

Support to strengthening the higher education system in Azerbaijan



Twinning project ENI/2018/395-401

Mission Report

Short-Term Mission on Activity 1.5. Provide recommendations for improvement of education standards for qualification for programmes in the priority areas (incl. legislative arrangements) with a view to describing achievements based on competences and skills, considering the AzQF

(September 30 – October 4, 2019)

1. Name and Function of the Expert:

Full name of expert

Mr. Michel Narce, France

Signature



Ms. Trine Johansen Meza, Lithuania

Signature



2. Objective and Tasks of the Mission:

The mission is carried out within the framework of:

COMPONENT 1: SELECTED NATIONAL EDUCATION STANDARDS ARE ALIGNED TO INCLUDE A COMPETENCE-BASED FOCUS

Activity 1.5. Provide recommendations for improvement of education standards for qualification for programmes in the priority areas (incl. legislative arrangements) with a view to describing achievements based on competences and skills, considering the AzQF

Benchmarks for this activity are:

- **State standards for selected study programmes (Biology state standard) are revised**, with a view to describing achievements based on competences and learning outcomes, considering AzQF;
- **Other relevant documents/ methodology materials are prepared.**

3. Time schedule of the mission:

Date and Time	Activity
Monday 30 th of September 2019	<p>Meeting point: <i>Ministry of Education, Museum meeting room</i></p> <p>09:30-10:30 Meeting with Ms. Vusala Gurbanova, Component Leader I, Senior Advisor at Higher Education Department at the Ministry of Education and Ms. Elizaveta Bydanova, RTA of Twinning project. (Mr. Michelle Narce will be absent as he will arrive on 30th of September, later in the evening.)</p> <p>10:30 – 13:00 Deskwork.</p> <p>13:00 – 14:00 LUNCH</p> <p>14:00 – 17:00 Deskwork</p>
Tuesday 1 st of October 2019	<p>Meeting point: <i>Ministry of Education, Museum meeting room</i></p> <p>10:00 – 12:00 Meeting with Working Group on Biology and relevant employers.</p> <p>13:00 – 14:00 LUNCH</p> <p>14:00-17:00 Deskwork</p>
Wednesday 2 nd of October 2019	<p>Meeting point: <i>Baku State University.</i></p> <p>10:00 – 13:00 Visit to Baku State University.</p> <p>13:00 – 14:00 LUNCH</p> <p>14:00 – 17:00 Deskwork</p>
Thursday 3 rd of October 2019	<p>Meeting point: <i>Ministry of Education, Museum meeting room</i></p> <p>10:00 – 12:00 Discussion with RTA.</p> <p>13:00 – 14:00 LUNCH</p> <p>14:00-17:00 Deskwork</p>
Friday 4 th of October 2019	<p>Meeting point: <i>Ministry of Education, Museum meeting room</i></p> <p>10:00 – 13:00 Report writing</p> <p>13:00 – 14:00 LUNCH</p> <p>10:00 – 13:00 Report writing, continued</p> <p>16:00 – 18:00 Debriefing with CL I and RTA.</p>

4. Relevant Background Information/State of Affairs regarding the mission

1. Classification of Bachelor and Master level programs in Azerbaijan
2. Standards of higher education of Bachelor level in Biology
3. Standards of higher education of Bachelor level in Physics, Foreign language teacher elaborated within the TWINNING project (included in "A methodological compendium on identifying and defining learning outcomes").
5. Decree of the Cabinet of Ministers "On the approval of the 'National Qualifications Framework for Lifelong Learning of the Republic of Azerbaijan'"
6. Standards of higher education of Master level in Biology

5. Achievement of the Expected Results

Planned action was achieved. During the visit we discussed and proposed new state standards for Bachelor programme in Biology. As the main achievement of the visit can be considered elaborated suggestions for development of competences-based education content in the field of Biology stressing the aspects, study topics, learning outcomes, competencies needed in the labor market, corresponding to recent trends worldwide.

6. Unexpected Results

State if any unexpected results were identified during the mission. Add any relevant comments.

7. Issues Left Open After the Mission

NA.

8. Recommendations (including recommendation for future missions)

1. The humanities such as history could be omitted from the state standard, but as we understand the secondary school is one year shorter than in many European countries and it is thereby a need for the subjects in higher education.
2. The language subjects should be constructed in such a way that the students acquire the ability to communicate professionally and academically in the native language as well as a foreign language. That is, academic/professional English is expected as it represents the international scientific language.
3. Communication skills including how to «sell oneself», writing CVs etc, is important
4. Management, business and marketing are considered important as many graduates goes into business when graduated and there should thereby be courses in this.
5. Subjects should not be repeated on master level, but there should be a progression from BSc to MSc. MSc should be more specialized and focused on discriminating subjects (see examples in

Annex 1). Then, the national classification on master level should be reconsidered and consequently updated to be more in line with international trends. In annex 2 we have given an example of master classification in Biology.

6. There is some misunderstanding about what the electives mean. We have understood that this is specializations and that students thereby can choose different electives. If so, the diversity and the volume (in ECTS) of elective subjects should be increased during the two last years of BSc in order to get a progressive and personalized specialization during the studies (see examples in Annex 1).
7. The students reported that more lab work (including making media, plant physiology experiments etc), as well as other practical sessions, would be needed. The alumni suggested that a more up-to-date literature is used and that some soft-skills, like teamwork and training in creativity, could also be offered. We agree that these are important issues that have to be followed up.
8. Practical works should represent at least $\frac{1}{4}$ of the courses. The duration of a session could be increased to 4 hours. Integrative projects, where students from different fields of biology work together, could also be included during the 4th year of BSc.
9. The state and the university should secure enough funding for building teaching and research labs for modern biology teaching and research. To ensure high quality of the study process, development of skills and competencies needed in labour market, the study program infrastructure and staff qualifications must comply with the expected study results. It means that students should have not only lecturing rooms, but also adequate infrastructure: laboratory facilities, software, access to scientific literature databases etc. The country is rich in natural resources and it is of thereby of great importance to have high quality education and research in biology. In this respect, biotechnologies are of the highest importance and teaching labs should be upgraded and equipped accordingly.
10. We had some discussions about the subject civil defence and first aid. As we understand this course, with the same content, is taught to students from all study programmes. We suggest that this subject in the programme of Biology is more oriented towards health and safety in the lab for example, and then we indeed recommend that this is included in the state standard for biology.
11. It is generally positive with an Internship period of 30 ECTS, as it may be difficult to provide research internships to a lot of students. We are in favour of this and recommend that there should be a written report with a defence in the end of the internship.
12. The learning outcomes and content of subjects and modules proposed for this new version of the state standards should be elaborated by the academic staff according to what is done in EU countries (see Annex 1). This will also facilitate international student exchange and recognition of ECTS (see ECTS user guide).
13. The period of completion should also be expressed as overall hours allotted for mastering the BSc program, and volume of hours allotted to theory and practice for each block or module
14. In future missions, experts should be given relevant documents such as national QF earlier and experts should be given more information about the educational system etc to be able to do a better job while on site. An exchange with the Heads of Departments and a visit of all the labs would be helpful to have a global view of what is done.

9. Acknowledgments (if any)

Many thanks to Resident Twinning Advisor Lisa Bydanova and her team for inviting us to participate in this mission and for her facilitating help. We would also like to express our thanks to Mrs. Vusala Gurbanova, senior advisor at the Ministry of Education and to Baku State University for the warm welcome and discussions.

Annexes

Annex 1 – examples for BSc and MSc programs in other European countries

Annex 2 – example of classification of MSc programs

Annex 3 – new state standard for BSc in Biology

Annex I – examples for BSc and MSc programs in other European countries

United Kingdom: At **Imperial College London** they have a three-year BSc program in Biochemistry and a three-year program in Biological Sciences. In addition, they have several programs that includes industry placement or management or research. These programs are generally more than three years.

Web page of Imperial where all the programs may be found :

<https://www.imperial.ac.uk/study/ug/courses/#group-B>

Web page of BSc in Biological Sciences: <https://www.imperial.ac.uk/study/ug/courses/life-sciences-department/biological-sciences-bsc/>

Study program specification of Biological Sciences (this is a very clear and informative overview of the program):

[https://www.imperial.ac.uk/media/imperial-college/study/programme-specifications/life-sciences/1718/ProgSpec\(C100\)-2017-18.pdf](https://www.imperial.ac.uk/media/imperial-college/study/programme-specifications/life-sciences/1718/ProgSpec(C100)-2017-18.pdf)

Web page of BSC in Biochemistry: <https://www.imperial.ac.uk/study/ug/courses/life-sciences-department/biochemistry-bsc/>

Study program specification of Biochemistry: [https://www.imperial.ac.uk/media/imperial-college/study/programme-specifications/life-sciences/1718/ProgSpec\(C700\)-2017-18.pdf](https://www.imperial.ac.uk/media/imperial-college/study/programme-specifications/life-sciences/1718/ProgSpec(C700)-2017-18.pdf)

In Imperial College, the student will have to choose from some subjects called I-explore Modules that will broaden the student's perspectives. <https://www.imperial.ac.uk/study/ug/i-explore/>
Some of these options are Business and management courses for engineers and scientists

<https://www.imperial.ac.uk/business-school/programmes/undergraduate-study/bpes-programme/>

Biological sciences are also given at **Cambridge University**, UK.

<https://www.undergraduate.study.cam.ac.uk/courses/natural-sciences#biological-sciences-options>

These webpages are slightly different than for example the one from Imperial College, and you have to read a little to understand the study program. If the student wants to take purely biology, the student will choose the subjects, Biology of Cells, Evolution and Behaviour and Physiology of Organisms. The students also have to take Mathematical Biology.

See webpage:

<https://www.undergraduate.study.cam.ac.uk/courses/natural-sciences/part1a#physiology-organisms>

<https://www.undergraduate.study.cam.ac.uk/courses/natural-sciences>

Sweden: Uppsala University offers the following program:

Biology/Molecular Biology - Bachelor's Programme in Biology/Molecular Biology. The program website is not available in English, only in Swedish.

<https://www.uu.se/utbildning/utbildningar/selma/program/?pKod=TBM1K&pInr=BIOL>

We have gone through the webpage to see how the program is structured and they have common subjects in chemistry, cell biology, microbiology, molecular biology, ecology, mathematics, statistics and so forth. In addition, they have a broad range of electives for the students, such as neurobiology, plant structure and function, bioinformatics and so forth.

Denmark: At Copenhagen University, they offer three different biology programs at BSc level: Biology, Biochemistry and Biotechnology.

All study programs are given in Danish, and there is not any information about the study programs in English on the webpage.

<https://studier.ku.dk/bachelor/biologi/>

France : Examples of Masters proposed by the **University of Burgundy**. As you can see, these are very specialized. So the students must get in all the necessary bases and relevant elective courses during the BsC, and must be familiar with lab work and technics. These master are internationals, welcome 10-15 students; the courses are delivered in English and most of the students are from foreign countries (India, Asia, Africa, North Africa, Eastern European countries, South America)

<http://www.ubfc.fr/master-mp2/>

<http://www.ubfc.fr/masters-in-innovative-drugs/>

<http://www.ubfc.fr/master-p2-food/>

<http://www.ubfc.fr/cartographie-des-formations/master/master-bewm/>

<http://www.ubfc.fr/cartographie-des-formations/master/master-emme/>

University of Bordeaux

Bachelor (in French)

You will see on the link below that teaching is divided in blocs, following the European standards and the Bologna recommendations. This is what we suggest in the new state standards

<https://www.u-bordeaux.fr/formation/2019/PRLISV/sciences-de-la-vie>

Masters (in English)

Again here, all the masters are specialized

<https://www.u-bordeaux.com/Education/Study-offer/Masters-in-English/Analytical-Chemistry-for-Drugs-and-Natural-Products>

<https://www.u-bordeaux.com/Education/Study-offer/Masters-in-English/Bioinformatics-and-Omics>

<https://www.u-bordeaux.com/Education/Study-offer/Masters-in-English/Marine-Environment-MER2>

<https://www.u-bordeaux.com/Education/Study-offer/Masters-in-English/Neuroscience-NeuroBIM>

University of Aberdeen (UK, Scotland) Ranked in the top 200 Universities in the world

A very interesting website presenting a BsC with a broad understanding of the nature of living things, from molecules and cells, organisms and populations, to communities and biomes. This BsC provide students with the technical skills to pursue their own interests through their project work

Here again, courses are grouped in blocks or modules with obligatory and optional blocks

<https://www.abdn.ac.uk/study/undergraduate/degree-programmes/459/C901/biological-sciences/>

Annex 2: Example of Master classification in Biology

Health-Biology.

Health.

Life sciences.

Public health.

Drug science.

Biotechnology.

Molecular and cellular biology.

Biochemistry, molecular biology.

Integrative biology and physiology.

Biology of development.

Plant's biology.

Pharmacology.

Toxicology and eco-toxicology.

Microbiology.

Neurosciences.

Immunology.

Nutrition and Food Science.

Bioinformatics.

Structural biology, genomics.

Genetic.

Ethology.

Biomechanics.

Health Engineering.

Ocean, Atmosphere and Climate Sciences.

Science of the sea

Earth and planet sciences, environment.

Georesources, geohazards, geotechnics.

Bio-geosciences.

Water sciences.

Astrophysics, astronomy, planetology.

Agrosciences, environment, territories, landscape, forest.

Biology, agrosciences.

Science and technology of agriculture, food and the environment.

Biodiversity, ecology and evolution.

THE MINISTRY OF EDUCATION OF THE REPUBLIC OF AZERBAIJAN

**Approved by the decree No ... of the
Ministry of Education of the Republic of
Azerbaijan of ...**

STATE STANDARD OF HIGHER EDUCATION

**STATE STANDARD OF
BACHELOR PROGRAMME OF BIOLOGY**

Specialty ciphers and names: 050501 – Biology

BAKU – 2019

1. General provisions

The **State standard of Bachelor level “050501 – Biology”** (hereinafter, the State standard) has been developed pursuant to the “Law on Education” of the Republic of Azerbaijan, ... *(to be completed)*.

The current state standard defines compulsory provisions for the Bachelor program “Biology”, which can be offered on a full-time and/or part-time basis.

This State standard aims to:

- Assist higher education institutions in **designing, implementing and self-assessing** study programmes;
- **Inform students and employers** about the knowledge and skills acquired by the graduates;
- Give guidelines to experts who **assess the study programmes**.

The State standard is obligatory for all higher education institutions which function in the territory of the Republic of Azerbaijan regardless of their subordination, ownership and organizational and legal forms and carry out studies in this specialty.

2. Competences required from graduates

The following general and professional competences shall be developed within the study programme:

General competences:

1. **Professional oral and written communication skills** in native language and **one foreign language, preferably English**
2. Capacity to use information technology at work effectively and appropriately
3. Capacity for **teamwork**, developing a collaborative approach to problem solving
4. Capacity to **adapt** to different working environments and capacity to **take initiative**
5. Ability for **abstract thinking** and **critical analysis (reports, articles, projects)**
6. Capacity to identify and select **additional information resources** to solve a problem; capacity for analysis, **synthesis and treatment of relevant data** for a given professional purpose
7. Ability to **plan and organise** autonomously one’s own activities to promote **self-learning** and skills enhancement, **capacity to manage time** and respect deadlines
8. Ability to act with **social and environmental responsibility, health and safety, civic awareness and ethical reasoning**
9. Ability to **step back from a situation, self-evaluate and questioning oneself** in order to improve knowledge and skills

Professional competences:

1. **Broad understanding** of science and biology from molecular to evolutionary processes.

2. **Ability to formulate and test hypotheses in biology** using appropriate experimental design and techniques from the different fields of biological sciences.
3. Ability to perform both computer-based work as well as laboratory work and field work.
4. **Capacity to analyse and exploit information**, evaluate sources of errors and uncertainty and probe a model by comparing its predictions to the experimental results
5. **Broad knowledge** of the principles and limitations of global analysis methods and tools in biology
6. **Ability to apply a scientific approach, develop innovative ideas and manage a project**
7. Use laboratory and field-based methods to generate data to solve **interdisciplinary biological problems** in different fields of society and industry relevant for Azerbaijan
8. **Ability to evaluate ethical aspects** for defending and criticising applications of biology as well as for performing work with living organisms and biological systems.
9. **Ability to communicate biological** issues and their solution to stakeholders and society accurately, openly and effectively.
10. **Ability to evaluate and apply biological knowledge** in a way that contributes to the sustainable development of society.
11. **Capacity to identify legal regulations**, their consequences and implementation as well as control possibilities relevant for biological research and industry.

3. The scope of study programme

The scope of the programme shall be **no less than 240 ECTS**, out of which :

Module 1: Humanities and soft skills - 30 ECTS, including:

Azerbaijani language and speech culture (Rhetoric) 4

Academic and professional skills in foreign language - 1 (European – English)

Academic and professional skills in foreign Language - 2 (Russian European languages, arabic)

History (History of Azerbaijan) 6

Introduction into management and business with emphasis on sciences - 5

Academic and professional communication skills in biological sciences -5

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Module 2: Biology specific subjects - 120 ECTS, including:

- **Compulsory subjects – 117 ECTS**

1. Basics for life sciences (15 ECTS)

Mathematics for biological sciences and biostatistics

Physics (biophysics, physics measurements, electricity, optics, magnetism...)

Chemistry (general chemistry and chemistry of solutions)

Computer sciences

Innovation and Entrepreneurship in Biology

2. Profiling basics (102 ECTS)

Cellular and molecular architecture of life sciences (cells, viruses....) -6

Life diversity (biodiversity-plant and animals, integrative biology and evolution) -10

From molecule to gene: structural biochemistry, metabolic biochemistry, enzymology, techniques in biochemistry and molecular biology, immunology, bioinformatics -20

Structures and functions of life sciences: animal and plant biology -10

Cellular functions and animal physiology: animal physiology and homeostasis, membrane physiology, molecular physiology and cellular functions -20

Microbiology and vegetal physiology- 10

Cellular biology - 6

Biology of reproduction and development -5

Genetics genomics and epigenetics -10

Biotechnologies and green technologies - 5

including Practical work / Lab training – Research project

Research work

- **Elective subjects – 60 ECTS depending on the internship duration and weight**

To be suggested by the institution according to local expertise of the teaching staff, research infrastructures, local and national job perspectives. In the block of elective subjects, there should also be possible for the students to go abroad. The university should offer several specializations in biology.

Examples of such specializations:

Molecular and cellular signaling

Applied microbiology

Bioactive molecules

Neurobiology

Human genetics

Plant molecular biology

...

Module 7: Civil safety with emphasis on laboratory safety and first aid – 3 ECTS

Module 8: Internship – 30 ECTS (whole semester duration, including achievement of the internship project within a company or within a research lab, written report, and defense).

4. Teaching and learning

- 4.1. Teaching and learning shall be organised in such a way that students can effectively achieve and demonstrate the intended **learning outcomes of the study programme**.
- 4.2. The teaching and learning methods shall be described in relevant documents and **made publicly available** (i.e. on university web-site, programme leaflets, etc.)
- 4.3. The teaching and learning methods shall be constantly reviewed and improved, taking into account innovative teaching practices in higher education internationally. The regular update of teaching and learning methods shall be part of the **quality assurance and control** process of the university.
- 4.4. A **variety of teaching methods** shall be used during the study process. These techniques shall promote a student-oriented approach with an active role of student in the learning process. Examples of the teaching and learning technics that can be used:
- Lecture, seminars, practical assignments,
 - presentations and discussions, debates,
 - independent work/studies (e.g. case studies),
 - Integrative projects,
 - problem-based teaching,
 - Essays
 - field studies,
 - role plays,
 - reports,
 - expert method,
 - video and audio conferencing,
 - video and audio lectures,
 - distance learning,
 - simulations,
 - etc.
- 4.5. The studies shall provide a **good balance between theoretical and practical training**. A focus should be made on strengthening practical skills in line with changing needs of the labour market.
- 4.6. The study programme shall support **student's autonomy** and develop the **concept of lifelong learning**. At the end of the study process the student shall be able to work autonomously in a given field and capable to further continue studies throughout lifetime.

5. Assesement

- 5.1. Assessment shall be organized in such a way that students can effectively **measure the achievement of the intended learning outcomes** of the study program and how they contribute at the development of competencies appreciated at the labor market and supporting the continuation of education. It should help to monitor progress and evaluate the extent to which study program outcomes are achieved, maintain feedback with students, and create preconditions for improving study programs.

- 5.2. The assessment methods shall be **described in relevant documents** and **made publicly available** (i.e. on university web-site, programme leaflets, etc.).
- 5.3. The assessment methods shall be constantly reviewed and improved, taking into account innovative teaching practices, academic integrity requirements in higher education internationally. The regular update of assessment methods shall be part of the **quality assurance** and control process of the higher education institution.
- 5.4. A **variety of assessment methods** shall be used during the study process. These techniques shall promote a student-oriented approach with an active role of student in the learning process. Examples of the teaching and learning techniques that can be used:
- E-study methods
 - written assignments,
 - tests of knowledge and skills, computer-based tests
 - continuous monitoring of knowledge
 - oral presentations,
 - public discussions,
 - work placement reports, fieldwork reports
 - assessment of skills based on observations in work placements, laboratories
 - project work reports,
 - professional portfolios assessment,
 - peer assessment,
 - demonstrations in simulated environment,
 - collegiate and self-assessment,
 - etc.
- 5.5. The methods applied to the assessment of learning achievements shall be based on **clearly formulated criteria** allowing to correctly and reliably reflect the level of knowledge, abilities and skills achieved by the student during (subject) studies. The assessment of student achievements must be based on clear and objective criteria. When assessing learning outcomes, teachers should follow the principles of transparency, impartiality mutual respect and benevolence.
- 5.6. Students shall be given the opportunity to discuss with the teachers/assessors all the aspects of their studies, including their assessments accordingly to a formulated and publicly available procedures. An appeal concerning the assessment process or assessment grade shall be submitted and considered in the procedure established by a higher education institution.
- 5.7. **Academic ethics** are high onto agenda of the study process. Students are taught to observe academic integrity, understand the risks of plagiarism, are familiar with the intellectual and property rights on product of intellectual work.

6. Learning outcomes, subjects and ECTS credits

- 6.1. The learning outcomes of the study program, learning outcomes of each subjects, each subject's syllabus, the number of ECTS allocation for each subject and the choice of teaching, learning and assessment methods are part of the pedagogical autonomy of universities and have to be **defined by the university academic staff** based on the state standard for the program of Bachelor of Biology.

6.2.A **mapping of learning outcomes** shall be presented in a form of matrix, prepared by the university academic staff (Annex 1). The matrix of the learning outcomes shall indicate how the learning outcomes of the program and of particular subjects relate to each other.

6.3. The **syllabus of study subjects shall be regularly updated** so that program provides an updated theoretical and practical content, which meets the changing needs of the society, social partners and the labor market as well as trends of development internationally.

7. Infrastructure and staff capacity

7.1. The teaching, learning and assessment process of the study program of “**050501 – Biology**” requires that the higher education institution possesses the **following infrastructure**: up-to-date practical work laboratories, supporting capacity to provide training in biochemistry, molecular biology, microbiology, physiology etc, supporting research laboratories, computer rooms provided with updated software, rooms for workshops and group work, etc. Learners shall have access to local network, internet, databases of scientific literature, e-libraries and information search systems of HEI.

7.2. As a rule, **HEI teaching staff** will hold required **scientific degrees**. Persons coming from other **public or private institutions and/or any other relevant organizations** may also be involved in teaching on **part-time basis and their participation in the study process is promoted**. Teaching staff is actively involved in scientific research, regularly participates in national and international conferences, publish their research in scientific journals included in major reference data bases. Research results of the teaching staff are regularly communicated to local society.

8. Internship

8.1. The program ends with an **internship**, to which **30 ECTS** are allocated. This part of the program is important as it enables to **reinforce the practical skills** of student.

8.2. The internship can take place in a private company, in a public institution, in a research institution (i.e. university, private local or international companies, etc.).

8.3. Before the internship starts, its program is prepared, work tasks, reporting format and deliverables are described and **tripartite agreement** signed between the university, the company/institution/institute, where the internship takes place, and the student. The agreement shall define conditions, functions and responsibilities of the student and other relevant details. The topic or the title of the project on which the student worked during the internship shall be indicated in the Diploma Supplement.

8.4. The **internship assessment**: the student shall prepare an internship report which is to be defended in front of a mixed jury, composed of the academic staff from the university and representatives of the company/institution where the internship took place. The internship report shall grant with a mark.

8.5. The **internship** can also be undertaken **abroad**. The recognition procedures as per the new regulations regarding recognition procedures shall be applied to recognize the internship taken

abroad as the integral part of the program, if the competences and learning outcomes acquired fit with the objectives of the programme.

9. Employability and access to further education

The university should do surveys about the employability of the graduates from the program on a regular basis. The university should give examples of jobs in their webpage.

9.1. Graduates of Bachelor programme in Biology may find work in positions in private companies and public institutions where there is a need of solid biological expertise (BioTechs, Pharmaceuticals, Foods, natural resources valorisation) to cope with the transition to a sustainable and green society.

9.2. Graduates of Bachelor programme in Biology may also work in various positions in **other private companies and public institutions** where the mastery of skills in the area of biological sciences, innovation and other transversal competences are required.

9.3. Graduates of Bachelor programme in Biology can **pursuit their education** in specialized Master's **programs in biology**.

9.4. The knowledge, skills and attitudes acquired during studies shall be preconditions for graduates to **engage independently in lifelong learning**.

Annex 1. Mapping of learning outcomes of the programme and of each subject (to be filled by universities)

1.1. Indicate **generic (max. 8 - 12) and professional (max. 8 - 12) learning outcomes of your programme**, which are in line with the competences indicated in the present standard:

Generic learning outcomes of the programme
GLO 1. Be able to communicate professionally in native language and a foreign language
GLO 2. Be able to use literature and sources which are important for professional development and are in foreign languages
GLO 3. Be able to function effectively on teams to accomplish a common goal
GLO 4. Be able understand professional, ethical, legal, security and social issues and responsibilities
GLO 5. Be able to master general culture subjects as well as Azerbaijani as International
GLO 6. Be able to integrate facts, concepts, and methods from multiple disciplines and apply to biological problems
GLO 7. Be able to describe the principles and concepts in biology at three different scales, molecular, organismal, and ecosystem.
GLO 8. Be able to think analytically and independently

Professional learning outcomes of the programme
PLO 1 (Professional Learning Outcome n.1)
PLO 2. The candidate has broad knowledge of the chemical, biochemical, cellular, immunological and physiological basis of human biology
PLO 3. Knowledge in biochemical techniques (concerning for example nucleic acid and proteins): methods of separation and purification, spectrophotometric, dosage methods; enzymatic activity
PLO 4. Knowledge in molecular techniques in molecular biology: PCR/RT-PCR; plasmid extraction; cloning and construction of genes as well as the related bioinformatic tools
PLO 5. Knowledge of standard cell biology techniques, cell ionization, cell culture (prokaryotes and eukaryotes) and characterization, immunological techniques
PLO 6. Knowledge of current genetic engineering techniques: transformation, transgenesis, mutagenesis and mutagenesis; genetic labeling
PLO 7. Knowledge of common study techniques of plant tissues and animals and are able to interpret the data from classical observation techniques
PLO 8. Use quantitative reasoning, observation, technical and analytical skills for scientific problem-solving and interpretation of biological data

1.2. Indicate **how different subjects of your programme support development of learning outcomes of your programme** (put a tick in a relevant box if the learning outcomes is developed throughout this subject/teaching module).

Title of module	Subjects	Learning outcomes of the programme							
		GLO1	GLO2	GLO3	GLO4	PLO1	PLO2	PLO3	PLO4

1. 3. Indicate **learning outcomes for each subject (max. 4-5)**. Also indicate teaching, learning and assessment methods for each learning outcome.

Name of subject	Learning outcomes of each subject	Teaching and learning methods for each learning outcome	Assessment methods for each learning outcome

For example:

Name of subject	Learning outcomes of each subject	Teaching and learning methods for each learning outcome	Assessment methods for each learning outcome
Cell biology	<p>Demonstrate an understanding of the fundamental elements of cell structure and function</p> <p>Ability to perform experiments in cell biology</p> <p>Identify and evaluate the different types of scientific literature and execute an effective search of the scientific literature for completion of course assignments.</p> <p>Synthesize ideas and communicate concepts in cellular biology using written communication skills</p> <p>Manage time effectively and follow instructions to meet deadlines for course requirements.</p>	<p>Lectures, laboratory work, group assignments</p> <p>Laboratory works: tests</p> <p>Lectures, literature searches, problem solving tasks</p> <p>Lectures, group works</p> <p>Laboratory works, written assignments</p>	<p>Written exam</p> <p>Laboratory protocols, tests</p> <p>Laboratory report including reference list</p> <p>Essays, discussions of essays</p>
