ASIIN Seal

Accreditation Report

Bachelor's Degree Programmes
Biology
Ecology and Nature Management
Plant Biotechnology and Microbiology

Master's Degree Programme
Biology
Environmental Protection and Rational Use of Natural Resources
Molecular Biotechnology and Biomedicine

Provided by
L.N. Gumilyov Eurasian National University

Version: 23.09.2022

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A About the Accreditation Process

Name of the degree programme (in original language)	(Official) English translation of the name	Labels applied for	Previous accreditation (issuing agency, validity)	Involved Technical Committees (TC)[1]
бакалавр естествознания/ жаратылыстану ғылымдарының бакалавры/ Bachelor of Natural Science	Biology	ASIIN Seal	ASIIN, 2015-2020	10
магистр естественных наук/ жаратылыстану ғылымдарының магистрі/ Master of Natural Science	Biology	ASIIN Seal	ASIIN, 2015-2020	10
бакалавр естествознания/ жаратылыстану ғылымдарының бакалавры/ Bachelor of Natural Science	Plant Biotechnology and Microbiology	ASIIN Seal	-	10
магистр естественных наук/ жаратылыстану ғылымдарының магистрі/ Master of Natural Science	Molecular Biotechnology and Biomedicine	ASIIN Seal	-	10
бакалавр естествознания/ жаратылыстану ғылымдарының бакалавры/ Bachelor of Natural Science	Ecology and Nature Management	ASIIN Seal	-	11
магистр естественных наук/ жаратылыстану ғылымдарының магистрі/ Master of Natural Science	Environmental Protection and Rational Use of Natural Resources	ASIIN Seal	-	11
Date of the contract: 31.01.2021 **Submission of the final version of the self-assessment report:** 22.03.2021				

[1] TC: Technical Committee for the following subject areas: TC 10 - Life Sciences; TC 11 – Geosciences.

Date of the onsite visit: 26.-28.05.2021 **at:** Due to continuing travel and safety restrictions caused by the Covid-19 pandemic, the audit was carried out digitally in agreement with the principal decision of the Accreditation Commission for Study Programmes.	
Peer panel: • Prof. Dr. Heinz Trasch (Steinbeis Foundation) • Prof. Carmen Genning (Ostfalia University of Applied Sciences) • Prof. Issayeva Akmaral Umirbekovna (M. Auezov South Kazakhstan University (Shykent)) • Yekaterina Astafyeva (PhD Student at University of Hamburg) • Sabine Huck (Federal Ministry for the Environment, Nature and Nuclear Safety)	
Representative of the ASIIN headquarter: Tanja Kreetz	
Responsible decision-making committee: Accreditation Commission for Degree Programmes	
Criteria used: European Standards and Guidelines as of 10.05.2015 ASIIN General Criteria, as of 28.03.2014 Subject-Specific Criteria of Technical Committee 10 Life Sciences as of 28.06.2019 and 11 – Geosciences as of 09.12.2011	

B Characteristics of the Degree Programmes

a) Name	Final degree (original/English translation)	b) Areas of Specialization	c) Corresponding level of the EQF[2]	d) Mode of Study	e) Double/Joint Degree	f) Duration	g) Credit points/unit	h) Intake rhythm & First time of offer
Biology	B.Sc.	Biology	6	Full time	-	8 semesters	240 ECTS	Annually
Biology	M.Sc..	Biology	7	Full time	-	4 semesters	120 ECTS	Annually
Plant Biotechnology and Microbiology	B.Sc.	Biotechnology	6	Full time	-	8 semesters	240 ECTS	Annually/2019
Molecular Biotechnology and Biomedicine	M.Sc..	Biotechnology	7	Full time	-	4 semesters	120 ECTS	Annually/2019
Ecology and Nature Management	B.Sc.	Environment	6	Full time	-	8 semesters	240 ECTS	Annually/2019
Environmental Protection and Rational Use of Natural Resources	M.Sc..	Environment	7	Full time	-	4 semesters	120 ECTS	Annually/2019

For the Bachelor's degree programme Biology the institution has presented the following profile in the self-assessment report:

"The objectives of the bachelor's educational program "Biology": training of bachelors with knowledge of fundamental and applied biology, having ideas about new areas of modern

[2] EQF = The European Qualifications Framework for lifelong learning

biology (bioinformatics, molecular and cellular biology, systems biology, etc.) and able to apply the knowledge gained in scientific and practical educational activities."

For the Master's degree programme Biology the institution has presented the following profile in the self-assessment report:

"The purpose of the Master's degree program "Biology" is training of biologists of a new formation with in-depth knowledge in the field of modern biology (genomics, molecular genetics, bioinformatics, systems biology, etc.), capable of practical implementation of the knowledge gained in science, production and teaching."

For the Bachelor's degree programme Plant Biotechnology and Microbiology the institution has presented the following profile in the self-assessment report:

"The goal of the bachelor's educational program "Plant Biotechnology and Microbiology": training biotechnologists who have fundamental knowledge of the theoretical and applied aspects of modern biotechnology, possessing the skills of obtaining, researching and using biotechnological objects, capable of applying the knowledge gained to work in design institutes, industrial enterprises, scientific research institutes, in breeding centers, as a teacher in educational organizations."

For the Master's degree programme Molecular Biotechnology and Biomedicine the institution has presented the following profile in the self-assessment report:

"The goal of the educational program of the master's degree "Molecular Biotechnology and Biomedicine": preparation of masters with advanced knowledge, mastering modern methods of scientific research and technological development in the field of molecular and cellular technologies, bioinformatics, metabolic engineering, biomedical and biopharmaceutical technologies, capable of working in research institutes biological and medical profile, teaching in institutions of higher education."

For the Bachelor's degree programme Ecology and nature management the institution has presented the following profile in the self-assessment report:

"The objectives of the educational program of the bachelor's degree "Ecology and nature management": training of specialists in the field of ecology, environmental protection and rational use of natural resources on the principles of close integration of science, education and innovation."

For the Master's degree programme Environmental protection and rational use of natural resources the institution has presented the following profile in the self-assessment report:

„ The goal of the master's degree program "Environmental protection and rational use of natural resources": preparation of masters with in-depth knowledge in the field of environmental protection, adapted to market requirements, able to work in a team, proficient in scientific research methods in the field of environmental protection, actively studying the structure and links between sections of ecology.“

C Peer Report for the ASIIN Seal[3]

1. The Degree Programme: Concept, content & implementation

Criterion 1.1 Objectives and learning outcomes of a degree programme (intended qualifications profile)

Evidence:

- Self-Assessment Report
- Matrix of goals/objectives for degree programmes
- Educational programmes
- Catalog of elective disciplines
- Discussion during audit
- Website

Preliminary assessment and analysis of the peers:
The peers refer to the Subject-Specific Criteria (SSC) of the Technical Committees as a basis for judging whether the intended learning outcomes of the Bachelor's degree programme Biology, the Bachelor's degree programme Ecology and Nature Management, the Bachelor's degree programme Plant Biotechnology and Microbiology, the Master's degree programme Biology, the Master's degree programme Environmental Protection and Rational Use of Natural Resources and the Master's degree programme Molecular Biotechnology and Biomedicine as defined by SQU, correspond with the competences as outlined by the SSC. They come to the following conclusion:

For the Bachelor's degree programme in Biology the institution has presented the following profile in the official programme description:

- Objective of Education Program: Training of Bachelor students with knowledge of fundamental and applied biology, who have ideas about new directions of modern biology (bioinformatics, molecular and cell biology, system biology and etc.) and

[3] This part of the report applies also for the assessment for the European subject-specific labels. After the conclusion of the procedure, the stated requirements and/or recommendations and the deadlines are equally valid for the ASIIN seal as well as for the sought subject-specific label.

who are able to apply their knowledge in scientific and practical, educational activities

- Qualification objectives: The education program is designed to train biology bachelors to work in industrial laboratories, research organizations (institutes, laboratories), environmental institutions, national parks, botanical gardens, reserves, sanitary-epidemiologic, hydrobiologic laboratories, specialized departments of higher educational institutions and specialized educational institutions (lyceums, gymnasiums, colleges, etc.)
- List of Specialist's Positions:
    - specialist, junior researcher, laboratory assistant of research institutes and organizations
    - specialist, laboratory assistant of enterprises for the production of biological products
    - specialist, junior researcher, research assistant for research projects
    - specialist, junior researcher, laboratory assistant of nature conservation institutions, national parks, reserves, botanical gardens, reserves, etc.
    - specialist, laboratory assistant in the sanitary-epidemiological, hydrobiological laboratory
    - laboratory assistants of specialized departments of higher educational institutions
    - specialist, laboratory assistant at production laboratories for the processing of raw materials of animal and vegetable origin, the organization of landscaping and biological profile
    - teacher in specialized educational institutions (gymnasiums, lyceums, colleges, etc.)

For the Bachelor's degree programme in Ecology and Nature Management the institution has presented the following profile in the official programme description:

- Objective of Education Program: Training qualified specialists in the field of ecology, environmental protection and environmental management on the principles of close integration of science, education and innovation.
- Qualification objectives: The educational program is intended for the training of personnel - ecologists for industry-specific industrial enterprises and ecological services for monitoring, monitoring the quality of the natural environment and human health.
- List of graduates' positions: Environmentalist by industry, environmental technician; environmental inspector; environmental technician; environmental engineer;

instructor in recreation and tourism; environmental education technician; instructor (specialist) in environmental education; technician of specially protected natural territories; inspector of specially protected natural territories; environmental scientist in research institutions, manager, environmental expert.

- Area of professional activity: Production, environmental service and monitoring, monitoring of environmental quality and human health.

For the Bachelors' degree programme in Plant Biotechnology and Microbiology the institution has presented the following profile in the official programme description:

- Objective of Education Program: The educational program is designed to train biotechnologists with fundamental knowledge of the theoretical and applied aspects of modern biotechnology, possessing the skills of obtaining, research and application of biotechnological objects that can apply the knowledge to work in design institutes, industrial enterprises, research institutes, breeding centers, as a teacher in educational institutions.
- Qualification objectives: The educational program is designed to train personnel in the field of plant biotechnology and microbiology.
- List of graduates' positions: Technologist in production laboratories; specialist-technologist in biotechnological production, specialist (laboratory assistant) in research institutes and universities; specialist in agricultural biotechnology; specialist in food production, biotechnology-breeder; specialist in environmental services and organizations; teacher (gymnasiums, colleges of biological, medical and agricultural profile
- Area of professional activity: Biological, agricultural profile, manufacturing plants and laboratories of food and processing, microbiological industries; agricultural enterprises; Research institutes of biotechnological, Botanical gardens, national and Zoological parks; organizations and institutions for phytosanitary plants, breeding centers; laboratories for control over quality and safety of agricultural products, gymnasiums, colleges, environmental services and organizations; installations and equipment for carrying out biotechnological processes; methods and means of quality control of raw materials and finished products; means of environmental assessment and protection from the impact of industrial production; regulatory and technical documentation
- Object of professional activity: Application of cell and tissue cultures for clonal micropropagation and improvement of plants, cell selection, experimental haploidy; use of molecular and biochemical markers in plant breeding, genetic reconstruction of plants on the basis of methods of cellular and genetic engineering of

plants, industrial production of valuable biologically active substances and biological products of plant and microbial origin, biotechnology to create diagnostic and preventive means of plant disease control; operation and quality management of biotechnological productions, the organization and carrying out quality control of raw materials, intermediate products and finished products, pedagogical activity in secondary educational institutions.

- Functions of professional activity: The objects of professional activity of the bachelor are: research institutes and Universities of biotechnological, biological, agricultural profile, manufacturing plants and laboratories of food and processing, microbiological industries; agricultural enterprises; Botanical gardens, national and Zoological parks; organizations and institutions for phytosanitary plants, breeding centers; laboratories for control over quality and safety of agricultural products, secondary schools, gymnasiums, colleges, environmental services and organizations; installations and equipment for carrying out biotechnological processes; methods and means of quality control of raw materials and finished products; means of environmental assessment and protection from the impact of industrial production; regulatory and technical documentation.

For the Masters' degree programme in Biology the institution has presented the following profile in the official programme description:

- Objective of the degree programme: Preparation of biology masters of a new formation, possessing profound knowledge in the field of modern biology (Genomics, Molecular Genetics, Bioinformatics, System Biology, etc.), capable of practical implementation of the knowledge gained in science, industry and teaching
- Qualification objectives: The educational program is designed to train biologists for work in research organizations (institutes, laboratories), research laboratories of a biological, medical, pharmaceutical, biotechnological, agricultural profile, nature conservation institutions, national parks, reserves, botanical gardens, nature reserves , in schools, gymnasiums, secondary special and higher educational institutions
- List of graduates' positions:
    - Researcher, specialist, laboratory assistant of enterprises for the production of biological products
    - Researcher, junior researcher, research project specialist
    - Researcher, specialist, laboratory assistant of nature conservation institutions, national parks, reserves, botanical gardens, etc.
    - Teachers, laboratory assistants of relevant departments of higher educational institutions

- Specialist, laboratory assistant at production laboratories for the processing of raw materials of animal and vegetable origin, the organization of landscaping and biological profile
- Head of the scientific group of research, production, administrative, expert, environmental institutions, etc.

For the Masters' degree programme in Environmental Protection and Rational Use of Natural Resources the institution has presented the following profile in the official programme description:

- Programme objectives: Preparation of undergraduates with in-depth knowledge of environmental protection, adapted to the requirements of the market, able to work in a team, proficient in research methods in the field of environmental protection, and actively studying the structure and relations between sections of ecology.
- Qualification objectives: The educational program is designed to prepare masters in the field of environmental protection and rational use of natural resources.
- List of graduates' positions: Ecologist, teacher, researcher, expert in the field of environmental protection

For the Masters' degree programme in Molecular Biotechnology and Biomedicine the institution has presented the following profile in the official programme description:

- Programme objectives: Preparation of Master students with in-depth knowledge and modern methods of scientific research and technological developments in the field of molecular and cellular technologies, bioinformatics, metabolic engineering, biomedical and biopharmaceutical technologies, capable of working in research institutes of biological and medical profile, teaching in institutions of higher education
- Qualification objectives: The educational program is dedicated to train biotechnologists for scientific research institutions, microbiological, medical and processing industries, expert services, standardization and certification centers, as well as university instructors.
- List of a graduates' positions: Researchers, innovation project coordinators, industry managers, experts, biological and biotechnological disciplines instructors in higher education institutions, heads of departments of retraining of middle technical stuff in biotechnological enterprises.

- The area of professional activity: Research, research-production, design organizations; organization of nature protection and environmental management; general educational institutions and educational institutions of vocational education
- The object of professional activity: Biological, bioengineering, biomedical, environmental technologies; biological assessment and monitoring; Instruments and methods used microorganisms, cell cultures derived from them, and using the substances in laboratory and industrial settings; regulations on the production of biotechnology products, international standards, regulatory, design and technological documentation; database technology, technical nature; environmental monitoring data and biological safety of the environment.
- Functions of professional activity: Training of graduates capable of professional activities in the implementation, maintenance and control, design of new and modernization of existing biotechnology industries; to research activities to solve fundamental and applied problems; to production activities to solve problems related to the quality management system of production of products, to professional activities for the organization and implementation of the educational process in the field of biotechnology.

The auditors acknowledge that the objectives of the six programmes under review are in most cases clearly and plausibly described and defined, matching the qualification requirements and learning outcomes of the programmes. They observe that students and teaching staff are duly informed about the study programmes, including on the ENU's website, where they find specific information about the learning objectives.

Learning outcomes are viable and meet the ASIIN subject related requirements. The auditors point out that structures to regularly renew the study objectives are to a certain degree in place. Apart from the relevant internal actors (research and teaching staff, students), external stakeholders such as representatives from research organisations, companies and other universities are actively engaged in the development of the programme objectives. There are sufficient structures in place to secure that objectives are regularly reflected and updated in order to meet the sector specific and labour market demands. The peer group is convinced that external partners regularly provide feedback on the programme objectives and contents in the context of joint collaborations and networking. Alumni surveys are frequently conducted, providing feedback from graduates as well.

However, the auditors miss a systematic and more formal reflection and feedback structure, such as enabled through an advisory board or through round tables. Such regular ac-

tivities bringing together different stakeholders to discuss programme objectives and ensure continuous adaptation and fine-tuning in correspondence with the changing demands of the domains are not identifiable.

During the auditing visit the experts ask about the orientation of the degree programmes in terms of their scientific or applied focus and the key mission (e.g. to bring graduates to Master's or PhD programmes or to introduce them to the industry). The programme coordinators plausibly explain the recent shift and the ongoing dynamic process of the ENU in terms of its development towards a research university, with new adjustments made also for the education and qualification of the students. The reviewers get the impression that both paths, towards academia and industry, are appropriately prepared for in all six degree programmes.

Criterion 1.2 Name of the degree programme

Evidence:

- Module Handbooks for all six degree programmes
- Self-Assessment Report
- Discussions during the audit
- Website

Preliminary assessment and analysis of the peers:
The auditors confirm that the names of the Bachelor's and Master's degree programmes correspond with the intended aims and learning outcomes as well as the main course languages offered. The names of the degree programmes duly aid potential future students and employers, informing them about the expected professional qualifications and skills acquired in these programmes.

The peer group informs the university that a consistent use of the names of the degree programmes is essential und must be ensured in all official and all publicly accessible documents. For the Master's programme Molecular Biotechnology and Biomedicine this is not always the case and requires revision (e.g. there are variations of the programme name on the website and in the Self-Assessment Report, in some cases the title contains "biology" instead of "biotechnology": https://fen.enu.kz/subpage/obrazovatel-nye-programmy-biotehnologiya-i-mikrobiologiya-kaf).

Criterion 1.3 Curriculum

Evidence:

- Module Handbooks
- Educational programmes
- Catalogue of elective disciplines
- Syllabi
- Self-Assessment Report
- Homepage
- Discussion during audit

Preliminary assessment and analysis of the peers:

The curricula of all six degree programmes are well designed, appropriately structured and allow the students to reach the intended learning and qualification objectives. The course plans are substantiated and detailed in terms of knowledge, skills and competencies to be acquired by the students and the particular ways of attaining them. The complete list of modules is included in the catalogues as well as in the module handbooks. The course catalogues are available in the educational programmes section on the departmental websites and are thus easily accessible for teachers, students and the interested public. Information is provided about the semester in which the modules is offered, the tiles and codes of each module, the course type (lectures, practices, seminars, research etc.), the form of examination, the hours as well as the amount of credits provided.

The auditors identify an altogether good mix of different teaching and learning methods and scenarios, enabling students to acquire the necessary theoretical and scientific knowledge, skills and competences required on the labour market. Integrated modules with practical courses and lectures offer the opportunity to effectively synchronise theory and practice. The Module Handbooks provide detailed module descriptions also for the practical components, particularly consisting of laboratory work, internships and research work. The peer group finds that practical learning in the laboratories is well-integrated into the curricula. During the auditing visit the reviewers are informed about the fact that specialists and experts from practical fields are sometimes included in the courses. Moreover, students visit companies and industrial representatives for their practical exposure and undertake industrial placements in all six degree programmes, e.g. students work on environmental issues and protection in the field of the Master's programme Environmental Protection and Rational Use of Natural Resources.

The reviewers notice that the Bachelor's degree programmes in Biology and Plant Biotechnology and Microbiology do not offer Latin as a compulsory or elective subject. As Latin is the international terminology language of biologists, it is necessary to include Latin in the curriculum.

The peer group requests further information about the technological contents of the Master's programme Biotechnology and Biomedicine which are not sufficiently detailed in the Module Handbook. The programme coordinators specify that these contents are well integrated in some of the modules and convincingly inform the expert group about the fact that students are appropriately trained also in those aspects, e.g. through selected modules and in laboratories, with a focus on sterilisation and how to work with preparations, microorganisms etc. Furthermore, students have the chance to work with scientific researchers and graduates, and can apply for grants to pay for equipment. The auditors conclude that technological contents are appropriately covered in the curriculum but indicate that the contents, technologies and techniques must also be explicitly mentioned and detailed in the module descriptions.

The peer group acknowledges that there is a good amount of collaboration with external partners (universities, non-academic research institutes, industry) and recommend an extension of partners, particularly to enable students to work with a good amount of materials (samples, bacteria, human cells samples to work in microbiology and cell biology) during their degree programme.

The auditors appreciate that the modules of the programmes are offered also in English in case a sufficient number of students selects English as their preferred language of instruction, which is expected to improve the employability and international mobility prospects for students and graduates.

Criterion 1.4 Admission requirements

Evidence:

- Rules of Admission to the L.N. Gumilyov Eurasian National University ENU
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

The admission requirements are in line with the Law of the Republic of Kazakhstan "On Education" for educational organisations implementing educational higher education and postgraduate education programmes. Admission is based on the Rules for admission to

study at L.N. Gumilyov ENU, approved by the rector, published on the website and therefore easily accessible to all relevant stakeholders and the interested public. The requirements and procedures of the admission rules are transparent, the same for all applicants and are clearly defined in the rules of admission. Structures dealing with the admission of applicants are installed (through the Admission Committee formed by ENU Rector and the Department of International Cooperation for applicants from other countries, respectively).

The admission requirements support the students in achieving the learning outcomes. Applicants for a Bachelor's programme must be secondary school graduates confirmed by the unified national testing (UNT) or complex testing (CT). For the Bachelor's programme in Biology and the Bachelor's programme in Plant biology and microbiology the choice of biology and chemistry as the main disciplines when passing the UNT is mandatory. For the Bachelor's programme in Ecology and environmental management biology and geography must have been selected as main disciplines when passing the UNT. Admission of foreign students is based on the analysis of the application and an online interview.

It is not specified in the Rules of Admission how individual admission requirements that have not been fulfilled can be compensated.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 1:

1.1 Objectives and learning outcomes

The statement and the corresponding attachment delivered by the HEI clearly informs about the procedures for the development and approval of degree programmes, which duly involves evaluations undertaken by internal and external experts. The peers are still convinced that objectives and learning outcomes are also frequently assessed by internal and external experts to ensure they continue to meet research and employment requirements in the respective field. However, the peers continuously miss a more formalised and clearly defined structure to regularly bring together external experts to review the study objectives and learning outcomes for the six degree programmes (e.g. through an Advisory Board meeting regularly in the context of round tables).

1.2 Name of the degree programmes

ENU has corrected the name of the Master programme Molecular Biotechnology and Biomedicine on the website, as requested by the peers in the Accreditation Report. The peers conclude that the names of the degree programmes are suitable and in correspondence

with the learning objectives and qualification expectations for all degree programmes under review.

1.3 Curriculum

The auditors acknowledge that Latin will be introduced as an optional course of the Bachelor's degree programmes Biology and Plant Biotechnology and Microbiology in the academic year 2021-2022. ENU must ensure that a Latin course will also be integrated as a constant element in the two curricula in the academic years beyond 2021-2022.

In terms of the request to further specify the technological contents contents of the Master's programme Biotechnology and Biomedicine in the handbooks, ENU informs in its statement that technologies and methods are presented in full detail in the syllabi of the programme. The experts mention that the Module Handbooks must however also provide these details.

The experts acknowledge the continuous engagement of ENU in terms of initiating, coordinating and sustaining collaborations with external partners.

1.4 Admission requirements

Based on the HEI statement provided, the reviewers agree that students are adequately supported during the admission process e.g. through the creation of individual plans for their education and training trajectory. Altogether, the peers conclude that the requirements and procedures for admission are transparent, clearly defined and duly justified in the rules of admission, enabling students to achieve the expected learning outcomes. The peers take into consideration that admission is regulated by the Ministry of Education and Science of Kazakhstan, and that students who have passed the Unified National Test organised by the National Center of Testing are admitted to the university they applied for. Information is still missing about how individual admission requirements that have not been fulfilled (e.g. in case of candidates with a Bachelor's degree from another university in or outside the country applying for a Master's programme at ENU) can be compensated. The peers suggest to reflect and to decide about potential rules for compensation and to document them in the rules of admission.

The peers assess criterion 1 for all study programmes under review to be partially fulfilled.

2. The degree programme: structures, methods and implementation

Criterion 2.1 Structure and modules

Evidence:

- Module Handbooks for all six degree programmes
- Self-Assessment Report
- Regulations
- Discussions during the audit

Preliminary assessment and analysis of the peers.

There is a modular, competence-based and consistent, well-aligned structure of all six degree programmes. The module descriptions comprise information about the teaching and learning elements. Learning objectives can be reached through the curriculum. Students are obliged by the state of the Republic of Kazakhstan to take a considerably large number of mandatory general modules. The students interviewed express their wish to be able to concentrate more on their core skills and competencies of their selected degree programme. Apart from these conditions and restrictions ENU cannot change, the reviewers are convinced that individual learning paths are enabled and encouraged. Students can choose their areas of specialisation in form of elective courses in line with their specific study interest (both in basic and applied science). They can choose internship specialisations, a graduation project, can participate in national and international conferences and become involved in the annual international conference.

The curriculum is structured in a way to allow students to complete their study programme without exceeding the regular duration. An excessively high workload required in some modules or phases of the degree programme is not identified. Major delays are not expected by the programme coordinators, students and graduates.

The modules have been adapted to the requirements of the degree programme. They ensure that each module objectives helps to reach both the qualification level and the overall intended learning outcomes.

Professional practice and internships are a compulsory element of the curriculum and differentiated by educational, pedagogical industrial and pre-diploma activities. The respective practice is clearly defined and well-integrated and aligned with the other modules, as evidenced by the Programme Handbooks and further explained during the visit. Students can take their industrial practice and internship based on their individual study preferences,

aided by university staff. In laboratory work, the assessment of the Head of Laboratory goes into the overall mark. The Head of Laboratory and also the supervisor during the internship can become the co-supervisor when writing the final thesis. The weekly and overall duration as well as the type and contents of the practice and internships are specified for each degree programme. The duration is based on the standard time of the student's work in practice (6 hours per day in a 5-day working week):

The reviewers notice that the module descriptions of the Bachelor's programme Plant Biotechnology and Microbiology lack recent educational and methodological literature and find that a revision of the curriculum with more updated sources to ensure that recent results and developments are considered is required.

For all programmes, the module handbooks must comprise information about computer databases and software programmes used for all relevant modules.

Academic mobility is explicitly enabled and encouraged as demonstrated in the Self-Assessment Report and confirmed by the interview of students and programme coordinators. The auditors appreciate that both the Bachelor's and Master's programmes are flexibly organised and enable study abroad semesters for their students, which facilitates their acquisition of foreign language skills and enhances international mobility. A mobility window has not been installed and recognition is based on a case-by-case decision. However the reviewers are convinced about the existing procedures and practices to recognise learning outcomes from study abroad semesters or semesters spent at another university in Kazakhstan, which are transparent and clear. The rules for recognition of learning outcomes acquired in other universities, including foreign universities, are clearly anchored in the Regulation on Outgoing Academic Mobility document, ensuring a transparent procedure applicable for all students. There is no specific limitation in terms of recognition, provided that contents, workload, amount of credits are comparable. Mandatory courses that cannot be covered abroad can be taken online or can be made up during the summer semester upon return. Additional courses outside the scope of the educational programme are documented in the students' Transcript of Records upon request. It is also worth mentioning that students may recognise credits deriving from a MOOC (massive open online course) if they pass the final assessment of the course. Students express their satisfaction with the organisation and recognition of their study abroad semester, e.g. in the Master's programme Molecular Biotechnology and Biomedicine where all courses were recognised upon their return.

Internationalisation "at home" is facilitated through course offers in English (in case of a shared interest among students to take the course in English) and by inviting guest speakers and professors.

Criterion 2.2 Work load and credits

Evidence:

- Module Handbooks
- Regulations on the procedure for recalculating credits according to ECTS in the L.N. Gumilyov ENU
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

In compliance with the state compulsory educational standards, the regulations of ENU and the ASSIIN accreditation requirements, the workload comprises the time required for the student to study the discipline, module or the entire degree programme, necessary for achieving the learning outcomes. The academic year consists of two semesters, the duration of one semester is 15 weeks. The full study load of one semester is specified, it comprises 30 ECTS, of the whole academic year 60 ECTS (1,800 academic hours). For the Bachelor's programmes, students must have accumulated at least 240 ECTS upon completion of their studies, for the Master's programmes at least 120 ECTS.

In addition ENU offers a summer period. The students, especially in the Master's programmes can take extra credits to make up for failed exams, missing courses due to studying abroad or get ready for applying for international mobility. The summer period is also designed for students aiming to transfer to ENU and lacking some additional courses because of inter-university curricular differences.

The modular programmes are plausibly devised in different study cycles spanning over the overall programme duration. To acquire the 240 ECTS for the Bachelor's programmes, students must gain 56 ECTS in general educational disciplines (these are mandatory for all students and required by the state of Kazakhstan), 112 ECTS in basic disciplines, 60 ECTS in profiling disciplines and 12 ECTS for their final certification, all comprising compulsory and elective modules.

For the Master's programmes they must gain 120 ECTS, with a comparable division into cycles entailing theoretical training in basic and major disciplines of the respective degree programme, practical training through practices, scientific or professional internships, research work including the implementation of the Master's thesis or project as well as the final certification.

For each module, the workload are specified based on the ECTS. The workload is based on the overall time required for the student to complete the module, comprising both attendance based elements such as lectures, seminars, practical and laboratory work as well as self-study work (either under guidance of a teacher or independent work) through reading literature, analysing results, practicing for exams, writing papers and holding presentations. The ratio of time allocated for contact hours and self-study hours is determined by the university; the volume of classroom work is at least 30%. Students gain 5 to 6 credits per module and take generally 5 courses per semester (each of 3 hours per week and 45 contact hours per semester), which complies with the standards of Ministry of Education.

Based on their assessment of the documents and the audit, the peer group gets the impression that the estimated time budget is altogether realistic and enables students to complete their degree without exceeding the regular course and study programme duration. Structural peaks in the work load are generally avoided.

The auditors ask about the procedures applied by ENU to check if credits and workload are matching. The university reports that the weekly load of contact hours developed by department is monitored by the Academic Councils at Faculty level and at university level. It is not clear to what degree the workload based on self-study is monitored though. However the students do not express that the work load required per module exceeds the hours foreseen.

The students mention however that during the online period in the pandemic it was sometimes hard for them to submit all the tasks as the teaching staff added instruments to monitor their work in the online setting (tests after each class, quizzes, assignments etc.). In general, particularly during the regular offline period when they can speak to teachers and there is a lack of these additional tasks, they express that studying in the given time period is feasible.

The reviewers conclude that the work load per course generally matches the ECTS, that study requirements can be realised during the study period.

Criterion 2.3 Teaching methodology

Evidence:

- Module Handbooks
- Self-Assessment Report
- Discussion during audit

Preliminary assessment and analysis of the peers:
Different learning methods are applied in order to reach the learning objectives, including lectures, seminars, educational dialogues and discussions, presentations, laboratory studies, practice and internships, research or projects as well as active and interactive methods and online training. Students also have the chance to collaborate in research projects and to get involved in the annual conference of ENU, apart from participating in national and international conferences if they wish. They get ample chances for gaining useful research skills including in academic writing, presentation and collaboration, which are vital for future employment in academia or industry.

During the pandemic the teaching staff adapted to the changed demands, provided online lectures, recorded lectures etc.. The peer group welcomes the university's flexibility to enable virtual laboratories and the use of digital instruments in order to replace presence based work in the laboratories and to not delay practical experiments.

As the module handbooks do not consistently provide detailed information about innovative learning methods applied to implement student-centred teaching and learning, the reviewers ask about the methods used to encourage student activation and student interactions. The auditors are informed that different methods and tools applied (e.g. Brainstorming, discussions, project based learning, work in small groups, Breakout sessions in online courses, inverted classroom learning, gamification, Kahoot, Mentimeter) but that these are not anchored in the module descriptions and the choice is decided by each teacher in correspondence with their teaching preferences.

In summary, the peer group judges the teaching methods and instruments to be suitable to support the students in achieving the learning outcomes. Moreover, they consider the degree programmes to be well balanced between attendance based learning and self-study.

Criterion 2.4 Support and assistance

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
According to the auditors support structures are clearly provided, both in terms of quantity and quality. The student feedback has demonstrated that students are highly satisfied with the support provided in terms of (individual and group) mentoring, supervision and help offered in courses and research projects as well as in the laboratories and beyond. Based on the input by the external partner organisations and collaborating companies, the peers

agree that mentoring and supervision during internships is an additional support mechanism in the process of qualification.

The students feel well supported to successfully work in the laboratories. Supervisors introduce and explain the use of equipment, machines and research tools well. The auditors appreciate the given structures and also welcome that students can apply for further materials if required for their research work. Risks mechanisms and safety regulations are well explained.

Students are also appropriately informed about mobility programmes and places through the automated information system and through advise structures. Moreover, they find good support for doing research work outside university. The auditors note that there are certain limitations for choosing countries with high living expenses for academic mobility due to financial restrictions, but are impressed by the collaboration opportunities provided under the given circumstances, including with the aid of ministry funds.

Students are well informed about job opportunities as well as internship opportunities from an early start in their studies. There are numerous support structures to help students find an internship placement and employment (such as job/vacancy fairs, interactions with employers, meeting platforms, list of vacancies on website, list of contacts in the departments, link to Employment Centre of Kazakhstan, alumni connections, support for graduates).

The mentoring provided by curators (member of the teaching staff assisting the students with general concerns and in the educational process) is seen as useful. The students feel adequately supported by their curator who helps them applying for programmes, with documentation and any other student concerns.

During the pandemic the teaching staff has easily adapted learning methods and channels to the new requirements and successfully developed alternative teaching forms (online lectures, MOOC courses, collaborative learning through Microsoft and Google tools, virtual labs, communication through the online platform Platonos etc.) so that students could reach their learning objectives also under pandemic circumstances. The students confirm that the university competently adapted to the new (online) requirements in teaching and appropriately assisted them also in these times.

In terms of the existing support structures the examiners conclude that all six study programmes enable students to complete their programme in the expected quality and within the scheduled time frame.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 2:

2.1 Module

The auditors acknowledge that the HEI has updated the literature list for some modules of the Bachelor's programme Plant Biotechnology and Microbiology. However, they identify that this is not the case for all modules. Especially Module 5 "Methodology and research module" is not based on recent sources and should be updated. All modules lack publications dating from 2019 onwards.

According to ENU's statement, computer programmes have been formulated in the module handbooks for the relevant modules. The auditors identify that this is not yet the case for Module 2 "Bioinformatics and molecular DNA technologies" of the Master's degree programme Molecular Biotechnology and Biomedicine; a specification of the computer databases and software programmes used is still missing. Concerning Module 3 "Modern aspects of immunogenetics and protein engineering" it is still unclear which particular technological platforms for genomic and proteomic research will be used. Module 4 „Biomedical aspects of biotechnology" lacks information about the particular molecular-genetic diagnostic methods used. The peers conclude that a rigorous review, specification and update for all modules is needed.

2.2 Workload and credits

The reviewers conclude that the workload per course generally matches the ECTS and find that study requirements can be realised during the study period.

2.3 Teaching methodology

The peer group judges the teaching methods and instruments to be suitable for appropriately supporting the students in achieving their learning outcomes. Following the assessment and the audit they have the impression that the degree programmes are well balanced between attendance based learning and self-study. According to ENU's statement, comments on teaching methods and technologies used in the modules have been removed from the Module Handbooks but should however be added in order to be more specific about how student information and interaction is ensured and which potential mix of methods is applied in the individual modules.

2.4 Support and assistance

The auditors positively note that ENU provides structures for improving its academic mobility programme and expanding the geographic span for study abroad endeavours (e.g. through the „ENU Students Ambassador program" providing a scholarship and covering

travel and accommodation costs as well as enhanced participation in the Mevlana and Erasmus+ programmes increasing student mobility numbers).

The peers assess criterion 2 for all study programmes under review to be partially fulfilled.

3. Exams: System, concept and organisation

Criterion 3 Exams: System, concept and organisation

Evidence:

- Module Handbooks
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The Self-Assessment Report provides detailed information about the examination regulations.

Exams are devised in line with the modular organisation of the curriculum and cover the intended learning outcomes based on knowledge, skills and competencies. Continuous feedback is offered to students about their progress and areas of improvement.

Examination procedures are well documented and transparently communicated to the students in due time before the exam take place (concerning time, place/mode, duration, form, assessment criteria etc.).

The curricula of the degree programmes comprise a final thesis which duly requires independent research work, reflection and analysis of the students and enables individual specialisations. The thesis can be written at an external collaboration partner, e.g. the former internship organisation/company of the student.

The Module Handbooks specify the form of assessment for each module.

To ensure sufficient time of preparation there are one to three free days between the respective exams. The reviewers consider that the times between exams may be tight. The students report they do not find exam schedules problematic but feasible.

Marking of exams is based on transparent criteria. General assessment criteria have been established, which are available in the syllabi of each discipline. Students can familiarise

themselves with the criteria already at the beginning of the semester. Each teacher, before the exam, forms their own assessment criteria based on general criteria.

Students who failed exams have the possibility to repeat them in the summer session following the semester. In principal, the number of attempts is not limited. However, retake-exams are fee-based. Disability compensation measures, illness and mitigating circumstances must be specified.

The students report they are well informed about the examination procedures and dates which they find sufficiently transparent and clear. The auditors request information about how the students assess the number and type of exams. According to the students, the number of exams is normally feasible (in Covid-19 times slightly too high), the exam forms are seen as a proper form of knowledge control related to meeting the learning objectives. Students have one week for preparing for mid-term tests and up to one week for preparing for final exams, which the students find appropriate. They find the procedures to retake a failed exams (e.g. certain days after the exam or to repeat the course during the summer period) feasible and unproblematic.

There is a good and suitable mix of different exam forms, enabling students to demonstrate their theoretical knowledge and practical skills and competencies.

The experts welcome the possibility for Bachelor's and Master's students to submit their thesis in English and at industry or partner sites if they wish, which facilitates potential future international mobility and employability.

The analysis of the results of the final certification for 5 years for the degree programmes in Biology demonstrates that the wide majority of graduates is admitted to the final certification (defence of thesis or state exam).

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 3:

ENU adds the information that student questionnaires also comprise information about the number of hours invested for exams and a question about the objectiveness of the assessment procedures at ENU, which is well appreciated by the auditors. This is also the case for ENU's planned review and potential improvement of its exam numbers and types. Taking into account the statement of the HEI the peers conclude that examination procedures are transparent and well documented, and that there are appropriate measures in place for continuous alignment and harmonisation with the expected learning outcomes. However, disability compensation measures, illness and mitigating circumstances are not specified,

which is a requirement. The peers assess criterion 3 for all study programmes under review to be partially fulfilled.

4. Resources

Criterion 4.1 Staff

Evidence:

- Personnel Policy and HR Policy of Republican State Enterprise on the Right of Economic Management L.N. Gumilyov Eurasian National University for 2020-2021
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The reviewers gain a very good impression about the education and qualification of the teaching staff. They appreciate that teachers can go abroad for learning purposes to widen their perspectives and expand their areas of knowledge and skills, in order to enhance the quality of their teaching practice.

Upon request by the peers, the teaching staff responded to the balance between teaching, research and administrative requirements. There is a tendency towards the development of a research university, a process initiated in the last few years. The teaching staff reports that a clear division between teaching and research cannot be made as students are involved in research activities in all six programmes. The reviewers find the situation and conditions for the provision of teaching and the links with research generally acceptable. Administration tasks do not seem to be a major burden for the fulfilment of the staff's teaching and research missions.

Criterion 4.2 Staff development

Evidence:

- Self-Assessment Report
- Appendix 27: Professional development and research trips of teaching staff
- Website
- Discussions during the audit

Preliminary assessment and analysis of the peers:
Staff development is enabled by the Department of Postgraduate Education, providing training of scientific personnel, including in English. Staff development is thus enabled, in terms of to advanced teaching skills at ENU but also through research internships and staff exchanges with national and international partners. Pedagogical qualifications can furthermore be improved through digital formats to enable distance learning, particularly relevant during the pandemic but also beyond. Staff development is encouraged by ENU, e.g. if teaching staff takes advanced courses, participates in conferences or undertakes internships. The experts appreciate the existing structure for not only incentivising continuous education of the teaching staff but also making it a compulsory element of their practice (e.g. in the degree programmes in Biology every five years). According to Appendix 27 the number of staff engaged and professional development and research trips activities in the last few years is not very numerous though. Teachers of the Master's programme Environmental Protection and Rational Use of Natural Resources must take an internship every five years in order to keep track with the discipline requirements and developments through practical exposure outside academia. ENU monitors and follows up on the training participation of each staff member. During the auditing visit the teaching staff mentions the exchange with guest lecturers from abroad as valuable sources for inspiration of the teaching practice.

Furthermore the professional and didactical suitability of the teaching staff is checked at least every three years. In case of detected shortcomings the so called "certification commission" has the right to direct specific trainings and (in the worst case) to demote the teacher concerned.

To sum up the assessment of the staff development, the auditors are convinced that ENU offers appropriate structures for continuous professional development for teaching staff and may consider to create further incentives for teachers to get involved in such trainings and activities on a more regular basis.

Criterion 4.3 Funds and equipment

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The general impression of the reviewers following the document assessment and the auditing visit is that laboratories are appropriately equipped, meeting the training needs of

the Bachelor's and Master's students. Bachelor's students find laboratories which enable experiments for which they can also use research laboratories, enabling them to work with particles, cell biology, light microscopy, electronic microscopy, isolating particles, analysing chemical composition.

Students furthermore use the laboratories and practical work environments of external partners (research institutes, universities, botanic garden, industry). The reviewers miss a technical center for small or medium scale production of biomass.

The experts gain a good impression about the allocation of resources for the procurement and maintenance of the laboratories and equipment, corresponding with the training needs. Laboratories and equipment are quality-checked on a regular basis.

There is a good inter-departmental collaboration between teaching staff with mutual teaching about technologies and laboratory installations and accessibility at other ENU sites in case of a shortage of places or a lack of equipment in their own programme.

The students express their overall satisfaction with the equipment and laboratories but would welcome an increase of materials (samples, certified strains of microorganisms, human cells samples to work in microbiology and cell biology). The experts agree that obtaining pure certified strains of microorganisms from the Republican collection of microorganisms for the subsequent work of students is considered difficult due to fairly high costs (about 100$/strain). The reviewers suggest to expand the number of collaborations with external partners to enable further access to materials, in order to enhance the training of the students.

Facilities for practical experience e.g. through microscopes, are sufficiently provided. Students writing on their thesis have access to high technological equipment, they can come to the laboratories whenever they need, have a workplace and are provided with materials.

In case their research or project work requires further equipment, students can make proposals with support of their professors, and submit them to the upper administration of ENU to claim for financial aid. There is a clear and transparent procedure in terms of requesting funding. In case the university cannot provide the infrastructure or materials itself (e.g. in terms of bioelectronics and bioformatics) the professors advise students about alternative channels of access, for instance through collaboration with national and international partners.

The reviewers welcome that budgetary resources are duly foreseen for repairing equipment.

During the visit the reviewers request information about the computer programmes used for statistical analysis (e.g. in the Ecological metrology and Biometry module in terms of the Master's programme Environmental Protection and Rational Use of Natural Resources). It becomes clear that to process statistical data GIS (Geographic Information System) licences are used as well as Excel.

Free internet access and WiFi throughout the university building and the campus are duly provided.

The external partners present in the auditing visit confirm the collaborative, friendly and consensual nature of the cooperation and the benefits for students as well as research and teaching staff. Collaboration structures are mostly transparent and comprehensive, collaboration agreements are closed with each partner. Most of the 17 agreements presented duly define the objectives and areas of collaboration, the type of practices for students and the responsibilities of the partners. However, the agreements are presented only in Russian, limiting access to the documents for some reviewers. Our local expert from Kazakhstan kindly provided a summary.

The validity period has expired for seven organisations/companies and needs to be renewed in case of further collaboration, and otherwise should be replaced by agreements with alternative partners in order to ensure practical experience in the respective field. Transfer and accommodation conditions for students should be specified for the partners located in another city, which is currently not the case in the respective agreements.

Kazvodkhoz RSE is presented as a base of practice for the Master's programme in Environmental Protection and Rational Use of Natural Resources where water resources are monitored during the practice. The reviewers recommend an expansion of collaborations by enabling professional practice for students also at environmental protection enterprises, enterprises for processing natural resources, mineral and human-produced waste. Also there is no collaboration partner presented enabling pedagogical practice for the specialty 6M011300 Pedagogical Biology which should be ensured.

The reviewers welcome the investment of 40,000 Euro for virtual labs and collaboration software (e.g. MS Teams) accessible for all staff and students during the pandemic. To facilitate online work 100 additional computers were purchased for the library. The students confirm they did not have problems in terms of accessibility of online courses and materials during lockdown periods.

The peer group concludes that the methods and work with equipment clearly meet the training requirements for the students, that the budget is spent in a good way, but that planning experiments depends on the availability of samples which can be scarce.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 4:

4.1 Staff

The reviewers adhere to their initial good impression about the education and qualification levels of the teaching staff, which are suitably equipped to meet the requirements for high quality teaching in all of the six concerned degree programmes.

4.2 Staff development

The reviewers remain convinced that the teaching staff has altogether good chances for scientific development and teaching skills enhancement (particularly through onsite and online courses, internship opportunities, staff exchanges and participation in conferences). They acknowledge that professional development is a compulsory element of the employment situation.

4.3 Funds and equipment:

The peers continuously find that laboratories are appropriately equipped and meet the practical training requirements of the Bachelor's and Master's students. In its statement based on the Accreditation Report ENU specifies the materials and procurement (consumables, laboratory glassware, certified strains of microorganisms and standard samples) purchased in 2021 upon request of the Faculty of Natural Sciences, which is positively remarked by the peers. They encourage ENU to keep up their efforts in providing access to a sufficient number of materials also for the upcoming years. ENU provides complementary information about the computer programmes used for statistical analysis and the licences purchased for its Master's programme Environmental Protection and Rational Use of Natural Resources, which is positively assessed by the experts. In terms of the expressed suggestion to secure collaborations in the field of pedagogical biology ENU convincingly informs about the collaborations closed with educational institutions (e.g. a gymnasium and a lyceum school, among others) for the purpose of pedagogical practice.

Taking the statement of the HEI into account the peers assess criterion 4 for all degree programmes to be completely fulfilled.

5. Transparency and documentation

Criterion 5.1 Module descriptions

Evidence:

- Module Handbooks for all degree programs
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The module descriptions are duly differentiated and sufficiently detailed in terms of identification codes, persons in charge, teaching methods, workload, credit points, expected learning outcomes, contents, planned use/applicability, admission and examination requirements, forms of assessment as well as the recommended literature for each module. It is unclear from the documents provided that detailed module descriptions (such as presented in the Module Handbooks, which ENU handed in shortly prior to the auditing visit), are accessible for students, which is indispensable for study orientation and planning purposes.

The Module Handbooks of all six degree programmes are duly substantiated and comprise all relevant information including course title, person in charge of the module, language of instruction (Kazakh, Russian, English), teaching type, contact hours, number of ECTS, forms of examination, prerequisites, contents, requirements for training and examination, references as well as media used. However, the Module Handbooks are incomplete. For all degree programmes all module descriptions must be integrated in one single document, which must comprise all modules taught in the entire respective degree programme.

Criterion 5.2 Diploma and Diploma Supplement

Evidence:

- Samples of the Diplomas and Transcript of Records
- Samples of Diploma Supplements
- Regulations on the procedure for recalculating credits according to ECTS in the L.N. Gumilyov ENU
- Self-Assessment Report
- Discussion during the audit

Preliminary assessment and analysis of the peers:
ENU issues the Diploma together with a Diploma Supplement printed in English. The documents duly inform about the student's qualification profile and individual performance as well as the classification of the degree programmes with regard to their applicable education system. Graduates benefit from the Diploma Supplement as an internationally recognised, standardised document enabling international comparability of study programmes and qualifications and facilitating academic and professional mobility. The graduates interviewed confirm they received a Diploma Supplement together with their Diploma and their Transcript of Records. The individual modules and the grades per modules are listed in the Transcript of Records. The grading procedure on which the final mark is based is clearly identifiable in the diploma certificate. Individual results can be easily identified and located in the distribution of grades table of the respective degree programme.

Criterion 5.3 Relevant rules

Evidence:

- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:
The auditors confirm that the rights and duties of both the university and the students are in most cases clearly defined and binding. Availability and free accessibility of relevant information and regulations related to the study process, access to the programme, final degree, examination, quality assurance etc. is guaranteed, and formulated in the course languages. However, as stated in 1.4 on admission rules, there is insufficient information about compensation rules and regulations in case of sickness and disability.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 5:

5.1 Module descriptions

The peers notice that the module handbooks are revised according to their comments expressed in the Accreditation Report. The handbook for each of the six degree programmes comprises all modules taught in the degree programme. The peers find that the module descriptions are duly differentiated and adequately informative, enabling students to gather sufficient details about each module through the online portal Platonus. They welcome that students can generate and download PDFs for each module and suggest that the module handbooks should be published on ENU's website.

5.2 Diploma and Diploma Supplement

The required certificates and diploma supplements are duly issued for all students graduating from the six degree programmes.

5.3 Relevant rules

Following the statement of the HEI, the reviewers acknowledge the regulations and support structures foreseen for students with special educational needs. ENU installed student-centred training procedures specifically tailored to the individual requirements of students. Free access to all academic building is provided. Existing distance learning technologies that are in place facilitate remote learning and participation. The peers also appreciate that an assistant tutor is available for providing support in classes and for facilitating transportation. While the rules are generally well documented and duly informative, the peers agree that compensation rules and regulations in case of sickness should also be explicitly addressed in the official documents, which is not yet the case.

Taking the statement of the HEI into account the peers assess criterion 5 for all study programmes under review to be completely fulfilled.

6. Quality management: quality assessment and development

Criterion 6 Quality management: quality assessment and development

Evidence:

- Appendix 3-9: Expert opinions on the educational programme for all six degree programmes
- Appendix C: Statistical data
- Appendix 20: Academic mobility of students
- Self-Assessment Report
- Discussions during the audit

Preliminary assessment and analysis of the peers:

Quality management and assurance standards and procedures are based on the general standards provided by the Ministry and mostly in correspondence with the criteria of international accreditation agencies. The Self-Assessment Report specifies the procedures to

continuously assess and improve the quality of the educational services (internal students/teaching staff/employees surveys, evaluation by external stakeholders such as graduates and employers, and internal audits). The internal audits are conducted based on the Standards and Guidelines for internal quality assurance, which are accessible in the internal document management system of ENU. The final audit report is discussed with the heads of the degree programmes. In case of discrepancies with accreditation standards, the heads of programme develops an action plan to deliminate them.

Programmes are developed based on internal procedures under involvement of internal (lecturers, students, university staff, employers) and external stakeholders. The development is coordinated by the Academic Council of the University. Active participation of students in quality assurance processes is also foreseen through their engagement in the Students Scientific Council as well as according to the students any time they wish to express an observation or concern. Preventive measures to avoid unequal treatment are in place through the availability of grants for students from underprivileged backgrounds (e.g. socio-economically, students from rural areas).

The reviewers acknowledge that there is a solid quality assurance system installed, with regular surveys conducted at different levels, under involvement of all stakeholders, internally (students, teaching staff, university staff) as well as externally (graduates, employees). Altogether more than 10 types of surveys are conducted in the information system Platonus and on the University website, particularly aiming at identifying the stakeholders' satisfaction with the quality of training, teaching, internships and employment conditions, respectively. The peers appreciate that ENU regularly assesses the evaluation results and takes mitigation actions in case of identified risks, e.g. increasing the number and enhancing the quality of modules and improving the announcements for teachers and students.

While survey results are discussed during departmental meetings and decisions following the meetings are disseminated to the students, important elements of the evaluation loop are however missing. The survey results are not discussed nor accessible in detail for the teaching staff concerning their specific courses, and a course-by-course discussion of the results with the students is equally missing. The system must be extended to also ensure these actions, which is essential for a case-by-case improvement of teaching practices based on the specific, anonymised student feedback.

The programme representatives mention an increasing attractiveness of Higher Education, Postgraduate Education and international mobility as a strategic development of ENU and with relevance also for the six degree programmes. Existing programmes are continuously under review, new concepts are under development (e.g. Double Degree Programmes). The process of further professionalisation demands recognition from external experts,

demonstrated by the involvement of industry representatives and foreign professors in the development of the contents of the study programme, ASIIN international accreditation process and the participation in Higher Education rankings.

The auditors mention that a sound knowledge and technology transfer strategy is another element relevant for continuously assuring the quality of the degree programme and matching with labour market requirements. The visit shows that students and graduates sufficiently benefit from existing collaborations with external partners (universities, research institutes, to a certain degree industry) with which collaboration agreements are in place. According to the peers, enabling knowledge and technology transfer going into both directions would create further synergies both for ENU and its partnering organisatons.

Final assessment of the peers after the comment of the Higher Education Institution regarding criterion 6:

Based on ENU's statement and their previous assessment the peers are convinced that there are sound strategies in place to continuously improve the quality of the study programmes under review. ENU regularly gathers and analyses student feedback concerning the general quality of the teaching and learning conditions as well as the internship experiences. The feedback loop is duly closed in terms of informing students about the survey results and the actions taken. However, in order to meet the required international quality management standards, ENU is advised to ensure that course evaluation results are discussed with the students for each course in question. The peers therefore adhere to their preliminary assessment and respective recommendation to enhance the quality management procedures related to course evaluations.

Taking the statement of the HEI into account the peers conclude criterion 6 for all study programmes under review to be partially fulfilled.

D Additional Documents

No additional documents requested.

E Comment of the Higher Education Institution (02.07.2021)

The institution provided a detailed statement as well as the following additional documents:

- Procedure for development, expert evaluation and approval of education programs
- Report on the work carried out according to the results of sociological research

F Summary: Peer recommendations (17.08.2021)

Taking into account the additional information and the comments given by ENU the peers summarize their analysis and **final assessment** for the award of the seals as follows:

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
BA Biology	With requirements for one year	30.09.2028	–	-
BA Ecology and Nature Management	With requirements for one year	30.09.2027	–	-
BA Plant Biotechnology and Microbiology	With requirements for one year	30.09.2027	–	-
MA Biology	With requirements for one year	30.09.2028	–	-
MA Environmental Protection and Rational Use of Natural Resources	With requirements for one year	30.09.2027	–	-
MA Molecular Biotechnology and Biomedicine	With requirements for one year	30.09.2027	–	-

Requirements

For all degree programmes

A1 (ASIIN 2.1, ASIIN 2.3) It is required to update the module handbooks by specifying the teaching methods, computer databases and software programmes used.

A2 (ASIIN 6) It must be ensured that the details of the individual course evaluation results are transferred to teachers and discussed with students.

A3 (ASIIN 3) Disability compensation measures, illness and mitigating circumstances must be specified.

For BA Biology and BA Plant Biotechnology and Microbiology

A.4 (ASIIN 1.3) There is a strong need to continuously integrate Latin into the curriculum (at least as part of the elective programme, better as part of the compulsory programme).

For MA Molecular Biotechnology and Biomedicine:

A.5 (ASIIN 2.1, ASIIN 5.3) The Module Handbook must be updated with more specific module descriptions in terms of technological contents, teaching methods, equipment, methods and teaching technologies used.

Recommendations

For all degree programmes

E.1 (ASIIN 1.1) It is recommended to introduce a more formal and more collaborative structure for external feedback (e.g. through round tables, advisory boards).

E.2 (ASIIN 1.3) It is recommended to continuously secure accessibility to materials (organic and non-organic materials) for students and to continue to establish collaboration connections with further external partners (e.g. enterprises, research centres, universities) whenever needed.

E.3 (ASIIN 1.4) The Rules of Admission should specify how individual admission requirements that have not been fulfilled can be compensated.

E.4 (ASIIN 2.1) It is suggested to revise the module handbooks and literature lists with more updated educational and methodological literature sources in the language of instruction.

E.5 (ASIIN 5.2) Compensation rules and regulations in case of sickness should be explicitly addressed in the official documents.

For MA in Environmental Protection and Rational Use of Natural Resources

E.6 (ASIIN 4.3) It is recommended to expand existing collaborations in order to enable practices for students in the fields of environmental protection, natural resources processing as well as mineral and human-produced waste.

G Comment of the Technical Committees 10 and 11 (02.09.2021)

Technical Committee 10 – Life Sciences (02.09.2021)

Assessment and analysis for the award of the ASIIN seal:

The TC sees that the points of criticism relate to the module descriptions, the teaching evaluations, regulations on compensation for disadvantages and knowledge of Latin. A total of five conditions are proposed. The six recommendations concern quality assurance, external cooperation and admission regulations. The Technical Committee is in favour of deleting both requirement A4 and requirement A5 without replacement. It is not necessary to offer an extra course on Latin terminology and requirement A5 is already included in requirement A1. In addition, recommendation E2 should be split into two separate recommendations.

The Technical Committee 10 – Life Sciences recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
BA Biology	With requirements for one year	30.09.2028	–	-
BA Plant Biotechnology and Microbiology	With requirements for one year	30.09.2027	–	-
MA Biology	With requirements for one year	30.09.2028	–	-
MA Molecular Biotechnology and Biomedicine	With requirements for one year	30.09.2027	–	-

Technical Committee 11 – Geosciences (02.09.2021)

Assessment and analysis for the award of the ASIIN seal:

The Technical Committee discussed the procedure and agrees with the assessment of the expert group without any changes.

The Technical Committee 11 – Geosciences recommends the award of the seals as follows:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
BA Ecology and Nature Management	With requirements for one year	30.09.2027	–	-
MA Environmental Protection and Rational Use of Natural Resources	With requirements for one year	30.09.2027	–	-

H Decision of the Accreditation Commission (17.09.2021)

Assessment and analysis for the award of the subject-specific ASIIN seal:

The Accreditation Commission follows the proposal of TC 10 to delete A4 (for the curricular integration of Latin courses), A5 (because of duplication with A1) and E6 (because of duplication with A3). It also follows the proposal of TC 10 to formulate two separate recommendations from E2.

Otherwise, the Accreditation Commission agrees with the requirements and recommendations proposed by the peers and the Technical Committees.

The Accreditation Commission decides to award the following seals:

Degree Programme	**ASIIN Seal**	**Maximum duration of accreditation**	**Subject-specific label**	**Maximum duration of accreditation**
BA Biology	With requirements for one year	30.09.2028	–	-
BA Ecology and Nature Management	With requirements for one year	30.09.2027	–	-
BA Plant Biotechnology and Microbiology	With requirements for one year	30.09.2027	–	-
MA Biology	With requirements for one year	30.09.2028	–	-
MA Environmental Protection and Rational Use of Natural Resources	With requirements for one year	30.09.2027	–	-

Degree Programme	ASIIN Seal	Maximum duration of accreditation	Subject-specific label	Maximum duration of accreditation
MA Molecular Biotechnology and Biomedicine	With requirements for one year	30.09.2027	–	-

Requirements

For all degree programmes

A 1. (ASIIN 2.1, ASIIN 2.3) It is required to update the module handbooks by specifying the teaching methods, computer databases and software programmes used.

A 2. (ASIIN 6) It must be ensured that the details of the individual course evaluation results are transferred to teachers and discussed with students.

A 3. (ASIIN 3) Disability compensation measures, illness and mitigating circumstances must be specified.

Recommendations

For all degree programmes

E 1. (ASIIN 1.1) It is recommended to introduce a more formal and more collaborative structure for external feedback (e.g. through round tables, advisory boards).

E 2. (ASIIN 1.3) It is recommended to continuously secure accessibility to materials (organic and non-organic materials) for students.

E 3. (ASIIN 1.3) It is recommended to continue to establish collaboration connections with further external partners (e.g. enterprises, research centres, universities) whenever needed.

E 4. (ASIIN 1.4) The Rules of Admission should specify how individual admission requirements that have not been fulfilled can be compensated.

E 5. (ASIIN 2.1) It is suggested to revise the module handbooks and literature lists with more updated educational and methodological literature sources in the language of instruction.

For MA in Environmental Protection and Rational Use of Natural Resources

E 6. (ASIIN 4.3) It is recommended to expand existing collaborations in order to enable practices for students in the fields of environmental protection, natural resources processing as well as mineral and human-produced waste.

I Fulfillment of Requirements (23.09.2022)

Analysis of the peers and the Technical Committees (09.03.2022)

Requirements

For all programmes

A 1. (ASIIN 2.1, ASIIN 2.3) It is required to update the module handbooks by specifying the teaching methods, computer databases and software programmes used.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: ENU has updated the module handbooks and specified what teaching methods, computer databases, and software programmes are used.
TC 10	fulfilled Vote: unanimous Justification: The TC follows the peers' assessment and sees the requirement as fulfilled.
TC 11	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.

A 2. (ASIIN 6) It must be ensured that the details of the individual course evaluation results are transferred to teachers and discussed with students.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: ENU has provided verification that the results of the course questionnaires are discussed with the students.
TC 10	fulfilled Vote: unanimous Justification: The TC follows the peers' assessment and sees the requirement as fulfilled.
TC 11	fulfilled Vote: unanimous

	Justification: The TC agrees with the peers' assessment.

A 3. (ASIIN 3) Disability compensation measures, illness and mitigating circumstances must be specified.

Initial Treatment	
Peers	Fulfilled Vote: unanimous Justification: The "Regulations on conducting current and mid-term assessment of learning achievements, midterm and final assessment of students in L.N. Gumilyov Eurasian National University" mention in § 3.8 different measures for disability compensation.
TC 10	fulfilled Vote: unanimous Justification: The TC follows the peers' assessment and sees the requirement as fulfilled.
TC 11	fulfilled Vote: unanimous Justification: The TC agrees with the peers' assessment.

Decision of the Accreditation Commission (23.09.2022)

Degree Programme	**ASIIN seal**	**Subject-specific labels**	**Maximum duration of accreditation**
Ba Biology	All requirements fulfilled	-	30.09.2028
Ba Ecology and Nature Management	All requirements fulfilled	-	30.09.2027
Ba Plant Biotechnology and Microbiology	All requirements fulfilled	-	30.09.2027
Ma Biology	All requirements fulfilled	-	30.09.2028
Ma Environmental Protection and Rational Use of Natural Resources	All requirements fulfilled	-	30.09.2027

Degree Programme	ASIIN seal	Subject-specific labels	Maximum duration of accreditation
Ma Molecular Biotechnology and Biomedicine	All requirements fulfilled	-	30.09.2027

Appendix: Programme Learning Outcomes and Curricula

According to the official programme description, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Biology:

Universal competences (UC)	Result of training (GPC units)	Names of Courses that Form Results of Training (units of competences)
UC_A – To use modern communication tools and technologies	**RT_1–** to get into communication in oral and written forms in Kazakh, Russian and foreign languages in order to solve problems of interpersonal, intercultural, and professional interactions; **RT_2 –** to use digital technologies, various types of information and communication technologies for search, storage, processing, protection, and dissemination of information, as well as to apply economic knowledge in various spheres of activity	1. Foreign language 2. Kazakh (Russian) language 3. Digital technologies by branches of application 4. Information and communication technology 5. Entrepreneurship and business
UC_B – ability to assess various situations based on a holistic systemic scientific worldview	**RT_3 –** to apply philosophical knowledge for the formation of world view, to analyze the main stages and patterns of the historical development of society in order to increase civic engagement.	1. Modern history of Kazakhstan 2. Rukhani Zhangyru 3. Philosophy 4. Social and Political Knowledge Module
UC_C – ability to form and define a person in a social environment and focus on a healthy lifestyle	**RT_4–** to provide a full-fledged social and professional activities by tools of physical culture, to master a safety culture, to promote an environmental awareness **RT_5 –**to have a sufficient level of legal awareness, to execute faithfully professional duties, and to follow principles of positive behavior and ethical norms of communication	1. Physical Training 2. Anti-corruption culture 3. Fundamentals of ecology and life safety
General professional competences (GPC)	**The result of training (GPC units)**	**The name of courses that form the results of training (units of competences)**
GPC_A Ability to understand general laws of nature and apply basic biological knowledge to solve research problems	**RT_6 –** Gained fundamental knowledge in mathematics and science relevant to biology	1. Physics 2. Chemistry 3. Mathematics
	RT_7 – Acquired methodological competence in bio sciences and to apply them in a different context, have relevant knowledge of environmental safety issues and the associated legal framework.	1. Introduction to Biology 2. Botany 3. Training-fiald practice of Botany 4. Vertebrate Zoology 5. Invertebrate Zoology 6. Training-field practice in zoology 7.Cytology and Histology 8. Human Anatomy 9.Plant physiology 10. Human Morphology 11. Cytology and Histology with the basics of Embryology
		1. Bioresources of Kazakhstan 2. Evolutionary Science

		3. Basics of systematics and phylogeny 4. Animal and human behaviour
GPC_B ability to independently perform laboratory, biochemical studies in solving research problems	**RT_8 –** Knows the theoretical foundations and basic ideas of the sciences on the diversity of biological objects, physiological sciences; modern basics of cell biology, the basics of human biology. Demonstrates knowledge of the principles of cellular and non-cellular organization of biological objects and owns the methods of observation, description, identification, classification, cultivation of biological objects.	1. Human and animal physiology 2. Biophysics 3. Neurophysiology 4.Virology 5.Microbiology 6.Immunology 7.Biochemistry 8.Immunology and Allergology
Professional Competences (PC)	**Result of Training (PC units)**	**Names of Courses that Form Results of Training (units of competences)**
PC_A Ability to plan, organize and conduct an experiment, present experimental data and use the knowledge gained in scientific and industrial activities; to demonstrate ideas about modern advances in molecular biology and apply the knowledge gained in research work	**RT_9** knows the basic laws and modern achievements of genetics, demonstrates knowledge in the field of modern methods for the study of genes. Understands modern problems of biology and uses fundamental biological concepts to solve research problems.	1.Genetics 2. Medical Genetics 3. Cytogenetics 4. Fundamentals of Molecular Medicine 5.Genetics of development 6. Gene engineering 7. Molecular Biology 8. Cell Biology 9. Molecular Biology and Biochemical methods 10. Hormones in phylo-and ontogenesis 11. Methods of investigation of biopolymers 12. Industrail intership 13. Pre – diploma practice
PC_B - Ability to use modern methods of processing and interpreting bioinformation; carry out statistical processing of field and laboratory data; find, structure and analyze information	**RT_{10}** Be able to use existing software, use the basic knowledge and skills of information management solutions for professional research tasks	1. Biometrics 2.Bioinformatics 3. Mathematical methods in biology
PC_C - ability to use systematic theoretical and practical knowledge for the formulation and solution of research problems in the field of applied biology.	**RT_{11}** knows the theoretical foundations of bioethics, parasitology, the biology of the aquatic and terrestrial environment, the principles of vegetation distribution, uses methods of observation, description and classification of biological objects.	1. Bioethics with elements of biosafety and biosecurity 2. Geobotany 3. Parasitology
PC_D ability to teach biological knowledge to students of educational institutions	**RT_{12}** Knows the main provisions of the traditional and modern methods of teaching biology in secondary and specialized educational institutions, the specifics, the basic principles to design the educational content; able to perform logical-biological, methodological and didactic analysis of learning content.	1. Methodology of teaching biology 2. Pedagogical practice

The following **curriculum** is presented:

Short description in English	*Full description in English*
GCD CC	General education courses, compulsory component
GCD EC	General education courses, elective component
BC UC	Basic courses, university component
BC EK	Basic courses, elective component
PD UC	Major courses, university component
PD EC	Major courses, elective component
UC	Universal competences
GPC	General professional competences
PC	Professional competences
RT	Learning outcomes
FA	Final attestation

3 The content of the education program

Module Name and Code	Course Code	Course Name	Cycle, Component	Language of instruction	Total of credits	The volume of hours by types of classes				Type of control	Developed competences	Department in charge
						Lectures	Seminars	Laboratory Classes	SIW			
Semester 1												
Module of general education		Modern history of Kazakhstan	GCD CC	Kazakh	5	30	15		105	SE	UC_B	History of Kazakhstan
		Foreign language	GCD CC	English	5		45		105	Exam	UC_A	Foreign Languages Department
		Kazakh (Russian) language	GCD CC	Kazakh/ Russian	5		45		105	Exam	UC_A	Practical Kazakh language Department of Russian

		Social and Political Knowledge Module	GCD CC	Kazakh/ Russian	8	30	60		150	Exam	UC_B	Political Science Sociology Philosophy SRS
		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC_C	Physical training and sports
General biological disciplines module		Introduction to Biology	BD UC	Kazakh/ Russian	5	15		30	105	Exam	GPC_A	General biology and genomics
Semester 2												
Module of general education		Information and communication technologies	GCD CC	English	5	30	15		105	Exam	UC_A	Computer science department
		Kazakh (Russian) language	GCD CC	Kazakh Russian	5		45		105	Exam	UC_A	Department of Practical Kazakh language Department of Russian
		Foreign language	GCD CC	English	5		45		105	Exam	UC_A	Foreign Languages Department
		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC_C	Physical training and sports
General biological disciplines module		Botany	BD UC	Kazakh/ Russian	5	15		30	105	Exam	GPC_A	General biology and genomics
		Training-field practice in botany	BD UC	Kazakh/ Russian	3					Report	GPC_A	General biology and genomics
Natural Sciences		Chemistry	BD UC	Kazakh/ Russian	5	30		15	105	Exam	GPC_A	Department of Chemistry
Total credits for 1st year					**60**	**135**	**390**	**90**	**1095**			
Semester 3												
Module of general education		Philosophy	GCD CC	Kazakh/ Russian	5	30	15		105	Exam	UC_B	Philosophy
		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC_C	Physical training and sports
Natural Sciences		Physics	BD UC	Kazakh/ Russian	5	30	15		105	Exam	GPC_A	department of general and theoretical physics
General biological disciplines module		Invertebrate Zoology	BD UC	Kazakh/ Russian	5	15		30	105	Exam	GPC_A	General biology and genomics
Choose one discipline												
		Human Anatomy	BD EK	Kazakh/ Russian	8	30		45	165	Exam	GPC_A	General biology and genomics

General biological disciplines module		Human Morphology	BD EK	Kazakh/ Russian	8	30		45	165	Емтихан Экзамен Exam	GPC_A	General biology and genomics
Choose one discipline												
Cell Biology, General and Molecular Genetic		Cytology and Histology	BD EK	Kazakh/ Russian	5	15		30	105	Exam	GPC_A	General biology and genomics
		Cytology and Histology with the basics of Embryology	BD EK	Kazakh/ Russian	5	15		30	105	Exam	GPC_A	General biology and genomics
Semester 4												
Natural Sciences		Mathematics	BD UC	Kazakh/ Russian	5	15	30		105	Exam	GPC_A	department of Higher Mathematics
General biological disciplines module		Biochemistry	BD UC	Kazakh/ Russian	5	15		30	105	Exam	GPC_B	General biology and genomics
		Human and animal physiology	BD UC	Kazakh/ Russian	5	15		30	105	Exam/ course work	GPC_B	General biology and genomics
		Vertebrate zoology	BD UC	Kazakh/ Russian	5	15		30	105	Exam	GPC_A	General biology and genomics
		Training-field practice in zoology	BD UC	Kazakh/ Russian	3					report	GPC_A	General biology and genomics
Choose one discipline												
Module of general education		Entrepreneurship and business	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_A	Economics and Entrepreneurship
		Rukhani Zhangyru	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_B	Department of Eurasian Studies
		Digital technologies by branches of application	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_A	Computer science department
		Anti-corruption culture	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_C	Theory and history of state and law, constitutional law
		Fundamentals of ecology and life safety	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_C	Department of Management and Engineering in the field of environmental protection
		Akademic rhetoric	GCD EC	Kazakh/ Russian	5	15	30		105	Exam		Department of Kazakh linguistics
Module of general education		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC_C	Physical training and sports

Total credits for 2nd year					**60**	**390**	**285**	**270**	**1905**			
Semester 5												
General biological disciplines module		Microbiology	PD UC	Kazakh/ Russian	5	15		30	105	Exam	GPC_B	General biology and genomics
		Virology	PD UC	Kazakh/ Russian	5	15	30		105	Exam	GPC_B	General biology and genomics
		Biophysics	PD UC	Kazakh/ Russian	5	15	30		105	Exam	GPC_B	General biology and genomics
		Plant physiology	PD UC	Kazakh/ Russian	5	15		30	105	Exam	GPC_A	General biology and genomics
Cell Biology, General and Molecular Genetic		Molecular biology	PD UC	Kazakh/ Russian	5	15		30	105	Exam	PC_A	General biology and genomics
Choose one discipline												
Applied Biology		Bioresources of Kazakhstan	BD EK	Kazakh/ Russian	5	15	30		105	Exam	GPC_A	General biology and genomics
		Basics of systematics and phylogeny	BD EK	Kazakh/ Russian	5	15	30		105	Exam	GPC_A	General biology and genomics
Cell Biology, General and Molecular Genetic		Methods of investigation of biopolymers	BD EK	Kazakh/ Russian	5	15		30	105	Exam	PC_A	General biology and genomics
General biological disciplines module		Hormones in phylo-and ontogenesis	BD EK	Kazakh/ Russian	5	15		30	105	Exam	GPC_A	General biology and genomics
Semester 6												
Bioinformatics and mathematical data processing in biology		Biometrics	BD UC	Kazakh/ Russian	5	15	30		105	Exam	PC_B	General biology and genomics
Cell Biology, General and Molecular Genetic		Genetics	PD UC	Kazakh/ Russian	5	15		30	105	Exam	PC_A	General biology and genomics
General biological disciplines module		Evolutionary Science	PD UC	Kazakh/ Russian	5	15	30		105	Exam	GPC_A	General biology and genomics
Methodical aspects of biology teaching		Methods of teaching biology	PD UC	Kazakh/ Russian	5	15	30		105	Exam	PC_D	General biology and genomics
Choose one discipline												
Applied biology		Parasitology	BD EK	Kazakh/ Russian	7	30	45		135	Exam	PC_C	General biology and genomics
Cell Biology, General and Molecular Genetic		Fundamentals of molecular medicine	BD EK	Kazakh/ Russian	7	30	45		135	Exam	PC_C	General biology and genomics
General biological disciplines module		Neurophysiology	BD EK	Kazakh/ Russian	7	30	45		135	Exam	GPC_B	General biology and genomics
		Animal and human behaviour	BD EK	Kazakh/ Russian	7	30	45		135	Exam	GPC_A	General biology and genomics

Methodical aspects of biology teaching		Teaching Practice	PD UC		3					report	PC_D	General biology and genomics
Total credits for 3rd year					**60**	**315**	**390**	**180**	**1905**			
7.1 trimester /7.2 quarter												
Cell Biology, General and Molecular Genetic		Cell Biology	PD UC	Kazakh/ Russian	5	15		30	105	Exam	PC_A	General biology and genomics
Choose one discipline												
Applied biology		Immunology	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_A	General biology and genomics
		Immunology and Allergology	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_A	General biology and genomics
Choose one discipline												
Cell Biology, General and Molecular Genetic		Gene engineering	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_A	General biology and genomics
		Medical genetics	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_A	General biology and genomics
Choose one discipline												
Bioinformatics and mathematical data processing in biology		Bioinformatics	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_B	General biology and genomics
		Mathematical methods in biology	BD EK	Kazakh/ Russian	5	30	15		105	Exam	PC_B	General biology and genomics
Choose one discipline												
Cell Biology, General and Molecular Genetic		Genetics of development	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_A	General biology and genomics
		Cytogenetics	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_A	General biology and genomics
Choose one discipline												
Cell Biology, General and Molecular Genetic		Methods of Molecular biology and biochemistry	BD EK	Kazakh/ Russian	6	30	30		120	Exam	PC_A	General biology and genomics
		Cytological and histological methods	BD EK	Kazakh/ Russian	6	30	30		120	Exam	PC_A	General biology and genomics
Choose one discipline												
Applied biology		Bioethics with elements of biosafety and biosecurity	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_B	General biology and genomics
		Geobotany	BD EK	Kazakh/ Russian	5	15	30		105	Exam	PC_A	General biology and genomics
Semester 8												
General biological disciplines module		Industrial practice	PD UC		6					Report	$PC_{A,B}$	General biology and genomics
		Pre – diploma practice	PD UC		6					Report	$PC_{A,B}$	General biology and genomics
Module of final assessment	State examination in the speciality		FA		6					SE	$PC_{A;B;C}$	General biology and genomics

	Completion and defense of Bachelor degree diploma project	FA		6					Defense of degree work	$PC_{A;B;C}$	General biology and genomics
Total credits for 4rd year				**60**	**240**	**345**	**30**	**1395**			
Total for education program				**240**	**1080**	**1410**	**570**	**6300**			

Course	Semester	Amountofmodulestobestudied	Amountofsubjects			Total of credits							Total amount in hours	Amount			
			CC	UC	EC	Theoreticalclasses	Educational practice	Industrial practice	Teaching internship	Pre – diploma practice	Finalassessment	Total		Exam	Differentiated attestation	eport	Coursepaper
1	1	2	5	1		30						30	900	5	1		
	2	3	4	3		27	3					30	900	5	1	1	
2	3	4	2	2	2	30						30	900	5	1		
	4	3	2	5		27	3					30	900	5	1	1	1
3	5	3		5	4	30						30	900	6			
	6	5		5	1	27			3			30	900	5		1	
4	7	4		1	6	36						36	1080	7			
	8	2						6		6	12	24	720	1		2	
Total:		**26**	**13**	**22**	**13**	**207**	**6**	**6**	**3**	**6**	**12**	**240**	**7200**	**39**	**4**	**5**	**1**

According to the official programme description, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Ecology and Nature Management:

Profile of Competences

Universal competences (UC)	**Result of training (GPC units)**	**Names of Courses that Form Results of Training(units of competences)**
UCA – To use modern communication tools andtechnologies	**RT1–** to get into communication in oral and written forms in Kazakh, Russian and foreign languages in order to solve problems of interpersonal, intercultural, and professional interactions; **RT2 –** to use digital technologies, various types of information andcommunication technologies for search, storage, processing, protection, and dissemination of information, as well as to apply economic knowledge in various spheres of activity	1. Foreign language 2. Kazakh(Russian) language 3. Digital technologiesby branches of application 4. Information and communication technology 5. Entrepreneurship and business 6. Business rhetoric
UCB – ability to assess varioussituations based on a holistic systemic scientific worldview	**RT3 –** to apply philosophical knowledge for the formation of worldview, to analyze the main stages and patterns of the historical development of society in order to increase civic engagement.	1. Modern history of Kazakhstan 2. Rukhani Zhangyru 3. Philosophy 4. Social and Political Knowledge Module
UCC – ability to form and define aperson in a social environment andfocus on a healthy lifestyle	**RT4–** know the basics of a full-fledged social and professional activity through physical culture, demonstrate a safety culture, analyze and evaluate sources of environmental hazards, and be able to organize life safety conditions; **RT5 –** demonstrate a sufficient level of legal awareness, fulfill professional duties and principles of behavioral culture and ethical norms of communication.	1. Physical Training 2. Anti-corruption culture Fundamentals of ecology and life safety
General Professional Competences (GPC)	**Result of training (GPC units)**	**Names of Courses that Form Results of Training(units of competences)**

GPCA - Ability to use the principles of functioning and evolution of ecological systems, the role and importance of socio-economic factors, components of the biosphere and the biosphere as a whole to solve environmental problems	**RT6-** Demonstrate basic knowledge of the basic laws of the functioning of ecosystems and the biosphere as a whole, the purpose and classification of environmental monitoring and its individual units and methods of observation.	1. Introduction to the specialty 2. Animals and plants ecology 3. Biodiversity of biocenoses 4. Biological components of the environment 5. Chemistry 6. Bioecology 7. Ecological biogeography 8. Social ecology Soil ecology 9. Ecology of geosystems 10. Ecological monitoring
	RT7 – Know about regional and global environmental problems, requirements of international and republican legislation in the field of environmental protection; understand the development trends of modern business, its significance for the ecology of the region; analyze, assess environmental problems in the field of economic management and production; compile information on the anthropogenic impact on the environment, apply methods for assessing environmental risk.	1. Ecological metrology and 2. Biometry 3. Bioindicator methods of research 4. Evolution of the biosphere 5. Medical Ecology 6. Industrial ecology 7. Population ecology and biocenology 8. Macroecosystem Ecology 9. Protection of natural resources 10. Habitat and human ecology 11. Institutional support of environmental protection

The following **curriculum** is presented:

Short description in English	*Full description in English*
GCD CC	General education courses, compulsory component
GCD EC	General education courses, elective component
BC UC	Basic courses, university component
BC EC	Basic courses, elective component
PD UC	Major courses, university component
PD EC	Major courses, elective component
UC	Universal competences
GPC	General professional competences
PC	Professional competences
RT	Learning outcomes
FA	Final attestation

3 The content of the education program

Module Name and Code	Course Code	Course Name	Cycle, Component	Language of instruction	Total of credits	The volume of hours by types of occupations				Type of control	Developed competences	Department in charge
						Lectures	Seminars	Laboratory Classes	SIW			
Semester 1												
Module of general education		Modern history of Kazakhstan	GCD CC	Kazakh	5	30	15		105	SE	UC_B	History of Kazakhstan

		Foreign language	GCD CC	English	5		45		105	Exam	UC_A	Foreign Languages Department
		Kazakh (Russian) language	GCD CC	Kazakh/ Russian	5		45		105	Exam	UC_A	Practical Kazakh language

												Department of Russian
		Social and Political Knowledge Module	GCD CC	Kazakh/ Russian	8	30	60		150	Exam	UC_B	Political Science Sociology Philosophy SRS
		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC_C	Physical training and sports
Fundamentals of Natural Sciences		Introduction to the specialty	BD UC	Kazakh/ Russian	5	15	30		105	Exam	GPC_A	Management and Engineering in the field of environmental protection
2 семестр /2 семестр / Semester 2												
Module of general education		Information and communication technologies	GCD CC	English	5	30	15		105	Exam	UC_A	Computer science department
					5		45		105			

		Kazakh (Russian) language	GCD CC	Kazakh Russian						Exam	UC A	Practical Kazakh language Department of Russian
		Foreign language	GCD CC	English	5		45		105	Exam	UC A	Foreign Languages Department
		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC C	Physical training and sports
Fundamentals of Natural Sciences		Biodiversity of biocenoses	BD UC	Kazakh/ Russian	5	30	15		105	Exam	GPC A	Management and Engineering in the field of environmental protection
Choose one discipline												

Applied ecology		Biological components of the environment	BD EC	Kazakh/ Russian	5	15	30		105	Емтихан Экзамен Exam	ЖКҚА ОПК$_A$ GPC$_A$	Management and Engineering in the field of environmental protection
Fundamentals of Natural Sciences		*Chemistry*	*BD EC*	*Kazakh/ Russian*	*5*	*15*	*30*		*105*	*Exam*	*GPC$_A$*	*Department of Chemistry*
Externship module		Educational practice	BD UC	Kazakh/ Russian	3		90			Report		Management and Engineering in the field of environmental protection
Total credits for 1st year					**60**	**150**	**555**		**1095**			
Semester 3												
Module of general education		Philosophy	GCD CC	Kazakh/ Russian	5	30	15		105	Exam	UC$_B$	Philosophy
		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differentiated attestation	UC$_C$	Physical training and sports
Choose one discipline												
				Қазақ/Орыс/	5	15	30		105			

Fundamentals of Natural Sciences		Animals and plants ecology	BD EC	Kazakh/ Russian						Exam	A GPCA	Management and Engineering in the field of environmental protection
Ecological research methods		*Biogeochemical monitoring*	*BD EC*	*Kazakh/ Russian*	*5*	*15*		*30*	*105*	*Exam*	*A GPCA*	*Management and Engineering in the field of environmental protection*
Choose one discipline												
Fundamentals of Natural Sciences		Bioecology	BD EC	Kazakh/ Russian	6	30	30		120	Exam	A GPCA	Management and Engineering in the field of environmental protection
ECOL 22002 Ecological research methods		*Ecological toxicology*	*BD EC*	*Kazakh/ Russian*	*6*	*30*	*30*		*120*	*Exam*	*A GPCA*	*Management and Engineering in the field of environmental*

												protectio n
Choose one discipline												
Fundamentals of Natural Sciences		Ecological metrology and Biometry	BD EC	Kazakh/ Russian	6	30	30		120	Exam	A GPCA	Manage ment and Engineeri ng in the field of environm ental protectio n

Ecological research methods		*Digital environmental research processing methods*	*BD EC*	*Kazakh/ Russian*	*6*	*30*	*30*		*120*	*Exam*	*A GPCA*	*Management and Engineering in the field of environmental protection*
Choose one discipline												
Ecological research methods		Bioindicator methods of research	BD EC	Kazakh/ Russian	6	30	30		120	Exam	A GPCA	Management and Engineering in the field of environmental protection
Fundamentals of Natural Sciences		*Ecological Geology*	*BD EC*	*Kazakh/ Russian*	*6*	*30*	*30*		*120*	*Exam*	*A GPCA*	*Management and Engineering in the field of environmental protection*
Semester 4												
Choose one discipline												
Module of general education		Entrepreneurship and business	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UCA	Economics and Entrepreneurship
		Rukhani Zhangyru	GCD EK	Kazakh/ Russian	5	30	15		105	Exam	UCB	Department of Eurasian Studies

		Digital technologies by branches of application	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC$_A$	Computer science department
		Anti-corruption culture	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC$_C$	Theory and history of state and law, constitutional law
		Fundamentals of ecology and life safety	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC$_C$	Management and Engineering in the field of environmental protection
		Business rhetoric	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC$_B$	Department of Theoretics and Applied Linguistics
		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC$_C$	Physical training and sports

University component												
Applied ecology		Ecological biogeography	BD UC	Kazakh/ Russian	5	30	15		105	Exam	A GPCA	Management and Engineering in the field of environmental protection
Social and legal aspects of ecology		Social ecology	BD UC	Kazakh/ Russian	5	15	30		105	Exam	A GPCA	Management and Engineering in the field of environmental protection
Choose one discipline												
Social and legal aspects of ecology		Evolution of the biosphere	BD EC	Kazakh/ Russian	5	30	15		105	Exam	A GPCA	Management and Engineering in the field of environmental protection

Fundamentals of Natural Sciences		*Environmental studies*	*BD EC*	*Kazakh/ Russian*	*5*	*30*	*15*		*105*	*Exam*	*GPCA*	Management and Engineering in the field of environmental protection

Choose one discipline												
Applied ecology		Medical Ecology	BD EC	Kazakh/ Russian	5	15	30		105	Exam	GPCA	Management and Engineering in the field of environmental protection
Fundamentals of Natural Sciences		*Biogeochemical provinces*	*BD EC*	*Kazakh/ Russian*	*5*	*15*	*30*		*105*	*Exam*	*GPCA*	
Externship module		Industrial practice	BD UC	Kazakh/ Russian/ English	3		90			Report		
Total credits for 2nd year					**60**	**255**	**420**	**30**	**1095**			
Semester 5												
Fundamentals of Natural Sciences		Soil ecology	BD UC	Kazakh/ Russian/ English	5	15		30	105	Exam	A GPCA	Management and Engineering in the field of environmental protection
Ecological research methods		Ecology of geosystems	BD UC	Kazakh/ Russian/ English	5	30	15		105	Exam	A GPCA	

Choose one discipline												
Engineering ecology		Industrial ecology	BD EC	Kazakh/ Russian/ English	5	30	15		105	Exam	PCB	Management and Engineering in the field of environmental protection
Applied ecology		*Urboecology*	*PD EC*	*Kazakh/ Russian/ English*	*5*	*30*	*15*		*105*	*Exam*	*GPCA*	
Choose one discipline												
Fundamentals of Natural Sciences		Population ecology and biocenology	PD EC	Kazakh/ Russian/ English	5	30	15		105	Exam	GPCA	Management and Engineering in the field of environmental protection
Engineering ecology		*Methods of geoecological researches*	*PD EC*	*Kazakh/ Russian/ English*	*5*	*30*	*15*		*105*	*Exam*	*A GPCA*	
Choose one discipline												
Applied ecology		Macroecosystem Ecology	PD EC	Kazakh/ Russian/ English	5	15		30	105	Exam	A GPCA	Management and Engineering in the field of environmental protection

Ecological Genetics and Climatology		*Ecology of aquatic ecosystems*	*PD EC*	*Kazakh/ Russian/English*	*5*	*15*		*30*	*105*	*Exam*	*ҒЖСА*	*Management and Engineering in the field of environmental protection*
Choose one discipline												
Environmental management and eco-tourism		Protection of natural resources	PD EC	Kazakh/ Russian/ English	5	15	30		105	Exam	GPCA PCB	Management and Engineering in the field of environmental protection
Engineering ecology		*Rational use of natural resources*	*PD EC*	*Kazakh/ Russian/English*	*5*	*15*	*30*		*105*	*Емтихан Экзамен Exam*	*ЖКҚ, ОПК, GPCA*	
6 семестр /6 семестр / Semester 6												
Environmental management and eco-tourism		Ecological monitoring	BD UC	Kazakh/ Russian/ English	5	15	30		105	Exam	GPCA	Management and Engineering in the field of environmental protection
Choose one discipline												
Ecological Genetics and Climatology		Habitat and human ecology	BD EC	Kazakh/ Russian/ English	5	15	30		105	Exam	GPCA	Management and Engineering in the field of environmental protection

System ecology		*Ecological resource science*	*BD EC*	*Kazakh/ Russian/ English*	*5*	*15*	*30*		*105*	*Exam*	*GPCA*	*Management and Engineering in the field of environmental protection*
Choose one discipline												
Social and legal aspects of ecology		Institutional support of environmental protection	BD EC	Russian/ English	5	15	30		105	Exam	GPCA	Management and Engineering in the field of environmental protection
System ecology		*Environmental regulation and examination*	*BD EC*	*Kazakh/ Russian /English*	*5*	*15*	*30*		*105*	*Exam*	*GPCA*	
Choose one discipline												
Environmental management and eco-tourism		Waste management	PD EC	Kazakh/ Russian/ English	6	30	30		120	Exam	PCA	Management and Engineering in the field of environmental protection

Engineering ecology		*Environmental engineering*	*PD EC*	*Kazakh/ Russian/ English*	*6*	*30*	*30*		*120*	*Exam*	*PCA*	*Management and Engineering in the field of environmental protection*
Choose one discipline												
Environmental management and eco-tourism		Ecological audit	PD EC	Kazakh/ Russian/ English	6	30	30		120	Exam	PCA	Management and Engineering in the field of environmental protection
Engineering ecology		*Greenhouse gas management*	*PD EC*	*Kazakh/ Russian/ English*	*6*	*30*	*30*		*120*	*Exam*	*PCA*	
Externship module		Industrial practice	BD UC		3		90			Report		
Total credits for 3rd year					**60**	**240**	**315**	**60**	**1185**			
semester, trimester, quarter 7												
System ecology		System Ecology	PD UC	Kazakh/ Russian/ English	5	15	30		105	Exam	PCA	Management and Engineering in the field of environmental protection

Choose one discipline												
Ecological Genetics and Climatology		Ecological safety and forecasting	PD EC	Kazakh/ Russian/ English	5	15	30		105	Exam	PCA	Management and Engineering in the field of environmental protection
Environmental management and eco-tourism		*Recreational Ecology*	*PD EC*	*Kazakh/ Russian/ English*	*5*	*15*	*30*		*105*	*Exam*	*PCA*	
Choose one discipline												
Environmental management and eco-tourism		Mechanisms of environmental management	B PD EC	Kazakh/ Russian/ English	5	15	30		105	Exam	PCA	Management and Engineering in the field of environmental protection
Ecological Genetics and Climatology		*Environmental Assessment Impact*	*PD EC*	*Kazakh/ Russian/ English*	*5*	*15*	*30*		*105*	*Exam*	*PCA*	*Management and Engineering in the field of environmental protection*

Choose one discipline												
Ecological Genetics and Climatology		Environmental biotechnology	PD EC	Kazakh/ Russian/ English	5	15	30		105	Exam	PCA	Management and Engineering in the field of environmental protection
System ecology		*Ecological zoning and sensing*	*PD EC*	*Kazakh/ Russian/ English*	*5*	*15*	*30*		*105*	*Exam*	*PCA*	
Choose one discipline												
Ecological Genetics and Climatology		Climate change and the «green» economy.	PD EC	Kazakh/ Russian/ English	5	15	30		105	Exam	PCA	Management and Engineering in the field of environmental protection
System ecology		*Paleoecology*	*PD EC*	*Kazakh/ Russian/ English*	*5*	*15*	*30*		*105*	*Exam*	*PCA*	
Choose one discipline												

System ecology		Mutagenesis and environment	PD EC	Kazakh/ Russian/ Englis sh	5	15	30		105	Exam	PCA	Managem ent and Engineeri ng in the field of environm ental protectio n
Ecological Genetics and Climatology		*Climatology and meteorology in ecology*	*PD EC*	*Kazakh/ Russian /English*	*5*	*15*	*30*		*105*	*Exam*	*PCA*	
Choose one discipline												
Environmental management and eco-tourism		Reserve management and studies	PD EC	Kazakh/ Russian/ English	6	30	30		120	Exam	PCA	Manage ment and Engineer ing in the field of environ mental protectio n
Social and legal aspects of ecology		*Ecology of Kazakhstan*	*PD EC*	*Kazakh/ Russian/ English*	*6*	*30*	*30*		*120*	*Exam*	*PCA*	
Semester 8												
		Industrial practice	PD UC		6					Report		

Externship module of ecology		Pre – diploma practice	PD UC		6					Report		
Module of final assessment	State examination in the speciality		FA		6					SE		
	Completion and defense of Bachelor degree diploma project		FA		6					Defense of degree work		
Total credits for 4rd year					**60**	**120**	**930**		**750**			
Total for education program					**240**	**765**	**2220**	**90**	**4125**			

Course	Semester	Amount of modules to be studied	Amount of subjects			Total of credits						Total amount in hours	Amount			
			CC	UC	EC	Theoretical classes	Educational practice	Industrial practice	Pre – diploma practice	Final assessment	Total		Exam	Differentiated attestation	Course paper	Report
	1	2	5	1		30					30	900	5	1		
1	2	4	4	2	1	27	3				30	900	5	1		1
	3	3	1		4	30					30	900	5	1		
2	4	5	1	2	2	27		3			30	900	5	1		1
	5	6		2	4	30					30	900	6			
3	6	6		1	4	27		3			30	900	5			1
	7	4		1	6	36					36	1080	7			
4	8	2						6	6	12	24	720				2
Total:						**207**	**3**	**12**	**6**	**12**	**240**	**7200**	**38**	**4**		

According to the official programme description, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Bachelor degree programme Plant Biotechnology and Microbiology:

Map / Profile of Competences

Universalcompetences (UC)	**Result of training (GPC units)**	**Names of Courses that Form Results of Training (units of competences)**
UC_A –To use modern communication tools and technologies	**RT_1**–to get into communication in oral and written forms in Kazakh, Russian and foreign languages in order to solve problems of interpersonal, intercultural, and professional interactions; **RT_2** –to usedigital technologies, various types of information and communication technologies for search, storage, processing, protection, and dissemination of information, as well as to apply economic knowledge in various spheres of activity	6. Foreign language 7. Kazakh (Russian) language 8. Digital technologies by branches of application 9. Information and communication technology 10. Entrepreneurship and business 11. Business rhetoric
UC_B –ability to assess various situations based on a holistic systemic scientific worldview	**RT_3** –to apply philosophical knowledge for the formation of world view, to analyze the main stages and patterns of the historical development of society in order to increase civic engagement.	5. Modern history of Kazakhstan 6. Rukhani Zhangyru 7. Philosophy 8. Social and Political Knowledge Modul
UC_C – ability to form and define a person in a social environment and focus on a healthy lifestyle	**RT_4**–to provide a full-fledged social and professional activities by tools of physical culture, to master a safety culture, to promote an environmental awareness **RT_5** –to have a sufficient level of legal awareness, to execute faithfully professional duties, and to follow principles of positive behavior and ethical norms of communication	4. Physical Training 5. Anti-corruption culture 6. Fundamentals of ecology and life safety
Professional Competences (PC)	**Result of Training (PC units)**	**Names of Courses that Form Results of Training (units of competences)**
PC_A competence in research, design, organizational and management, production and technological and pedagogical activities: - ability to conduct scientific research	**RT_6** – To define a strategy for solving scientific biotechnological problems, to plan and independently carry out biotechnological scientific experiments, to summarize and justify the results obtained and on their basis to make innovative decisions in the preparation of projects in the field of plant biotechnology and microbiology, to advise on biotechnology.	1. Organization of scientific research 2. Biofuel production technology 3. Industrial microbiotechnology 4. Plant biotechnology

- the ability to navigate the organization and management of enterprises; - the ability to professional growth and self-learning new research methods	**RT_7 –**To operate modern biotechnological production, ensuring their high efficiency and safety; apply the acquired knowledge and skills for the implementation and management of biotechnological processes; evaluate technical means and technologies taking into account the environmental consequences of their application; ensure compliance with safety regulations, industrial sanitation, fire safety and labor protection. To set and solve the problems of engineering analysis to create innovative biotechnological processes and products.	1. Engineering support of biotechnological processes 2. Industrial microbiotechnology 3. Fundamentals of biotechnology 4. Biotechnology of food additives 5. Biosynthesis of biologically active compounds 6. Engineering enzymology
	RT_8 – To analyze and independently choose biotechnological methods of selection programs to create breeding material resistant to biotic and abiotic factors, to use these methods to solve biological problems in genetic and biotechnological research. Compare the effectiveness of different technologies in vitro to create varieties resistant to stress, diseases and pests, improve them to create economically valuable genotypes.	1. Plant biotechnology 2. Agroecology and environment 3. Applied aspects of environmental biotechnology 4. Bioindication and biotesting 5. Selection and seed production of agricultural crops 6. Methods of cryobiotechnology in the creation of genetic banks of plants 7. Biotechnology for production of plant protection agents and bio-fertilizers 8. Adaptive mechanisms of plant stress resistance
PC_B - execution of technological calculations of equipment, the choice of standard equipment for biotechnological production; the possibility of technological processes in the production and production of targeted biotechnological processes;	**RT_9 –** To use the methods of cultivation of microorganisms on various substrates for the production of microbial synthesis products. Know the features of biotransformation and biosynthesis and the scope of their use, genetic modification, methods of cell and genetic engineering. To use biotechnology methods to obtain new energy sources, waste processing and biodegradation of xenobiotics, increase soil fertility. Able to model biotechnological processes.	1. Bioethics and safety in biotechnology 2. Objects of biotechnology and their industrial applications 3. Engineering support of biotechnological processes 4. Fundamentals of biotechnology 5. Methods of production of industrial strains of microorganisms 6. Genetic engineering of plants
General Professional Competences (GPC)	**Result of training (GPC units)**	**Names of Courses that Form Results of Training (units of competences)**
GPC_A The ability to use natural scientific knowledge to form a scientific worldview and orientation in the patterns of the arrangement of living systems and in the branches and directions of biotechnology	**RT_{10} –** to demonstrate basic knowledge of the basic concepts of mathematics, physics, chemistry, biology, has the ability to apply knowledge of fundamental and applied disciplines.	1. Mathematics 2. Physics 3. Chemistry 4. Biophysics 5. General and molecular genetics 6. Molecular Biology 7. Molecular virology 8. Biological active substances of plants 9. Biopolymers and supramolecular structures of plants 10. Adaptive mechanisms of plant stress resistance 11. Biosynthesis of biologically active compounds 12. Botany, algology, mycology 13. Cell biology with the basics of histology 14. Physiology of plants

		15. Plant biochemistry 16. General microbiology 17. Molecular phytopathology 18. Phytoimmunity 19. Biology of reactive oxygen species 20. Ecology of microorganisms 21. Technology of clonal microreproduction of plant 22. Genetics and selection of microorganisms
GPCб The ability to use specific knowledge of biotechnological disciplines in their respective directions	**RT11 –** Find specialized scientific literature on the Internet and databases, use specialized computer programs to process the results, prepare scientific publications, create and submit scientific reports. Demonstrate in-depth knowledge of social, ethical and legal aspects of innovative engineering activities, competence in sustainable development to master the basic methods of protection of production personnel and the population from the possible consequences of accidents, disasters, natural disasters.	1. Organization of scientific research 2. Medical and veterinary biotechnology 3. Engineering enzymology 4. Microorganisms for the food and processing industries 5. Biotechnology of food additives 6. Technology of processing plant medicinal raw material

The following **curriculum** is presented:

Short description in English	*Full description in English*
GCD CC	General education courses, compulsory component
GCD EC	General education courses, elective component
BC UC	Basic courses, university component
BC EC	Basic courses, elective component
PD UC	Major courses, university component
PD EC	Major courses, elective component
UC	Universal competences
GPC	General professional competences
PC	Professional competences
RT	Learning outcomes
FA	Final attestation

Module Name and Code	Course Code	Course Name	Cycle, Component	Language of instruction	Total of credits	The volume of hours by types of occupations				Type of control	Developed competences	Department in charge
						Lectures	Seminars	Laboratory Classes	SIW			
Semester 1												
Module of general education		Modern history of Kazakhstan	GCD CC	Kazakh	5	30	15		105	SE	UC_B	History of Kazakhstan
		Foreign language	GCD CC	English	5		45		105	Exam	UC_A	Foreign Languages Department
		Kazakh (Russian) language	GCD CC	Kazakh/ Russian	5		45		105	Exam	UC_A	Practical Kazakh language

												Department of Russian
		Social and Political Knowledge Module	GCD CC	Kazakh/ Russian	8	30	60		150	Exam	UC_B	Political Science Sociology Philosophy SRS
Module of general education		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen -tiated attestati on	UC_C	Physical training and sports
Natural Sciences module		Mathematics	BD UC	Kazakh/ Russian	5	15	30		105	Exam	GPCa	Higher mathematics department
Semester 2												
Module of general education		Information and communication technologies	GCD CC	English	5	30	15		105	Exam	UC_A	Computer science department
		Kazakh (Russian) language	GCD CC	Kazakh Russian	5		45		105	Exam	UC_A	Practical Kazakh language Department of Russian
		Foreign language	GCD CC	English	5		45		105	Exam	UC_A	Foreign Languages Department
Module of general education		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen- tiated attestatio n	UC_C	Physical training and sports
Natural Sciences module		Chemistry	BD UC	Kazakh/ Russian	5	30		15	105	Exam	PCb GPCa	Chemistry department
Choose one of the modules												
Natural science module of fundamental biological disciplines		Cell biology with the basics of histology	BD EC	Kazakh/ Russian	8	30	15	30	165	Exam	PCb	Biotechnology and microbiology

Natural science module of fundamental biological disciplines		Botany, algology, mycology	BD EC	Kazakh/ Russian	8	30	15	30	165	Exam	PCb GPC$_B$	Biotechnology and microbiology
Total credits for 1st year					**60**	**165**	**435**	**45**	**1155**			
Semester 3												
Module of general education		Philosophy	GCD CC	Kazakh/ Russian	5	30	15		105	Exam	UC$_B$	Philosophy
Module of general education		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC$_C$	Physical training and sports
Natural Sciences module		Physics	BD UC	Kazakh/ Russian	5	30	15		105	Exam	GPCa	Department of general and theoretical physics
Module of natural Sciences and General biotechnology		Objects of biotechnology and their industrial applications	BD UC	Kazakh/ Russian	6	30	15	15	120	Exam	PCa PCb	Biotechnology and microbiology
Natural science module of fundamental biological disciplines		Plant biochemistry	BD UC	Kazakh/ Russian	6	30	15	15	120	Exam	PCb GPC$_B$	Biotechnology and microbiology
Natural science module of fundamental biological disciplines		Physiology of plants	BD UC	Kazakh/ Russian	6	30	15	15	120	Exam	PCb GPCa	Biotechnology and microbiology
Semester 4												
Choose one of the disciplines												
Module of general education		Entrepreneurship and business	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC$_A$	Economics and Entrepreneurship

		Rukhani Zhangyru	GCD EK	Kazakh/ Russian	5	30	15		105	Exam	UC_B	Department of Eurasian Studies
		Digital technologies by branches of application	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_A	Computer science department
		Anti-corruption culture	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_C	Theory and history of state and law, constitutional law
		Ecology and life safety	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_C	Management and Engineering in the field of environmental protection
		Business rhetoric	GCD EC	Kazakh/ Russian	5	30	15		105	Exam	UC_A	Department of Theoretical and Applied Linguistics
Module of general education		Physical Training	GCD CC	Kazakh/ Russian	2		60			Differen-tiated attestation	UC_C	Physical training and sports
Module of natural Sciences and General technology		Fundamentals of biotechnology	BD UC	Kazakh/ Russian	5	30		15	105	Exam	KK_A $ПК_A$ PCa KK_B $ПК_B$ PCb	Biotechnology and microbiology
Natural science module of fundamental biological disciplines		General and molecular genetics	BD UC	Kazakh/ Russian	5	30		15	105	Exam	PCb $GPC_Б$	Biotechnology and microbiology
Choose one of the modules												
Natural science module of fundamental biological disciplines		Biosynthesis of biologically active compounds	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb GPCa	Biotechnology and microbiology

		Biophysics	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb	Biotechnology and microbiology
Natural science module of fundamental biological disciplines		Applied aspects of environmental biotechnology	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb GPC_B	Biotechnology and microbiology
		Biofuel production technology	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa	Biotechnology and microbiology
Methodology and research module		Industrial practice	BD UC		3				90	Report		
Total credits for 2nd year					**60**	**300**	**255**	**60**	**1185**			
Semester 5												
Module of professional profiled special knowledge of biotechnology disciplines		Plant biotechnology	BD UC	Kazakh/ Russian	6	30	30		120	Exam	PCb GPC_B	Biotechnology and microbiology
Module of professional profiled special knowledge of biotechnology disciplines		General microbiology	BD UC	Kazakh/ Russian	6	30	15	15	120	Exam	PCb GPC_a	Biotechnology and microbiology
Natural science module of fundamental biological disciplines		Molecular Biology	PD UC	Kazakh/ Russian	6	30	15	15	120	Exam	Pca PCb GPC_B	Biotechnology and microbiology
Choose one of the modules												

Module of professional profiled special knowledge of biotechnology disciplines		Selection and seed production of agricultural crops	BD EC	Kazakh/ Russian	6	30	30		120	Exam	PCa PCb	Biotechnology and microbiology
Module of professional profiled special knowledge of biotechnology disciplines		Bioindication and biotesting	BD EC	Kazakh/ Russian	6	30	30		120	Exam	PCa PCb	Biotechnology and microbiology
Choose one of the modules												
Module of industrial and technological activities		Engineering support of biotechnological processes	PD EC	Kazakh/ Russian	6	30	30		120	Exam	PCb	Biotechnology and microbiology
Module of industrial and technological activities		Technology of processing plant medicinal raw material	PD EC	Kazakh/ Russian	6	30	30		120	Exam	PCa PCb	Biotechnology and microbiology
Semester 6												
Module of industrial and technological activities		Industrial microbiotechnology	BD UC	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb GPC_a	Biotechnology and microbiology
Choose one of the modules												
Module of professional profiled special knowledge of biotechnology disciplines		Genetic engineering of plants	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb GPC_b	Biotechnology and microbiology
		Methods of production of industrial strains of microorganisms	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb GPC_a	Biotechnology and microbiology
		Biology of reactive oxygen species	BD EC	Kazakh/ Russian	5	30	15		105	Exam	Pca	Biotechnology and

											PCb GPCa	microbiology
Module of professional profiled special knowledge of biotechnology disciplines		Molecular virology	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb GPC_a	Biotechnology and microbiology
		Engineering enzymology	BD EC	Kazakh/ Russian	5	30		15	105	Exam	PCa PCb	Biotechnology and microbiology
		Technology of clonal microreproduction of plant	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb GPC_A	Biotechnology and microbiology
Choose one of the modules												
Module of professional profiled special knowledge of biology and biotechnology disciplines		Molecular phytopathology	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb GPC_B	Biotechnology and microbiology
Module of professional profiled special knowledge of biology and biotechnology disciplines		Genetics and selection of microorganisms	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb	Biotechnology and microbiology
Methodology and research module		Pedagogical practice	BD UC		5				150	Report		
Total credits for 3rd year					**60**	**300**	**195**	**30**	**1275**			
7 term; quarter												

Methodology and research module		Organization of scientific research	PD UC	Kazakh/ Russian	6	30	30		120	Exam	PCa PCb GPCa	Biotechnology and microbiology
Choose one of the modules												
Module of industrial and technological activities		Methods of cryobiotechnology in the creation of genetic banks of plants	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb PCb GPC_5	Biotechnology and microbiology
Module of professional profiled special knowledge of biotechnology disciplines		Medical and veterinary biotechnology	BD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb	Biotechnology and microbiology
Choose one of the modules												
Module of professional profiled special knowledge of biotechnology disciplines		Adaptive mechanisms of plant stress resistance	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa	Biotechnology and microbiology
		Biotechnology for production of plant protection agents and bio-fertilizers	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb	Biotechnology and microbiology

		Bioethics and safety in biotechnology	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb GPCa	Biotechnology and microbiology
		Biological active substances of plants	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb GPCa	Biotechnology and microbiology
		Biopolymers and supramolecular structures of plants	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb GPCa	Biotechnology and microbiology
Module of professional profiled special knowledge of biotechnology disciplines		Phytoimmunity	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb GPCa	Biotechnology and microbiology
		Biotechnology of food additives	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb PCb	Biotechnology and microbiology
		Microorganisms for the food and processing industries	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa GPCa	Biotechnology and microbiology
		Ecology of microorganisms	PD OC	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb	Biotechnology and microbiology

											GPCa	
		Agroecology and environment	PD OC	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb $GPC_Б$	Biotechnology and microbiology
Semester 8												
Methodology and research module		Industrial practice	PD UC		6				180	Report		
		Pre – diploma practice	PD UC		6				180			
Module of final assessment	State examination in the speciality		FA		6				180	SE		
	Completion and defense of Bachelor degree diploma project		FA		6				180	Defense of degree work		
Total credits for 4rd year					**60**	**210**	**120**		**1470**			
Total for education program					**240**	**975**	**1005**	**135**	**5085**			

Course	Semester	Amountofmodulestobestudied	Amountofsubjects			Theoreticalclasses	Total of credits						Total amount in hours	Amount			
			CC	UC	EC		Educational practice	Industrial practice	Pedagogical practice	Pre – diploma practice	Finalassessment	Total		Exam	Differentiated attestation	Courseпaper	Report
1	1	2	5	1		30						30	900	5	1		
	2	3	4	1	1	30						30	900	5	1		
2	3	4	2	4		30						30	900	5	1		
	4	4	2	2	2	27		3				30	900	5	1		1
3	5	3		3	2	30						30	900	5			
	6	3		1	4	25			5			30	900	5			1
4	7	3		1	6	36						36	1080	7			
	8	2		2				6		6	12	24	720	1			2
Total:		**24**	**13**	**15**	**15**	**208**		**9**	**5**	**6**	**12**	**240**	**7200**	38	4		4

According to the official programme description, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Biology:

General professional competences (GPC)	The result of training(GPC units)	The name of courses that form the results of training (units of competences)
GPC_A - The ability to put the latest achievements in the field of pedagogical activity into practice, to expand and deepen their knowledge in the field of scientific research.	**RT_1** - Analyzes the main world outlook and methodological problems, including cross-disciplinary ones, arising in science at the present stage of its development as well as uses its results in professional activities.	1. Foreign Language (Professional) 2. History and Philosophy of Science
	RT_2 – knows modern pedagogical technologies and possesses communication skills	1. Foreign Language (Professional) 2. Higher School Pedagogy Management psychology 3. Teaching practice
GPC_B - Ability to critically understand issues and problems based on knowledge of the most recent advances in the biological sciences.	**RT_3** – Comprehensively positioned in the discussion on complex problems of biology as in their own results of scientific research, as well as in context with international research papers and present in written and oral works	1. Genetic engineering 2. Physiology of sensory systems 3. Conservation of biological diversity 4. Basic molecular and genetic processes 5. Medical Microbiology 6. Psychoneuroimmunology
Professional Competences (PC)	**The result of training (PC units)**	**The name of courses that form the results of training (units of competences)**
PC_A - Ability to build strategies for self-study and research activities, to represent the relationship between various areas of modern biological knowledge, their relationship with socio-economic processes	**RT_4** – Acquired the substantive and interdisciplinary competence of solving biological problems.	1. Molecular and Cell biology 3. Medical Microbiology 4. Molecular Virology 5.Genetics of Microorganisms 6.Molecular bases of pharmacology
PC_B - Ability to integrate knowledge, to make judgments in the presence of limited information, to solve complex and unpredictable problems in the field of biological sciences	**RT_5** – Acquired the ability to combine biological knowledge of various component disciplines, conduct independent scientific work and organize, manage more complex projects, as well as publish materials of the results	1. Introduction to structural biology 2. Genetics of cancer and multifactorial diseases 3. The latest molecular genetics and cellular technologies 4 Genomics and proteomics 5. Mutagenesis and reparation 6. Eukaryotic genome 7.Selected chapters of biotechnology 8.Molecular bases of endocrinology

		9.Structure and organization of the genome

The following **curriculum** is presented:

Short description in English	*Full description in English*
BD UK	Basic courses, university component
BD EC	Basic courses, elective component
PD UK	Major courses, university component
PD EC	Major courses, elective component
UC	Universal competences
GPC	General professional competences
PC	Professional competences
RT	Learning outcomes

3 Content of the education program

Module name and code	Course code	Course name	Cycle, component	Language of instruction	Amount of credits	The volume of hours by types of occupations				Type of control	Developed competences	Department in charge
						Lectures	Seminars	Laboratory classes	SIW			
Semester 1												
Methodology The Master Training		Higher School Pedagogy	BD UK	Kazakh/ Russian	4	15	22		83	Exam	GPC_A	Social pedagogy and selfcognition
		Management psychology	BD UK	Kazakh/ Russian	4	15	23		82	Exam	GPC_A	
Choose one discipline												
Molecular and Cell Biology		Genetic engineering	BD EC	Kazakh/ Russian	5	15	30		105	Exam	GPC_B	General biology and genomics
		Basic molecular and genetic processes	BD EC	Kazakh/ Russian	5	15	30		105	Exam	GPC_B	General biology and genomics
Choose one discipline												
Mutational process and the environment		Conservation of biological diversity	BD EC	Kazakh/ Russian	5	15	30		105	Exam	GPC_B	General biology and genomics

Biomedicine		Medical Microbiology	BD EC	Kazakh/ Russian	5	15	30		105	Exam	GPC_B	General biology and genomics
Choose one discipline												
Biomedicine		Psychoneuroimmunology	BD EC	Kazakh/ Russian	5	15	30		105	Exam	GPC_B	General biology and genomics
		Physiology of sensory systems	BD EC	Kazakh/ Russian	5	15	30		105	Exam	GPC_B	General biology and genomics
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	7					Report		
Semester 2												
Methodology The Master Training		Foreign language (professional)	BD UK	English	4		37		83	Exam	GPC_A	Foreign Languages Department
		History and Philosophy of Science	BD UK	Kazakh/ Russian	4	15	23		82	Exam	GPC_A	Philosophy
Molecular and Cell Biology		Molecular and cell biology	PD UK	Kazakh/ Russian	5	30	15		105	Exam	PC_A	General biology and genomics
Choose one discipline												
Molecular and Cell Biology		Cell cycle genetics	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_A	General biology and genomics
		Molecular Virology	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_A	General biology and genomics
Choose one discipline												
Molecular and Cell Biology		Molecular bases of pharmacology	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_A	General biology and genomics
Biomedicine		Genetics of microorganisms	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_A	General biology and genomics
Methodology of the master training		Scientific-research work of graduate students		Kazakh/ Russian	7					Report		
Total credits for 1st year					**60**	**285**	**358**	**0**	**1487**			
Semester 3												
Molecular and Cell Biology		Mathematical processing of the results of molecular genetic studies	PD UK	Kazakh/ Russian	5	30	15		105	Exam	PC_B	General biology and genomics
Choose one discipline												
Molecular and Cell Biology		Introduction to Structural Biology	PD EC	Kazakh/ Russian	7	30	45		135	Exam	PC_B	General biology and genomics
Biomedicine		Genetics of cancer and multifactorial diseases	PD EC	Kazakh/ Russian	7	30	45		135	Exam	PC_B	General biology and genomics

		Molecular bases of endocrinology	PD EC	Kazakh/ Russian	7	30	45		135	Exam	PC_B	General biology and genomics
Molecular and Cellular Biology		The latest molecular genetics and cellular technologies	PD EC	Kazakh/ Russian	7	30	45		135	Exam	PC_B	General biology and genomics
Choose one discipline												
		Genomics and proteomics	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_B	General biology and genomics
Mutational process and the Environment		Mutagenesis and reparation	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_B	General biology and genomics
		Eukaryotic genome	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_B	General biology and genomics
Choose one discipline												
Molecular and Cell Biology		Selected chapters of biotechnology	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_B	General biology and genomics
		Structure and organization of the genome	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PC_B	General biology and genomics
Methodology The Master Training		Teaching internship	BD UC	Kazakh/ Russian	4					Report		General biology and genomics
		Scientific-research work of graduate students		Kazakh/ Russian	4					Report		
Semester 4												
		Research practice	PD UK	Kazakh/ Russian	12					Report		General biology and genomics
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	6					Report		
Module of final assessment	Accomplishment and defense of Master's degree thesis		FA		12					Defense of degree work		
Total credits for 4rd year					**60**	**270**	**255**	**0**	**1065**			
Total for education program					**120**	**555**	**613**	**0**	**2552**			

Course	Semester	of modules to be studied	Amount of subjects		Total credits						Total amount in hours	Amount		
			UC	EC	Theoretical classes	SRWG	Research practice	Teaching internship	Final assessment	T Total		Exam	Report	Course paper
1	1	4	2	3	23	7				30	900	5	1	
	2	3	3	2	23	7				30	900	5	1	
2	3	4	2	3	22	4		4		30	900	4	2	
	4	2	1			6	12		12	30	900	1	2	
Total:		**13**	**8**	**8**	**68**	**24**	**12**	**4**	**12**	**120**	**3600**	**15**	**6**	

According to the official programme description, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Environmental Protection and Rational Use of Natural Resources:

Profile of Competences

General professional competences (GPC)	Оқыту нәтижелері (ОПК мөлшері)/ Результаты обучения (единицы ОПК)/ The result of training(GPC units)	The name of courses that form the results of training (units of competences)
GPC_A - The ability to put the latest achievements in the field of pedagogical activity into practice, to expand and deepen their knowledge in the field of scientific research.	**RT_1** - Demonstrate knowledge of ideological and methodological approaches based on interdisciplinary analysis and use the results in professional activities	3. Foreign Language (Professional) 4. History and Philosophy of Science
	RT_2 – knows modern pedagogical technologies and possesses communication skills	4. Foreign Language (Professional) 5. / Higher School Pedagogy 6. Management psychology 7. Teaching internship
Professional Competences (PC)	**The result of training (PC units)**	**The name of courses that form the results of training (units of competences)**
	PT_3 - Describe modern efficient technologies for the use of natural resources, predict non-traditional methods of using raw materials. To simulate the educational process on ecology in higher education, the organizational forms of teaching ecology at the university, highlight modern methods and technologies of education used in environmental education.	1.New technologies and sustainable use of biological raw materials 2. Environmental education and worldview

PC_A. - The ability to conduct research using basic methods of environmental management, ecotoxicology, environmental biotechnology and environmental safety.	**PT_4** - Describe the types of biocenotic relationships within ecosystems, the principles of biodiversity conservation; analysis of the state of biodiversity of the Republic of Kazakhstan; group botanical-zoo-geographical division of the territory of the Republic of Kazakhstan. Apply microorganisms and biological objects for waste treatment, wastewater treatment, highlight biotechnological methods of environmental protection in agriculture.	1. Environmrnt and conservasion of biological diversity 2. Ecological microbiology and biotechnology 3. Environmental biotechnology in agriculture and mining industry
	PT_5 - Identify environmental conditions and hazards that pose a risk to public health. Assess the quality of the environment and the dependence of certain human diseases on these conditions, Compare the mechanisms of action of mutagenic, carcinogenic and teratogenic substances, adaptive reactions of the human body.	1 Ecological epidemiology and ecopathology 2.Vegetative and endocrine mechanisms of adaptasion 3.Mutagenesis, teratogenesis, carcinogenesis under the influence of environmental conditions 4. Medical and ecological bases of susteinable development
	PT_6 - To describe the types of environmental safety in production and energy, to compare their impact on the environment. To model modern methods of control on branches of ecological service.	1.Ecological aspects of security in the energy sector 2Environmental Service 3.Management of ecological safe processes and production
	PT_7 -. Analyze project documentation and assess the state of the environment, the level of anthropogenic impacts on the environment; simulate the protection of the environment from pollution.	1. Environmental assessment and examination of design documentation 2. Strategy for protection the environment from pollution 3.Assessment of the status and dynamics of the human impact on the environment
	PT_8 - Interpret the legal framework for the effective use and management of natural resources: (land, water); identify methods of integrated use of natural resources for sustainable development.	1. Rational use of land resources 2. Integrated water resources management 3.Environmental policy and legal basis for environmental management

The following **curriculum** is presented**:**

Short description in English	*Full description in English*
BD UK	Basic courses, university component
BD EC	Basic courses, elective component
PD UK	Major courses, university component
PD EC	Major courses, elective component
UC	Universal competences
GPC	General professional competences
PC	Professional competences
RT	Learning outcomes

Module name and code	Course code	Course name	Cycle, component	Language of instruction	Amount of credits	The volume of hours by types of occupations				Type of control	Developed competences	Department in charge
						Lectures	Seminars	Laboratory classes	SIW			
1 семестр /1 семестр / Semester 1												
Methodology The Master Training		Higher School Pedagogy	BD UK	Kazakh/ Russian	4	15	22		83	Exam	GPC_A	Social pedagogy and self-cognition
		Management psychology	BD UK	Kazakh/ Russian	4	15	23		82	Exam	GPC_A	
Select one module												
Environmental pollution and its assessment		Environmrnt and conservasion of biological diversity	BD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC4}	Management and Engineering in the field of environmental protection
		Ecological epidemiology and ecopathology	BD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC5}	
		Environmental assessment and examination of design documentation	BD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC7}	
Ecological problems		Ecological aspects of security in the energy sector	BD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC6}	Management and Engineering in the field of
		Mutagenesis, teratogenesis, carcinogenesis under the influence of environmental conditions	BD EC	Kazakh/ Russian	5	30	15		105	Емтихан Экзамен Exam	A_{PC5}	

and environmental protection		Management of ecological safe processes and production	BD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC5}	environmental protection
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	7		210			Report		
2 семестр /2 семестр / Semester 2												
Methodology The Master Training		Foreign language (professional)	BD UK	English	4		37		83	Exam	GPC_A	Foreign Languages Department
		History and Philosophy of Science	BD UK	Kazakh/ Russian	4	15	23		82	Exam	GPC_A	Philosophy
Environmental education		Environmental education and worldview	PD UK	Kazakh/ Russian	5	30	15		105	Exam	A_{PC3}	Management and Engineering in the field of environmental protection
Select one module												
Ecological problems and environmental protection		Integrated water resources management	PD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC8}	Management and Engineering in the field of environmental protection
		Vegetative and endocrine mechanisms of adaptasion	PD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC5}	
Rational use of resources		Environmental Service	PD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC2}	
		Medical and ecological bases of susteinable development	PD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC6}	
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	7		210			Report		
Total credits for 1st year					**60**	**225**	**613**		**962**			
3 семестр /3 семестр / Semester 3												
Rational use of resources		New technologies and sustainable use of biological raw materials	PD UK	Kazakh/ Russian	5	30	15		105	Exam	A_{PC3}	Management and Engineering in the field of environmental protection
Select one module												

Ecological problems and environmental protection		Strategy for protection the environment from pollution	PD EC	Kazakh/ Russian	6	30	30		120	Exam	A_{PC7}	Management and Engineering in the field of environmental protection
		Ecological microbiology and biotechnology	PD EC	Kazakh/ Russian	6	30	30		120	Exam	A_{PC4}	
		Rational use of land resources	PD EC	Kazakh/ Russian	5	30	15		105	Exam	A_{PC8}	
Environmental pollution and its assessment		Environmental policy and legal basis for environmental management	PD EC	Kazakh/ Russian	6	30	30		120	Exam	A_{PC8}	
		Environmental biotechnology in agriculture and mining industry	PD EC	Kazakh/ Russian	6	30	30		120	Exam	A_{PC1}	
		Assessment of the status and dynamics of the human impact on the environment	PD EC	Kazakh/ Russian	5	30	15		105	Емтихан Экзамен Exam	A_{KK4} $A_{ПК4}$ A_{PC4}	
Practice (pedagogical, research)		Teaching internship	BD UK	Kazakh/ Russian	4		120			Report		
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	4		120			Report		
Semester 4												
Practice (pedagogical, research)		Research practice	PD UK	Kazakh/ Russian	12		360			Report		Management and Engineering in the field of environmental protection
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	6		180			Report		
Module of final assessment	Accomplishment and defense of Master's degree thesis		FA		12		360			Defense of degree work		
Total credits for 4rd year					**60**	**120**	**1230**		**450**			
Total for education program					**120**	**345**	**1843**		**1412**			

Course	Semester	Amount of modules to be studied	Amount of subjects		Total credits						Total amount in hours	Amount		
			UC	EC	Theoretical classes	SRWG	Research practice	Teaching internship	Final assessment	Total		Exam	Report	Course paper
1	1	3	2	3	23	7				30	900	5	1	
	2	4	3	2	23	7				30	900	5	1	
2	3	4	2	3	22	4		4		30	900	4	2	
	4	3				6	12		12	30	900	1	2	
Total:		14	7	8	68	24	12	4	12	120	3600	15	6	

According to the official programme description, the following **objectives** and **learning outcomes (intended qualifications profile)** shall be achieved by the Master degree programme Molecular Biotechnology and Biomedicine:

General professional competences (GPC)	The result of training(GPC units)	The name of courses that form the results of training(units of competences)
GPC_A- The ability to put the latest achievements in the field of pedagogical activity into practice, to expand and deepen their knowledge in the field of scientific research.	**RT_1**- Analyzes the main world outlook and methodological problems, including cross-disciplinary ones, arising in science at the present stage of its development as well as uses its results in professional activities.	5. Foreign Language (Professional) 6. / History and Philosophy of Science 3. Methodological foundations of scientific research 4. Scientific-research work of undergraduate student
	RT_2 – To know modern pedagogical technologies and possesses communication skills.	8. Foreign Language (Professional) 9. Higher School Pedagogy 10. Management psychology 11. Teaching internship
GPC_B - readiness for theoretical analysis and experimental verification of theoretical hypotheses; - ability to use modern biotechnology instruments and scientific instruments; - to use databases, software and Internet resources, the products of digitization for the decision of tasks of professional activity;	**RT_3**– is capable of collecting data and comprehensively analyzing and analytical generalization of scientific information and technical documentation in the field of biotechnology and related disciplines for the purpose of scientific, patent and marketing support of fundamental research and technological development; to have the skills of planning, organizing and conducting scientific research, to correctly process the results of experiments and to make informed conclusions and conclusions, to master the methodology of the design of scientific results (articles, articles, theses).	1. Methodological foundations of scientific research 2. Scientific-research work of undergraduate student 3. Protein engineering 4. Moleculargenomics 5. Molecular regulation of eukaryotic gene expression
	RT_4 – Be able to apply knowledge and skills to manage the biotechnological process. To have the skills to implement quality management systems for biotechnology products in accordance with the requirements of Kazakhstan and international quality standard.	1. Methods for isolation and purification of biological macromolecules 2. Methods for isolation and purification of BAS

		3. Research practice
Professional Competences (PC)	**The result of training (PC units)**	**The name of courses that form the results of training (units of competences)**
PC_A - research, project, organizational and managerial, pedagogical competences: - the ability to plan, organize and conduct research in the field of biotechnology; - the ability to professional growth, to self-study new research methods; - ability to implement and manage biotechnological processes;	**RT_5**–knows the principles of structural and functional organization of biological objects and mechanisms of their activities; owns a wide range of molecular biological and biochemical methods, including the cultivation of eukaryotic cells, the allocation of genomic DNA and RNA, PCR amplification and sequencing of genes, isolation and identification of plasmids, restriction analysis; electrophoresis, various methods of genotyping, chromatographic methods, owns methods of analysis and control of safety of biotechnological products.	1. Bionanotechnology 2. Immunogenetics 3. Protein engineering Scientific-research work of undergraduate student 4. Methods for isolation and purification of biological macromolecules 5. Methods for isolation and purification of BAS 6. Free radical processes regulation mechanisms 7. Legal bases for biosafety of GMOs 8. Biosecurity and risks of GMOs
	RT_6 – able to creatively use theoretical knowledge in the field of structural features and evolution of genomes, key metabolic processes occurring in Pro - and eukaryotic cells, molecular post-transcription mechanisms of gene regulation and expression at different levels.	1. Molecular regulation of eukaryotic gene expression 2. Механизмы апоптоза и некроза/ Apoptosis and necrosis mechanisms
PC_B -the ability and willingness to use the scientific methodology of research in accordance with current trends and prospects for the development of biotechnology and related sciences, reasonably choose theoretical and experimental methods and means to solve the tasks; - the ability to carry out the biotechnological process in accordance with the regulations; use technical means to	**RT_7 -** to know the methods of bioinformatics at the level of genomic, proteomic analysis to solve biochemical, biotechnological, medical and pharmacological problems of applied and fundamental nature; to work with bioinformatic programs and resources, to independently collect, process, interpret biological information to solve scientific and practical problems; to know the methods of working with cells in vitro, to use cell cultures for diagnosis and treatment; to demonstrate readiness to participate in research on bionanotechnology.	1. Bioinformatics and proteomics 2. Biomedical bases of regeneration 3. Protein engineering 4. Moleculargenomics 5. Immunogenetics 6. Bionanotechnology 7. Protein markers in modern clinical diagnosis 8. Genetherapy 9. Free radical processes regulation mechanisms
	RT_8– To search for and development of new and effective ways of obtaining biotechnological products, the creation of modern biotechnology, including DNA technology and cell technology. Being able to isolate, identify and analyze the products of biosynthesis and biotransformation,	1. Genetherapy 2. Bionanotechnology 3. Biosecurity and risks of GMOs 4. Protein engineering 5. Moleculargenomics

measure the main parameters of biotechnological processes, the properties of raw materials and products; - the ability to implement quality management systems for biotechnology products in accordance with the requirements of Kazakhstan and international quality standards; apply the acquired knowledge	the acquisition of new producing strains of biologicals. Own technology expected outcome prediction and analysis in molecular - genetic experiment.	6. Methods for isolation and purification of biological macromolecules

The following **curriculum** is presented

Module name and code	Course code	Course name	Cycle, component	Language of instruction	Amount of credits	The volume of hours by types of occupations				Type of control	Developed competences	Department in charge
						Lectures	Seminars	Laboratory classes	SIW			
1 семестр /1 семестр / Semester 1												
Methodology The Master Training		Higher School Pedagogy	BD UK	Kazakh/ Russian	4	15	22		83	Exam	GPC A	Social pedagogy and self-cognition
		Management psychology	BD UK	Kazakh/ Russian	4	15	23		82	Exam	GPC A	
Choose one of the modules												
Bioinformatics and molecular DNA technologies		Bioinformatics in genomics and proteomics	BD EC	Kazakh/ Russian	8	30	45		165	Exam	GPCa PCb	Department of Biotechnology and Microbiology
		Molecular genomics	BD EC	Kazakh/ Russian	7	30	45		135	Exam	GPCв PCb	Department of Biotechnology and Microbiology

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Modern aspects of immunogenetics and protein engineering		Protein engineering	BD EC	Kazakh/ Russian	8	30	45		165	Exam	PCa PCb	Department of Biotechnology and Microbiology
		Immunogenetics	BD EC	Kazakh/ Russian	7	30	45		135	Exam	$КК_А$ $ПК_А$ PCa	Department of Biotechnology and Microbiology
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	7				210	Report		
2 семестр /2 семестр / Semester 2												
Methodology The Master Training		Foreign language (professional)	BD UK	English	4		37		83	Exam	$GPC_А$	Foreign Languages Department
		History and Philosophy of Science	BD UK	Kazakh/ Russian	4	15	23		82	Exam	$GPC_А$	Philosophy
Post-genomic mechanisms of gene regulation		Molecular regulation of eukaryotic gene expression	PD UK	Kazakh/ Russian	5	30	15		105	Exam	PCa	Department of Biotechnology and Microbiology
Choose one of the modules												
Biomedical aspects of biotechnology		Biomedical bases of regeneration	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb	Department of Biotechnology and Microbiology
		Bionanotechnology	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb	Department of Biotechnology and Microbiology
Biomedical aspects of biotechnology		Protein markers in modern clinical diagnosis	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa	Department of Biotechnology and Microbiology
		Genetherapy	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCb	/Department of Biotechnology and

												Microbiology
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	7				210	Report	PCa PCb GPCв	
Total credits for 1st year					**60**	**195**	**238**		**1367**			
Semester 3												
The methodology of scientific research		Methodological foundations of scientific research	PD UK	Kazakh/ Russian	5	30	15		105	Exam	PCa PCb GPCв	Department of Biotechnology and Microbiology
Модульдің біреуін таңдау / Выбрать один из модулей / Choose one of the modules												
Methods of isolation and purification of biological macromolecules and BAS		Apoptosis and necrosis mechanisms	PD EC	Kazakh/ Russian	6	30	30		120	Exam	PCa	Department of Biotechnology and Microbiology
		Free radical processes regulation mechanisms	PD EC	Kazakh/ Russian	5	30	15		105	Exam	PCa	Department of Biotechnology and Microbiology
		Methods for isolation and purification of biological macromolecules	PD EC	Kazakh/ Russian	6	30	30		120	Exam	PCa PCb	Department of Biotechnology and Microbiology
Methods of isolation and purification of biological macromolecules and BAS		Methods for isolation and purification of BAS	PD EC	Kazakh/ Russian	6	30	30		120	Exam	PCa PCb	Department of Biotechnology and Microbiology
		Biosecurity and risks of GMOs	PD EC	Kazakh/ Russian	5	30	15		105	Exam	GPCв $КК_в$ $ПК_в$ PCb	Department of Biotechnology and Microbiology
		Legal bases for biosafety of GMOs	PD EC	Kazakh/ Russian	6	30	30		120	Exam	PCa PCb GPCв	Department of Biotechnology and Microbiology
Pedagogical		Teaching internship	BD UK	Kazakh/	4				120	Report		

practice module				Russian								
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	4				120	Report	PCa PCb GPCв	
Semester 4												
Research practice module		Research practice	PD UK	Kazakh/ Russian	12					Report	PCa PCb GPCв	
Methodology The Master Training		Scientific-research work of graduate students		Kazakh/ Russian	6				180	Report	PCa PCb GPCв	
Module of final assessment	Accomplishment and defense of Master's degree thesis		FA		12				360	Defense of degree work		
Total credits for 4rd year					**60**	**120**	**90**		**1590**			
Total for education program					**120**	**315**	**328**		**2957**			

Course	Semester	Amount of modules to be studied	Amount of subjects		Total credits						Total amount in hours	Amount		
			UC	EC	Theoretical classes	SRWG	Research practice	Teaching internship	Final assessment	Total		Exam	Report	Course paper
1	1	3	2	2	23	7				30	900	4	1	
	2	3	3	2	23	7				30	900	5	1	
2	3	4	2	3	22	4		4		30	900	3	2	
	4	3	1			6	12		12	30	900	1	2	
Total:		13	8	7	68	24	12	4	12	120	3600	13	6	