in the area such as Thermo Fisher Scientific Baltics, UAB Teva Baltics, UAB Biotechpharma, AB Roquette Alimina etc. The aim of these programmes is to train Biotechnology professionals, develop competent researchers and empower them to develop intellectual competencies who could immensely contribute to the rapidly growing bioeconomy in Lithuania.

The study programmes of both cycles are being developed based on current academic potential and activities which are implemented at the Faculty of Natural Science. All study programmes are very well aligned with the strategic goals of the country and well positioned to offer changes in the rapidly changing life sciences business environment in Lithuania. The contents of the study programmes (Biotechnology, Applied Biotechnology, and Biotechnology and Pharmaceutical Analysis) reflect the latest developments, achievements and results in the fields of biology, biochemistry, chemistry, physics, and genetics. The programmes of the 2nd cycle seem more consistent and well-balanced towards technology subjects. However, the number of students in both second cycle programmes is low and has a considerable amount of overlapping disciplines. The panel believes that both the second cycle programmes can be merged into one programme with a solid list of elective courses. This will not only help in strength of programme but also students in specialising in the subjects related to the specific industrial biotech topics.

Physical infrastructure is in good condition and the experimental and computational tools are excellent. The university library is comprehensive. This is crucial for maintaining flexibility, and especially for a multidisciplinary research approach. However, limited access to the Web of Science is a major problem that needs to be addressed. Teachers announce their research topics annually, in addition, students are encouraged to choose and suggest their

own research topics. Students are also invited to participate in the projects of the teachers. Research-based studies are developed at the VMU in the following ways: - students use the elements of research in laboratory work, exercises and practices; - teachers use research results in content of study courses; - students prepare and publish scientific articles. Research topics in the field of Biotechnology are relevant and the overall number of high-level publications is good (80), yet the quality of the target journals could be even better.

Students of VMU can participate in various exchange programmes and these mobility opportunities benefit them through better outside exposure and information on this is posted on various platforms of the University. VMU provides Financial, Social, Academic, and Career support to all the students. Social support is coordinated by a responsible unit in university where students can receive all the needed information. Students of VMU are introduced to student support during the annual events, introductory week at the beginning of the academic year, and newsletters. Information is provided on the website of VMU and internal student system. It is praiseworthy that all the full-time Lecturers provide consultations to students in their academic field.

VMU applies best practices in collaboration with social partners and members of the alumni club, who help carry out the study process, advertise the study programmes, and provide students with internships and jobs.

The weekly workload of a teacher is 36 hours whereas contact hours with students is not more than 50% and at least 33% of the work is dedicated to research. The composition of the teaching team is as follows: 10 Professors, 14 Associate Professors and 14 Lecturers with a PhD degree with an average pedagogical experience of 20 years and minimum three years of research experience in Biotechnology, Pharmaceutical analysis or close fields. Most of the teaching staff have a good track record of publishing articles in peer reviewed journals. The academic staff is well qualified to ensure a high-quality teaching which is also supported by parallel research in the field. About 70% of teachers have proficiency in English language at B2 or higher levels. All the staff should be able to teach in English as without learning the subject in English, students cannot make progress and impact at international levels.

The Department need to recruit more teachers with a background in Chemical/Biochemical Engineering who could teach topics like Thermodynamics, Kinetics, Mass/Heat transfer, Material/Energy balance, Reactor engineering, Downstream processing etc which are currently missing in the syllabus of first cycle (Biotechnology) and second cycle (Applied Biotechnology) programmes.

Biotechnology is a non-classical Engineering and cannot be compared with other Engineering degrees and one can have a great future after a PhD degree. The Department should initiate some schemes where meritorious Master students could be offered scholarships to pursue PhD degree. This will also help in getting future faculties.

The academic staff at VMU actively participates in mobility schemes and about 180 staff members participate in staff mobility for training in a year. It is good to know that during 2017-2021, ~ 40% of teachers of the programmes' specialty courses have gone abroad to teach or study at universities, both inside and outside the EU, to improve their didactic and/or research competencies, to give lectures, and to conduct research at various foreign research and education institutions. Teachers of the Biotechnology field who are members of research groups are allowed to use cluster funding to finance mobility-related costs. Teachers have access to bilateral agreements, other international mobility programmes and projects to exchange teachers with institutions inside and outside the EU. The university has a research fund, which aims to promote transnational mobility. The ambience for mobility of academic staff is highly conducive. More and more staff involved in teaching and research in the discipline of Biotechnology should participate in mobility schemes and visit reputed institutes worldwide to gain more exposure and experience and enhanced learning.

In order to improve the pedagogical skills of the University teachers, a lot of attention has been paid in recent years to training teachers on more active involvement of students in studies, distance teaching and learning, providing feedback to students, as well as other relevant training. The panel appreciates the efforts by VMU but more channelized efforts in a professional way is required as many higher education institutes do around the world. They should develop a proper teaching qualification leading to a diploma or certificate, mandatory for all the teaching staff.

Learning facilities and resources are in quite good shape with strong support from VMU. VMU has 222 classrooms for teaching and learning needs and many of these classrooms and laboratories are equipped with video display facilities (projectors), internet connection, computerised teaching staffs, training stands and layouts and other visual aids. Many of the laboratories have been refurbished through projects and contributions from university patrons. The University strictly implements the guidelines and protocols for ensuring health and safety of staff, students, visitors and the general public. The infrastructure of VMU is well equipped to take care of students with disabilities.

More Social partners should be on board to facilitate industrial teaching and research and support for instrumentation facilities. There is a lack of software facilities related to core

teaching courses and research in Biotechnology. Software for simulation-based teaching and research in the field of Biotechnology should be purchased. Lab facilities for upstream and downstream research should be developed.

The QA system is in place and it is regulated by all levels of legal acts within the University. All major stakeholders are involved in the QA process. The quality assurance system at VMU in general and the Faculty of Natural Sciences in particular contains all major elements aiming at maintaining the highest standards in teaching. The systematic QA information processing methodologies are not in place. QA processes directed towards elucidating major factors responsible for the competitiveness of programmes are missing. The quality assurance processes which include systematic information processing should be implemented (this can possibly be the part of the "360 degrees" study quality assurance framework, mentioned in the University Strategic plan chapter "Studies 360"?).

Expert panel chairperson signature:

Dr. Vinod Kumar **(signature)**