***UNIVERSITY OF PRISHTINA “HASAN PRISHTINA”***

***FACULTY OF MATHEMATICS AND NATURAL SCIENCES***

***Department of Biology***

**Program:**

**MOLECULAR BIOLOGY – Bsc.**

**SELF-ASSESSMENT REPORT**

PRISHTINA, 2022

[I. INTRODUCTION 4](#_heading=h.2bn6wsx)

[i. A brief overview of the institution and program under evaluation 4](#_heading=h.qsh70q)

[ii. Leadership, management, administration, and regulation of FNSM personnel 6](#_heading=h.3as4poj)

[iii. Students, their socioeconomic background, and relevant contextual information about the area in which the program is offered 6](#_heading=h.1pxezwc)

[iv. Teaching, learning and the curriculum 7](#_heading=h.49x2ik5)

[II. PROGRAM EVALUATION - Molecular biology Bsc. 8](#_heading=h.2p2csry)

[1. Mission, objectives and administration 10](#_heading=h.147n2zr)

[2. Quality management 15](#_heading=h.23ckvvd)

[3. Accademic staff 23](#_heading=h.32hioqz)

[4. Educational process content 27](#_heading=h.1hmsyys)

[5. Students 115](#_heading=h.2grqrue)

[6. Research 118](#_heading=h.vx1227)

[7. Resources and infrastructure 127](#_heading=h.3fwokq0)

[1. Anex (nëse ka) 140](#_heading=h.1v1yuxt)

**UNIVERSITY OF PRISHTINA “HASAN PRISHTINA”**

**FACULTY OF MATHEMATICS AND NATURAL SCIENCES**

**(MOLECULAR BIOLOGY – Bsc.)**

**SELF ASSESSMENT REPORT**

PRISHTINA,2022

# INTRODUCTION

## A brief overview of the institution and program under evaluation

The University of Pristina (UP) is the largest university in Kosovo, offering a range of degree programmes (bachelor's, master's and doctoral) in various faculties. The study of natural sciences and mathematics (chemistry, biology, physics and mathematics) was first started at the University of Prishtina in 1960 as part of the Faculty of Philosophy. Later, in 1971, the departments of exact sciences were separated from this faculty and the Faculty of Natural and Mathematical Sciences (FNMS) was established by a decision of the Assembly of Kosovo (Official Gazette of PSSP No. 37/71). Since then, full-time and distance education is organized in five departments: Chemistry, Biology, Physics, Geography and Mathematics, which still exist today. Due to the political and social circumstances that Kosovo went through, especially in the last decade of the 20th century, FNMS, like the whole UP, faced great challenges and obstacles. Most of these challenges were overcome thanks to the great work and dedication of the academic staff, which not only justified the establishment of this Faculty, but also successfully fulfilled its mission as teachers and researchers.

In order to improve and increase the quality of studies, the academic staff of FNSM has taken measures to modify the curricula, with the aim of achieving the best European standards and strengthening cooperation with European universities. The adaptation of the curricula to the Bologna Agreement (3 + 2 + 3) was one of the most important steps to improve and increase the quality of the studies.

Since October 1, 2001, higher education studies at FNSM have been organized more in line with the Bologna Declaration.

**Faculty address**: University Campus in Pristina, Faculty of Mathematics and Natural Sciences; St. "Mother Teresa" n.n., 10 000 Pristina, Republic of Kosovo; Phone: +383 (0) 38 249 872/249 873/249 874; Fax: +383 38 226 104; E-mail: [fshmn@uni-pr.edu](mailto:fshmn@uni-pr.edu)

**Other programs offered at the center and at all campus sites:**

* **Department of Chemistry**
  + Undergraduate level programs

1. Chemistry

2. Engineering chemistry

* + Master's level programs

1. Physical Chemistry and Inorganic Chemistry

2. Organic Chemistry

3. Analytical Chemistry and Environmental Chemistry

* **Department of Mathematics**
  + Undergraduate level programs
    - 1. Mathematics
      2. Financial mathematics in banking and insurance
      3. Computer science
  + Master's level study programs

1. Mathematics

* **Department of Physics**
  + Undergraduate level programs:

1. Physics

* + Master's level study programs:

1. Physics

* **Department of Biology**
  + Undergraduate level programs:

1. Biology

2. Ecology and environmental protection

* + Master's level study programs:

Ecology and environment protection

General biology (accredited until 30.09.2024)

* **Department of Geography**
  + Undergraduate level programs:

1. Geography

* + Master's level study programs:

1. Geography

The degrees obtained are: **Bsc**. and **Msc**.

Faculty of Mathematics and Natural Sciences

Mission: "The University is an autonomous public institution of higher education that promotes academic education, scientific research, artistic creation, vocational guidance, and other areas of academic activity."

The University has the following goals:

* To act as an institutional and leading center for the advancement of knowledge, creative ideas and science in the higher education system of Kosovo;
* To play the leading role in the development of education, science, culture, society and economy of Kosovo;
* To support the process of promoting civic democracy;
* To create and support the highest standards in teaching and learning, scientific research and artistic creation;
* To use its own resources as efficiently as possible;
* To maximise cooperation and participation in all university activities at the national, regional and international levels;
* Alignment with European standards;
* Fully integrate into the European Higher Education Area and the European Research Area and implement the reform steps necessary to fulfil this mission.

## Leadership, management, administration, and regulation of FNSM personnel

**A screenshot of a computer

Description automatically generated**

## Students, their socioeconomic background, and relevant contextual information about the area in which the program is offered

According to the Statute of the University of Pristina (UP), the University is committed to providing equal opportunities for all, without discrimination based on gender, race, sexual orientation, marital status, language, religion, political opinion, nationality, ethnic or social affiliation or membership in a national community, property, birth status or any other status.

The Faculty of Mathematics and Natural Sciences (FMNS), in accordance with the University Statute, establishes the criteria for the admission of new students for each academic year. The number of students is proposed by the academic units (faculties) or by the departments based on their human and material resources, and these quotas are then approved by the FMNS Council and the University Senate. The criteria for student enrollment are specified in the Statute UP and are followed by all academic units, including FMNS.

To enroll in any of the UP BSc-level degree programs, applicants must have successfully completed high school and the matriculation examination. In addition, students must pass the entrance examination in the appropriate subjects at FMNS in order to be admitted to the program for which they have applied.

For students who come from socially disadvantaged families, there is a support programme to assist them in their studies, which are provided for in the administrative instruction approved by MEST. The semester fee is also acceptable for most social categories (students), while students from countries further away from Pristina can live in the dormitory on the university campus and eat in the student canteen at a very symbolic price, affordable for the social and economic status in the country. For students who are very successful in their studies, UP awards a number of scholarships from its budget every year. As for the before-hand preparation of students at the BSc level, they come mainly from high schools (gymnasia), where they have previously taken courses in science and mathematics, or from vocational schools, while at the MSc level they come from the corresponding BSc programs held at the FNSM. Currently, the number of students in all programs at FNSM ends up according to the planning.

​​

## Teaching, learning and the curriculum

Teaching at FMNS is organized on a regular (full-time) basis and includes a series of planned activities to achieve the objectives of the courses and the program as a whole. These activities include lectures, laboratory work, theoretical and practical exercises, seminars, scientific research, mentoring of students, etc. At FMNS, each program of study is completed with a thesis. All academic staff at FMNS have appropriate academic and scientific qualifications related to their respective study programs. Each year, UP organizes a student evaluation of the teaching staff in order to continuously improve the quality of teaching. In addition, the Center for Excellence in Teaching (CPM), located at the College of Pristina, provides regular training and other resources to improve teaching quality. In addition, the QPM provides continuous professional development opportunities to faculty through innovative services and various resources to promote a culture of excellence in teaching and learning at the College of Pristina (UP).

**Learning**: as far as learning is concerned, students are actively involved in the learning process by organizing different activities to achieve the expected results and their professional development. At the beginning of each course, professors are required to present their syllabus, which includes all the activities planned for that course. Attendance at lectures and practical work is mandatory and is regularly registered (through the electronic system). Classroom/laboratory activities include individual work, group work, seminars, homework, laboratory work, practical exercises, scientific research, etc., depending on the content of the course. Student performance and progress in each course will be continuously evaluated through mid-term and final examinations. The evaluation criteria and deadlines are specified in the statute UP and in the FMNS regulation. FMNS has some very modest libraries where students can read during the day, but there is a university library equipped with modern literature and access to digital platforms at UP.

**Curriculum**: the content of the courses is designed on the basis of the Faculty and University Regulations and the University Statutes. Curriculum development at FMNS is regulated and involves the development of a set of processes and experiences that students must complete in order to receive a degree. For each proposed new degree program, the committee appointed by the relevant FMNS department first establishes the goals and learning outcomes of the program and then, through planned activities, ensures the appropriate subject content that will enable students to achieve objective outcomes that are relevant to their learning.

The entire academic staff is actively involved in the preparation of new degree programs as well as in the revision of existing degree programs. In addition, student accessibility assessment methods are also provided during the preparation process. New degree programs are proposed by the academic unit (Departments), approved by the FMNS Council and then by the University Senate.

# PROGRAM EVALUATION - Molecular biology Bsc.

**Data for the Study Program for which you are applying for accreditation: Molecular Biology BSc.**

|  |  |
| --- | --- |
| Name of the Institution: | University of Prishtina “Hasan Prishtina” |
| Faculty/Department: | Faculty of Mathematics and Natural Sciences |
| Main Campus and/or Branch: | Main Campus |
| If applying for a Branch, please specify the Branch: | - |
| Name of the Study Program: | **Molecular Biology** |
| Person(s) responsible for the Study Program: | Prof.Ass.Dr. Ilir Mazreku  Prof.Ass.Dr. Lulzim Millaku  Prof.Dr. Kemajl Bislimi |
| Accreditation/Reaccreditation: | Accreditation |
| Qualification level according to the KKK: | Level VI |
| Academic degree or designation of the academic degree in the diploma: | Bachelor of Science (BSc.) |
| ECTS: | 180 |
| Study program profile (specializations): | - |
| The field of study according to Erasmus Subject Area Codes (ESAC): | 13.1. Biology |
| Form of studies: | Regular studies |
| Minimum duration of studies: | 3 years |
| Number of study places: | 30 |
| Mark the permanent scientific/artistic staff for the Study Program (at least 3 PhDs): | |  | | --- | | Prof. Dr.Kasum Letaj | | Prof. Dr.Kemajl Kurteshi | | Prof. Dr.Idriz Vehapi | | Prof. Dr.Avdulla Alija | | Prof. Dr.Kemajl Bislimi  Prof. Dr. Fadil Millaku | | Prof.Dr. Ferdije Zhushi Etemi | | Prof.Dr.Linda Grapci Kotori | | Prof.Dr. Elez Krasniqi | | Prof. Asoc.Dr.Bekim Gashi | | Prof.Dr. Sefer Avdiaj | | Prof.Dr. Ramiz Hoti | | Prof. Ass.Dr. Jeton Halili | | Prof. Dr.Avni Berisha | | Prof. Dr.Arben Haziri | | Prof. Ass.Dr. Lulzim Millaku | | Prof. Ass. Dr.Ilir Mazreku | | Prof.Ass.Dr. Gzim Hudolli | | Prof.Asoc.Dr. Imer Haziri | | Prof.Ass.Dr. Kajtaz Bllaca | | Prof.Ass.Dr. Eliot Bytyqi | | Ass.Dr. Kaltrina Jusufi | | Ass.Dr. Driton Vela | | Ass. Dr. Naim Berisha | | Ass. Dr. Nesade Muja | | Ass. Msc. Alban Hyseni | | Ass.Dr. Fisnik Asllani | | Ass. Msc. Bujar Kadriaj | | Ass.Msc. Qendrim Ramshaj | | Ass.Msc. Donard Geci | |

## Mission, objectives and administration

*Standard 1.1. The mission of the study program is consistent with the general mission statement of the institution.*

The Molecular Biology (undergraduate) program is a new program offered by the Department of Biology. Its mission is to be a national and international leadership and research program in basic and applied areas of molecular biology. The Molecular Biology (Bsc) program aims to develop and train graduate molecular biologists that are able to use and apply knowledge of basic sciences such as cell biology, biochemistry, microbiology, genetics, chemistry, mathematics, and physics. They should also be capable of analytical and creative thinking, be able to constantly improve their scientific skills, and have the professional skills to conduct scientific research in various areas of molecular biology, genetics, and biotechnology and to share the acquired knowledge and experience with other interested parties.

They should also be capable of analytical and creative thinking, be able to constantly improve their scientific skills, and have the professional skills to conduct scientific research in various areas of molecular biology, genetics, and biotechnology and to share the acquired knowledge and experience with other interested parties.

Moreover, there is a lack of such a study program in all public and private higher education institutions in Kosovo, while the experience in Europe, as well as in countries whose economic and social status is comparable to that of Kosovo, shows that such fields of study do exist and are in demand. Since it is the study of biological systems at the molecular level, this degree program would have applications in various fields such as medicine, agriculture and industry through genetic engineering. With this degree program, we aim to produce graduates who are well prepared to work in applied areas of molecular biology, in professional laboratories, and in postgraduate and professional programs, which offers a wide variety of career development opportunities.

**Rationale of the program**

Some of the reasons listed below are essential for building and starting this program:

* The Molecular Biology program is a program that would fill the gap with molecular biology professionals in the Republic of Kosovo.
* The Republic of Kosovo is the only country in the region that does not offer such a study program.
* The COVID -19 pandemic and the problems in staffing laboratories with specialists in molecular biology analyzes are a very important indication of the need for the professionals in this field.
* The Faculty of Mathematics and Natural Sciences and the Faculty of Medicine have scientific and support staff and technical capabilities for the application of this program.
* The Faculty of Mathematics and Natural Sciences and the Faculty of Medicine have adequate facilities and equipment for the application of this program to the levels required for undergraduate study.
* The state of development of biosciences at the global level sets the path for research at the molecular level.
* Graduates of the Bachelor's program have opportunities for further scientific and academic development at home and abroad.

**The objectives of the bachelor's degree program in Molecular Biology are as follows:**

* Preparation of students with basic concepts in molecular biology and natural sciences.
* Preparation of students with complete theoretical and practical knowledge in a number of related areas such as cell biology, biochemistry, molecular biology, genetics, microbiology, physiology, and in interdisciplinary areas such as neurogenesis, genomics, and bioinformatics.
* Ability to discuss the molecular mechanisms by which DNA controls the development, growth, or morphological characteristics of an organism.
* Development of professional skills in molecular biology techniques and methods, laboratory protocols, equipment, experimental and analytical design, writing skills, information retrieval, statistical data analysis and presentation of results, problem solving, and group work required for employment.
* Students should be able to provide advice and expertise to relevant institutions and organizations in the field of molecular biology,
* To prepare students for the next cycle of study to advance the life sciences.

The mission and objectives of this programme are in line with those of the Faculty of Mathematics and Natural Sciences (FMNS) and the mission of the UP: "The University of Pristina is an independent public higher education institution that develops academic education, scientific research, professional guidance and other areas of academic activities" (Article 6 of the University Statute).

The specific objectives of the University of Pristina are as follows:

* - To act as an institutional and leading center for the advancement of knowledge, creative ideas and science in the higher education system of Kosovo.
* - To play a leading role in the development of education, science, culture, society and economy in Kosovo.
* - To actively participate in the process of promoting civic democracy,
* - To create and support the highest standards of teaching and learning, scientific research and artistic creativity.
* - To use its resources as efficiently as possible;
* - Maximize cooperation and participation in higher education activities at the national, regional and international levels.
* - Alignment with European standards.
* - Fully integrate into the European Higher Education Area and the European Research Area and implement the necessary reform steps to fulfill this mission.

Moreover, in all institutions of higher education in Kosovo, public and private there is a lack of such a program of studies, therefore, based on our needs, such a field of study is very much in demand. The main advantage of proposing this unique study program for accreditation is based on the need of the Republic of Kosovo and beyond for specialists in this field.

*Standard 1.2 Relevant academic and professional recommendations are taken into account when defining the intended learning outcomes, which are aligned with the National Qualifications Framework and the European Higher Education Area Qualifications Framework.*

**Expected learning outcomes**

Upon completion of this program, students will possess the following knowledge and skills:

* - Interpretation of the structural and functional aspects of molecules and their interactions that form supramolecular complexes such as organelles and cells, and how these complexes function in organisms.
* - Evaluate challenging problems and devise detailed, logical, and thoughtful solutions to these problems using an analytical and critical approach.
* - Be able to discuss the major discoveries and theories in the historical development of biological science and the impact of these discoveries on the development of molecular biology.
* - Be able to explain the principles and laws of heredity at the cell, individual, and population levels.
* - Demonstrate knowledge and understanding of the basic principles and mechanisms of metabolic control and molecular signal transduction.
* - Be able to explain the origin of mutations and their effects on the survival of individuals and species.
* - They are able to relate the structure of tissues, organs, organ systems, and organisms to their functions in plants and animals.
* - They will be able to analyze the major structural elements and processes involved in reproduction, growth, development, and regulation of cellular functions that enable the survival of living organisms.
* - Be able to interpret the principles of cloning and genetic manipulation and their application in genetic analysis.
* - Critically analyze scientific theories, models, concepts and techniques in the field of molecular biology.
* - Develop the ability to apply the scientific method to scientific problems. They will identify, characterize, and analyze the components of scientific problems, ask important scientific questions, formulate hypotheses, and design experiments to test those hypotheses.
* - Be able to identify and apply the appropriate methods and instrumentation needed to successfully experimentally test hypotheses or make routine biochemical, hormonal, or genetic measurements.
* - They are able to apply basic rules for safe laboratory work and proper use and maintenance of equipment and supplies.
* - Be able to independently and competently use various laboratory equipment, measuring instruments, and optical aids in routine laboratory work.
* - Demonstrate the ability to communicate effectively with their scientific colleagues in written and oral form,
* - Demonstrate the ability to research scientific literature and collect scientific articles, book chapters, and other scientific literature. Demonstrate the ability to critically analyze these scholarly works.

*Standard 1.3 The study program has a clearly defined didactic and scientific concept.*

The program consists of 6 semesters over 3 years with a total of 180 ETCS (60 ETCS per year). Students complete their studies with the thesis and defend the bachelor's degree in Molecular Biology, which complies with Bologna standards.

A variety of methods that provide opportunities for active learning are used in the teaching of the various subjects in this program. These methods include interactive lectures, laboratory and field work, case studies, design work, problem solving, group work, project-based work, independent practice, etc. Emphasis is placed on hands-on group and individual work (especially in thesis writing) to prepare students to work independently and present results orally and in writing.

**Administration of study program**

*Standard 1.4. There are formal policies, guidelines and regulations dealing with recurring procedural or academic issues. These are made publicly available to all staff and students.*

Legal basis for development/revision of the curriculum and other academic issues are stated in the Statute of the University of Prishtina. All relevant documents that regulate academic processes such as the UP Statute, UP Regulations and Faculty Regulations, are published on the website of the University of Prishtina and are easily accessible to all interested.

For each study program offered in the Department of Biology, there are three academic staff (for master study program two) responsible for the respective program.

According to the statute, each Faculty has a Study Committee, which serves as an advisory body for the Faculty Council. Study Committee at Faculty is responsible for drafting new study programs and for adoption and revision of existing study programs.

The faculty management structures are responsible for organizing of the teaching process, research, quality assurance and student evaluation (exams), and to monitor the students’ progress during the studies, while at the Department level, the Head of the Department is responsible person to coordinate and supervise teaching process.

There is a Study Committee at University level too, which serves as the advisory body to the Senate.

*Standard 1.5. All staff and students comply with the internal regulations relating to ethical conduct in research, teaching, assessment in all academic and administrative activities.*

Management, academic staff, and students comply with the internal regulations relating to ethical conduct in research, teaching and assessment in Faculty. Respectively to the:

* Code of ethics for Academic staff,
* Regulation on disciplinary measures and procedures for academic staff No. 857, dated 11.04.2017).

*Standard 1.6. All policies, regulations, terms of reference and statements of responsibility relating to the management and delivery of the program are reviewed at least once every two years and amended as required in the light of changing circumstances.*

The review of a study program takes place periodically based on the dynamics foreseen in legal documents issued by Accreditation Agency of Kosovo.

**SWOT analysis for mission, objectives and administration:**

1. **Strengths**

* The mission of the Bachelor of science program in Biology is in line with the mission of the FMNS and UPHP,
* Objectives of this study program are realistic and achievable, and are the result of consultations between members of the Department of Biology,
* The expected learning outcomes of the individual courses as well as entire program are in accordance with the level VI of the National Qualification Framework,
* The student’s progress in the program from registration up to completion/graduation is clear and in accordance with the Statute of the UP and the FMNS regulations,
* The Department of Biology has sufficient academic and administrative resources to enable full implementation of the program,
* The FMNS administration supports the program including the student's file and its progress until the completion of studies,
* The FMNS has the Regulation for Bachelor Studies, which regulates the administrative procedures, including the Student Complaint Procedure in case of dissatisfaction with their evaluation.

1. **Weaknesses**

* FMNS actually has no building and its available spaces are limited
* Technical supporting staff for maintenance of new equipment is scarce and not qualified for this purpose,
* The building in which the Department of Biology operates is limited and do not meet the criteria for people with disabilities.

1. **Opportunities**

* It is the only program of its kind in the country,
* Attractive for students of Kosovo and abroad,
* The graduates can follow master studies in Biology (FMNS) or in the Faculty of Education in the master program Education in Natural Sciences , or in other similar master programs in Kosovo or abroad

1. **Threats**

* High unemployment rate in the country,
* The labour market in the country is not defined and structured
* Inability to compete in the labour market abroad

## Quality management

*(Please provide your self-evaluation of the education provider performance against each of the standards and performance indicators included in this domain, as specified in the KAA Accreditation manual.)*

*Quality management:*

*Standard 2.1. All staff participate in self-evaluations and cooperate with reporting and improvement processes in their sphere of activity.*

The actors in the quality assurance and assessment system are as follows:

1. University Senate

2. The Rector

3. The central commission for quality assurance and evaluation at the University level

4. Office for Academic Development at the University level

5. Dean of the academic unit and

6. Committee for quality assurance and assessment at the level of the academic unit

The Senate of the University is the body that approves the Quality Assurance and Evaluation Regulation, as well as the members of the Central Quality and Evaluation Commission.

The rector makes sure that the right conditions exist for:

● carrying out evaluation activities within the quality assurance system,

● that there is the necessary financial support to carry out evaluation activities within the quality assurance and evaluation system,

● that the results of evaluations are translated into operational measures for appropriate improvements and rewards for good practices.

The central Committee for quality assurance and evaluation at the University level is an advisory committee of the Senate and consists of: the Vice-Rector for Quality (ex-officio), the official from the Office for Academic Development, up to 8 representatives of the academic staff from the various academic units, a representative of students with an average grade above 8 and a good knowledge of the English language. The members of the Committee are proposed by the Rector and approved by the Senate for a 4-year term.

At least one third of the members of the Central Committee for Quality Assurance and Evaluation must continue in the composition of the Committee after the 4-year mandate to ensure continuity of work.

The central quality assurance and assessment committee has the duty to:

● draw up the quality assessment activities guide,

● design instruments for qualitative and quantitative assessment,

● draw up and review evaluation/self-evaluation reports,

● examine self-assessment reports for institutional and program accreditation,

● review the self-assessment reports for institutional and program re-accreditation in relation to the level of addressing the issues raised by KAA,

● approve the members of working groups for the realization of evaluations as needed, lead the process of publishing evaluation reports.

Academic Development Office:

* administers evaluation processes according to the planning,
* manages the process of distribution and publication of evaluation activity reports,
* provides operational assistance to the Central Quality Assurance and Evaluation Commission,
* establishes working groups according to the recommendations of the Central Quality and Evaluation Commission at the UP level to carry out evaluation activities as needed.

The dean of the academic unit ensures that;

* the coordinator for academic development carries out his responsibilities regarding the realization of evaluations at the level of the University and at the level of the academic unit according to the approved planning.
* provides access to data for assessments that are made within the Quality Regulation.
* ensures that evaluation activities within the respective unit are carried out successfully and according to planning.
* draws up the improvement plan after each evaluation activity and reflects the measures to be taken in the annual budget of the academic unit.

The committee for quality assurance and evaluation at the level of the academic unit consists of the Management, the Coordinator, the students and the academic staff.

The coordinator is a bridge between the academic unit and the Office for Academic Development of the University of Pristina (UP).

The coordinator guides the academic staff and students regarding the practical aspects of ECTS implementation, guides and monitors the relevant department and the study commission during the accreditation/re-accreditation process to design/revise the study programs, advises, plans and monitors the evaluation process of subjects and teaching, as well as internal quality assessment, in cooperation with the management of the academic unit, takes care of and monitors the involvement of all interested parties (academic staff, students, businesses or members of the Advisory Board) for the design/review of the programs of study, organizes information sessions for the academic staff and students regarding the Bologna process, in cooperation with the management, organizes data and information related to the scientific activity in the academic unit (recording of scientific works, professional and scientific projects), advises the management and students of related academic unit with the realization of student mobility, advises, plans and monitors schemes, activities and activities for the improvement of quality in the academic unit, collects and reports on the data of each activity according to the request of the Vice-Rector for Academic Development, to demonstrate the degree of progress from the current state to the desired state.

*Standard 2.2. Evaluation processes and planning for improvement are integrated into normal planning processes.*

The University of Prishtina implements Law No. 04/L-037 "Law of Higher Education” in the Republic of Kosovo and the Statute of the University as a legal basis for regulation, operation, financing, quality assurance in higher education in accordance with European standards. Also in support of article 210 to 225 of the Statute of the University of Pristina, the Senate of the University of Pristina approved on 30.12.2016 the Regulation of quality assurance and assessment at the University of Pristina. This regulation aims to define the mechanisms and procedures of quality assurance and assessment at the University of Pristina. This regulation also defines the role and responsibility of organizational and academic units in the University for the realization of quality assurance and evaluation activities. The regulation defines the mechanisms and processes that align the University of Pristina with the ENQA standards for quality assurance and evaluation. Therefore, the Faculty of Natural Mathematical Sciences, like any other academic unit, has the legal basis for the implementation of quality assurance procedures in these legal documents that were mentioned above.

*Standard 2.3. Quality assurance processes deal with all aspects of program planning and delivery, including services and resources provided by other parts of the institution.*

Within the quality assurance and evaluation system, two types of evaluations are conducted:

* + - 1. Internal evaluation and
      2. External evaluation (1. Evaluations for institutional accreditation purposes and 2. Evaluations for program accreditation purposes at the level of academic units).

**Internal evaluation**

The stakeholders in the quality assurance and assessment system are as follows:

* + - 1. University Senate
      2. The Rector
      3. The central commission for quality assurance and evaluation at the University level
      4. Office for Academic Development at the University level
      5. Dean of the academic unit and
      6. Committee for quality assurance and assessment at the level of the academic unit

The Senate of the University is the body that approves the Quality Assurance and Evaluation Regulation, as well as the members of the Central Quality and Evaluation Commission.

The rector makes sure that the right conditions exist for:

* carrying out evaluation activities within the quality assurance system,
* that there is the necessary financial support to carry out evaluation activities within the quality assurance and evaluation system,
* that the results of evaluations are translated into operational measures for appropriate improvements and rewards for good practices.

The central committee for quality assurance and evaluation at the University level is an advisory committee of the Senate and consists of: the Vice-Rector for Quality (ex-officio), the official from the Office for Academic Development, up to 8 representatives of the academic staff from the various academic units, a representative of students with an average grade above 8 and a good knowledge of the English language. The members of the Commission are proposed by the Rector and approved by the Senate for a 4-year term.

At least one third of the members of the Central Committee for Quality Assurance and Evaluation must continue in the composition of the Committee after the 4-year mandate to ensure continuity of work.

The central commission for quality assurance and assessment has the responsability to:

* compile up the quality assessment activities guide,
* design instruments for qualitative and quantitative assessment,
* draw up and review evaluation/self-evaluation reports,
* examine self-assessment reports for institutional and program accreditation,
* review the self-assessment reports for institutional and program re-accreditation in relation to the level of addressing the issues raised by KAA,
* approve the members of working groups for the implemention of evaluations as needed, lead the process of publishing evaluation reports.

Academic Development Office:

* administers evaluation processes according to the planning made,
* manages the process of distribution and publication of evaluation activity reports,
* provides operational assistance to the Central Quality Assurance and Evaluation Commission,
* establishes working groups according to the recommendations of the Central Quality and Evaluation Commission at the UP level to carry out evaluation activities as needed.

*Standard 2.4. Quality evaluations provide an overview of quality issues for the overall program as well as of different components within it; the evaluations consider inputs, processes and outputs, with particular attention given to learning outcomes for students*

The UP Senate has approved three different forms of quality improvement instruments: questionnaires for academic staff, questionnaires for administrative employees, and questionnaires for students, in order to regulate the quality of academic and administrative activities.

Additionally, there are supporting systems for quality improvement. For instance, the academic staff of the UP's research activities are evaluated for quality through publications in peer-reviewed international journals and participation in national and worldwide scientific conferences.

Based on the number of papers in journals with international review, the advancement of the academic staff is also done. Data are collected from the faculties on student performances such as: percentage of passing exams, organization of colloquiums, duration of studies, etc. Assesment of study programs by the UP Senate is also considered a traditional mechanism, where each new study program must pass through the faculty structures and then receive the consent of the Senate.

*Standard 2.5. Quality assurance processes ensure both that required standards are met and that there is continuing improvement in performance.*

The processes of quality assurance and the follow-up of the progress of the quality in general are constantly coordinated in the top-down line, by the Vice-Rector of Quality, the Office for Academic Development, the Dean of the Academic Unit, the Coordinator of the relevant Academic Unit and the staff aiming at an improvement of continuous quality of the teaching process. In this case, the fulfillment of standards and regulations in the barrel for quality is monitored.

*Standard 2.6. Survey data is being collected from students, graduates and employers; the results of these evaluations are made publicly available.*

In order to make the most objective evaluation of the teaching process and the responsibility for the quality of the studies towards the students, the Faculty of Mathematics and Natural Sciences within the University of Prishtina uses questionnaires and forms for the academic and administrative staff and the students. All these questionnaires contain separate questions for each category. The questionnaires are completed electronically and administered by SEMS.*The questionnaire for academic staff* contains three categories of questions: for the faculty, for teaching and learning-learning and for scientific research activity. Its purpose is to collect sufficient data that would influence the continuous improvement of these three activities, according to the teachers' perspective.

*The questionnaire for university administrative and support staff* contains questions that answer the nature of their jobs and responsibilities in the workplace. Mainly, through them it is aimed at collecting information about the professional preparation of the administrative staff, their working conditions and the relationship with the academic staff.

*Questionnaire for students* - the questionnaire provides data on teaching and learning, practical / laboratory work of the lesson and infrastructure services.

In addition to these three questionnaires, there is also the *questionnaire on the student's assessment of the subject and teaching*, which is also organized in electronic form and managed through SEMS. Through this questionnaire, students have the opportunity to give their evaluations for each subject, including for the teacher, so that based on their objective answers, steps can be taken for further improvements. Regarding this method of assessment, there is Instruction document No. 1/438 dated 18.05.2018.

Currently, at our University, periodically at the end of each semester, students are evaluated electronically through the SEMS system for each subject.

*Standard 2.7. Results of the internal quality assurance system are taken into account for further development of the study program. This includes evaluation results, investigation of the student workload, academic success and employment of graduates.*

The University regularly conducts external and internal evaluations in accordance with the Law on Higher Education and the Statute, as well as the standards set by the Kosovo Accreditation Agency.

After the completion of the internal and external evaluations, follow-up actions follow in order to use the results of the evaluations for the eventual improvement of the program plan and quality in general. The obtained results help to identify eventual problems in the quality of teaching and teaching-learning and enable the undertaking of relevant improvement measures.

Continuous improvement of the curriculum is the teacher's responsibility. Based on the results obtained from the questionnaire for the student's assessment of the subject and teaching, the teacher has the obligation to examine possible criticisms and improve the curriculum. This is one of the evaluation mechanisms, and the other depending on the following of new literature and innovations encountered in the given field, the teacher constantly refreshes the subject he teaches.

Also, the external assessment made by foreign experts represents an added value in this process. The recommendations from the external evaluation report are a starting point for taking action measures in order to eliminate eventual deficiencies that may have been evident during the design of educational programs that have been subjected to the evaluation process, as well as a good basis for the actual design of other programs that in the future expect to go through the evaluation process.

*Standard 2.8. The institution ensures that reports on the overall quality of the program are prepared periodically (eg. every three years) for consideration within the institution indicating its strengths and weaknesses.*

The University regularly conducts external and internal evaluations in accordance with the Law on Higher Education and the Statute, as well as the standards set by the Kosovo Accreditation Agency. The evaluation for accreditation of the programs adapts to the dynamics of the accreditation of the programs. The assessment must be done at least once every five years according to planning, based on the criteria specified by the Kosovo Accreditation Agency.

*Standard 2.9. The quality assurance arrangements for the program are themselves regularly evaluated and improved.*

The academic units oversee the accreditation of the programs through the central Quality Assurance Commission at the University and Senate level studies Commission in accordance with the standards of the Kosovo Accreditation Agency, working in tandem with the Vice-Rector for Quality Assurance and the Office for Academic Development.

Information on the quality of teaching and learning, the quality of scientific activity, international cooperation, graduates' perceptions of the quality of their studies, employers' perceptions of the quality of graduates, the quality of services provided to students, and the quality of organizational culture and management must all be considered in the assessment made for program accreditation.

The UP Senate has approved three different types of quality improvement instruments: questionnaires for academic staff, questionnaires for administrative employees, and questionnaires for students. This is done in part to check the quality of academic and administrative activities.

These tools make it easy to monitor and assess pertinent concerns that are crucial for quality assurance and evaluation. The results collected enable the implementation of pertinent improvement strategies as well as the identification of potential issues with the quality of education and teaching-learning.

**SWOT analysis for quality management**

**Strenghts:**

* There are relevant bodies, human resources and adequate legal infrastructure to ensure the smooth running of the quality assurance process,
* There is good coordination of all relevant bodies and human resources, academic staff and students in the development of internal and external evaluation processes,
* Compared to the previous periods of the quality assurance process journey, there is now a greater experience in terms of quality management, but also on the part of the staff and students themselves, that all together contribute to the assurance of quality through the provision of quality programs.
* The electronic collection of necessary information from staff, students, administrative services, etc. has also been modernized.

**Weaknesses:**

* Lack of funds for quality assurance,
* Lack of spatial infrastructure for the implementation of study programs,
* Low interest of students to engage in quality assurance procedures.

**Opportunities:**

* Good quality assurance system increases the possibilities of participation in international projects,
* Increases the employability of graduates in the labor market outside Kosovo,
* Involvement of students and stakeholders in the quality assurance process raises students' awareness of studying in nationally and internationally recognized quality programs.

**Threats:**

* Weak job market
* Immigration of youth (stundents)

## Accademic staff

*Standard 3.1. Candidates for employment are provided with full position descriptions and conditions of employment. To be presented in tabular form data about full time (FT) and part time (PT) academic/ artistic staff, such as: name, qualification, academic title, duration of official (valid) contract, workload for teaching, exams, consulting, administrative activities, research, etc. for the study program under evaluation.*

Below is the table that provides the list of full-time academic staff in the Department of Biology (name and surname, academic title, type of contract), who will teach in Molecular Biology program. Their teaching hours are given in the table under the name “Program Summary”. Other commitments such as exams, consultations, etc. are provided in the course syllabus (attached to the self-assessment report). For the implementation purposes of this program, we provide 25 academic teaching staff ; 17 are in the teaching capacities (professors), and 8 of them as teaching assistants (TA)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Name and surname** | **Scientific title** | **Academic degree** | **Language of the classes** | **Start of contract** | **Termination of contract** |
|  | Kasum Letaj | Dr.sc. | Prof. | Albanian | 27.07.2016 | Undefinned |
|  | Kemajl Kurteshi | Dr.sc. | Prof. | Albanian | 27.07.2016 | Undefinned |
|  | Idriz Vehapi | Dr.sc. | Prof. | Albanian | 27.07.2016 | Undefinned |
|  | Avdulla Alija | Dr.sc. | Prof. | Albanian/English | 27.07.2016 | Undefinned |
|  | Kemajl Bislimi | Dr.sc. | Prof. | Albanian | 27.07.2016 | Undefinned |
|  | Fadil Millaku | Dr.sc. | Prof. | Albanian | 27.07.2016 | Undefinned |
|  | Ferdije Zhushi | Dr.sc. | Prof. | Albanian/English | 14.10.2016 | Undefinned |
|  | Linda Grapci Kotori | Dr.sc. | Prof. | Albanian/English | 14.10.2016 | Undefinned |
|  | Elez Krasniqi | Dr.sc. | Prof. | Albanian | 14.10.2021 | Undefinned |
|  | Bekim Gashi | Dr.sc. | Prof. Asoc. | Albanian/English | 14.10.2021 | 13.10.2025 |
|  | Sefer Avdiaj | Dr.sc. | Prof. | Albanian/English | 14.10.2021 | Undefinned |
|  | Ramiz Hoti | Dr.sc. | Prof. | Albanian | 14.10.2021 | Undefinned |
|  | Jeton Halili | Dr.sc. | Prof.Ass. | Albanian/English | 28.12.2022 | 28.12.2026 |
|  | Avni Berisha | Dr.sc. | Prof. | Albanian/English | 14.10.2021 | Undefinned |
|  | Arben Haziri | Dr.sc. | Prof. | Albanian/English | 14.10.2021 | Undefinned |
|  | Lulzim Millaku | Dr.sc. | Prof. Ass. | Albanian | 14.10.2021 | 13.10.2025 |
|  | Ilir Mazreku | Dr.sc. | Prof. Ass. | Albanian/English | 14.10.2021 | 13.10.2025 |
|  | Gzim Hudolli | Dr.sc. | Prof. Ass. | Albanian/English | 14.10.2021 | 13.10.2025 |
|  | Imer Haziri | Dr.sc. | Prof. Ass. | Albanian/English | 14.10.2021 | 13.10.2025 |
|  | Kajtaz Bllaca | Dr.sc. | Prof. Ass. | Albanian/English | 14.10.2018 | 13.10.2024 |
|  | Eliot Bytyqi | Dr.sc. | Prof. Ass. | Albanian/English | 14.10.2021 | 13.10.2025 |
|  | Kaltrina Jusufi | Dr.sc. | Ass. | Albanian/English | 14.10.2021 | 13.10.2024 |
|  | Driton Vela | Dr.sc. | Ass. | Albanian/English | 14.10.2021 | 13.10.2024 |
|  | Naim Berisha | Msc. | Ass. | Albanian/English | 14.10.2021 | 13.10.2024 |
|  | Nesade Muja | Dr.sc. | Ass. | Albanian | 29.06.2016 | 29.08.2020 |
|  | Alban Hyseni | Msc. | Ass | Albanian | 01.10.2016 | 29.08.2020 |
|  | Fisnik Asllani | Dr. | Ass. | Albanian/English | 14.10.2021 | 13.10.2024 |
|  | Bujar Kadrijaj | Msc. | Ass. | Albanian | 01.10.2018 | 01.10.2021 |
|  | Qendrim Ramshaj | Msc. | Ass. | Albanian | 14.10.2021 | 13.10.2024 |
|  | Donard Geci | Msc. | Ass. | Albanian/English | 14.10.2021 | 13.10.2024 |

*Standard 3.2. The teaching staff must comply with the legal requirements concerning the occupation of teaching positions included in the Administrative instruction on Accreditation.* The recruitment procedures for employment and evaluation of the academic staff are structured by University of Prishtina regulations. The decision on the recruitment or promotion of the academic staff is made by the Senate of the University of Prishtina, but it is based on the Faculty Council proposal and the preliminary evaluation commissions consisting of at least three professional members of the relevant field, while the contract is signed by the Rector.

*Standard 3.3. Academic staff do not cover, within an academic year, more than two teaching positions (one full-time, one part-time), regardless of the educational institution where they carry out their activity.*

All the academic staff in the Department, do not cover more than two teaching positions (one full-time, and one part-time), regardless of the educational institution where they perform their activity. This is regulated by the UP Statute (Article 170), which states that full-time staff cannot have another full-time employment contract at another university. The contracts of the staff have been submitted to the Kosovo Accreditation Agency through the E-declaration process.

*Standard 3.4. At least 50% of the academic staff in the study program are full time employees, and account for at least 50% of the classes of the study program.*

Currently, the Department of Biology has enough qualified staff for all study programs, including the Molecular Biology study program. This program is covered 100% by full-time employees. The courses that are not from the field of biology are covered by full time staff of the Department of Chemistry, Faculty of Medicine and Faculty of Agriculture and Veterinary.

*Standard 3.5. For each student group (defined by the statute of the institution) and for every 60 ECTS credits in the study program, the institution has employed at least one full time staff with PhD title or equivalent title in the case of artistic/applied science institutions.*

For this study program, three of the academic staff with full-time contacts (with the Doctor of Science title) are named as responsible people, which means one professor for every 60 ECTS credits, while the number of staff employed for this program is 27. There are 19 professors and 8 of them are in the capacities of teaching assistants.

*Standard 3.6. Opportunities are provided for additional professional development of teaching staff, with special assistance given to any who are facing difficulties.*

Furthermore, five teaching assistants from the Biology Department are currently pursuing doctoral studies at University of Prishtina and abroad. All the academic staff affiliated in this study program are employed as full-time staff with adequate academic qualifications according to the relevant teaching courses. To improve the quality of teaching, the new staff are obliged to attend training organized by the Center of Excellence in Teaching (UP). Moreover, the academic staff constantly improves teaching methodologies and implements different information technologies in the learning process. To achieve this in practice, University of Prishtina signed four international agreements (mainly covering the specific fields of this study program) for the staff and student exchange, as well as other general agreements where the academic staff of the Biology Department can attend the program exchange.

*Standard 3.7. The responsibilities of all teaching staff, especially full-time, include the engagement in the academic community, availability for consultations with students and community service.*

The teaching staff is available for consultation and any information for community needs. They are required to submit a schedule for consultations and community service help hours, at least twice a week.

*Standard 3.8. Academic staff evaluation is conducted regularly at least through self-evaluation, students, peer and superiors’ evaluations, and occur on a formal basis at least once each year. The results of the evaluation are made publicly available.*

At the end of each semester, each course (including academic staff) is evaluated by students using an anonymous questionnaire survey prepared by the Office of Academic Development and managed by SEMS to identify weaknesses that need to be improved.

*Standard 3.9. Strategies for quality enhancement include improving the teaching strategies and quality of learning materials.*

The academic staff constantly improves the teaching methodologies considering the weaknesses identified with the surveys during the evaluation process. Every year the university plans a budget, which covers expenses for chemicals, equipment for laboratory research, as well as transportation and accommodation of students for the work in the terrain. In addition, the university is a subscriber to a scientific database (Science Direct), in which academic staff and students can access online literature free of charge.

*Standard 3.10. Teachers retired at age limit or for other reasons lose the status of full-time teachers and are considered part-time teachers.*

The retirement age of the academic staff is 65 years, with the possibility of being considered as a part-time professor employee until the age of 70.

**SWOT analysis for academic staff:**

**A. Strengths**

● Adequate number of qualified staff,

● Available opportunities for training on the application of new teaching methodologies,

● Participation of academic staff in projects, scientific conferences, and training,

● Exchanges with international universities that influence their professional development

**B. Weaknesses**

Differences in the conditions and the use of opportunities for experimental research in the host universities

**C. Opportunities**

● Specialization of young academic staff in Ph.D. programs, some of them in prestigious universities abroad

● Staff and student exchange in ERASMUS programs.

**D. Threats**

The increased need for qualified staff in other higher institutions in the country will attract our graduates.

## Educational process content

*Standard 4.1. The study program is modelled on qualification objectives. These include subject-related and interdisciplinary aspects as well as the acquisition of disciplinary, methodological and generic skills and competencies. The aspects refer especially to academic or artistic competencies, to the capability of taking up adequate employment, contributing to the civil society and of developing the students’ personality*

The fundamental professional and educational objective is to educate students in general botany, human biology, ecology, biochemistry with microbiology and genetics, general zoology, physiology, laboratory practice research, experimental field work, as well as other areas of biology. All the fields are in accordance with current employment needs and future ones for educational experts. Graduates will be trained in the use of computers, communication, and information systems. Students who complete basic studies in Molecular Biology will be employed in various institutions, including laboratories, or will have the opportunity to continue their Master studies in the Faculty of Education and get hired in primary and secondary schools, but also in various institutions: public administration, journalism, governmental and non-governmental organizations.

*Standard 4.2. The study program complies with the National Qualifications Framework and the Framework for Qualifications of the European Higher Education Area. The individual components of the program are combined in a way to best achieve the specified qualification objectives and provide for adequate forms of teaching and learning.*

The structure of the study program of Molecular Biology corresponds to the National Qualifications Framework and the Framework for Qualifications of the European Higher Education Area. The program provides the knowledge and skills required for undergraduate studies in the fields of natural sciences in general, and biological sciences in particular. Theoretical and experimental work form the basis of any educational and learning activity.

The undergraduate program in Molecular Biology lasts three years (6 semesters) during which students must acquire at least 60 ECTS/year, which correspondsto an average commitment of 40 hours per week in a school year. The commitment of the students includes different activities: active learning (lectures, exercises, projects, seminars, theoretical and experimental work), independent work, examinations, and other forms of activities. Of the total 180 ECTSs, 15% of the courses are electives, while 85% of the courses are Mandatory.

*Standard 4.3. The disciplines within the curriculum are provided in a logical flow and meet the definition and precise determination of the general and specific competencies, as well as the compatibility with the study programs and curricula delivered in the EHEA. To be listed at least 7 learning outcomes for the study program under evaluation.*

* demonstrat theoretical concepts, scientific, and experimental research from the field of Molecular Biology and other natural sciences,
* act autonomously while planning and carrying out research, apply uniqueness to the application of learned knowledge and practical understanding for identifying and resolving difficulties,
* Critically analyzes scientific theories, concepts, models, and techniques from the fields of Biology.
* research scientific and professional literature for the requirements of the research field,
* Reads and critically evaluates the results of qualitative and quantitative research from the respective fields.
* Communicates effectively and persuasively both orally and in writing,
* Collects problem-solving projects in the respective disciplines,
* Offers advice and expertise in molecular biology.

The learning outcome of this study program are in accordance with the National Qualifications Framework, respectively with the requirements for knowledge, skills and personal responsibilities.

*Standard 4.4. The disciplines within the curriculum have analytical syllabuses which comprise at least the following: the discipline’s objectives, the basic thematic content, learning outcomes, the distribution of classes, seminars and applicative activities, students’ assessment system, the minimal bibliography, etc. The full course description/ syllabuses of each subject/ module should be attached only in electronic form to the self-assessment report for the study program under evaluation.*

An overview of each class's curriculum is provided along with the self-evaluation report. The description includes the field's (subject's) objectives, the fundamental information, the learning outcomes, the teaching sessions, seminars, and practical exercises, the assessment of the students, the minimal bibliography, etc.

*Standard 4.5. If the language of instruction is other than Albanian, actions are taken to ensure that language skills of both students and academic staff are adequate for instruction in that language when students begin their studies. This may be done through language training prior to the commencement of the program.*

The classes are organized only in the Albanian language, but during the admission of students, other nationalities are also admitted, and those students are assisted individually.

*Standard 4.6. The student-teacher relationship is a partnership in which each assumes the responsibility of reaching the learning outcomes. Learning outcomes are explained and discussed with students from the perspective of their relevance to the students’ development.*

Considering that the syllabus is presented to the student in the first meeting, meaning that they are already informed of the necessary duties of the course and the expected results from it. This makes both parties engaged: professors and students, to fulfill the objective of teaching and learning together.

*Standard 4.7. Strategies of teaching and assessment set out in program and course specifications are followed with flexibility to meet the needs of different groups of students.*

The teaching strategy is consistent at the University of Prishtina because there are different documents, approved by the Office of Academic Development and the Vice-Rector for quality, which explain in detail how to plan, write, and implement the syllabus of a course. All the staff, before being promoted to Professor tittle, go through several training for teaching strategies and suitable methodologies for their profile of study. Correspondingly, part of the training program is also for writing and designing the syllabus organized by the Center for Excellence within the Rectorate.

*Standard 4.8. Student assessment mechanisms are conducted fairly and objectively, are appropriate for the different forms of learning sought and are clearly communicated to students at the beginning of courses.*

At the beginning of each teaching class (in the first unit), the syllabus is disclosed to the students, where they are informed of the course description, the expected results of the course, the work methodology, tools, the ratio of theoretical-practical hours, the teaching units that will be developed in the following 15 weeks of the course, as well as the evaluation method. During the teaching units, students can go under two evaluation processes (first and second evaluation) which ease the students for the final exam. The deadlines for the exams are provided in the Statute of the University of Prishtina and are published on the University's website. Also, the schedule exams are announced with necessary details into the Faculty of Mathematical and Natural Sciences website. All the issues that are mentioned above are regulated by article 110, 112 and 113 of the Statute of the University of Prishtina

*Standard 4.9. Appropriate, valid and reliable mechanisms are used for verifying standards of student achievement. The standard of work required for different grades is consistent over time, comparable in courses offered within a program, and in comparison with other study programs at highly regarded institutions.*

Success and evaluation are determined according to the Statute of UP in articles 108 and 109. Student grading for each course is done starting from the lowest grade of 5 to the highest grade of 10 and is consistent for all subjects of the program. The final evaluation of the students also includes their contributions (seminar papers, presentations, homework, participation in lectures) and the results shown during intermediate evaluations and during participation in the courses.

*Standard 4.10. Policies and procedures include actions to be taken in to dealing with situations where standards of student achievement are inadequate or inconsistently assessed.*

If the student is not satisfied with the result of the examination, he/she can file a complaint according to the Statute of UP, Article 114. In this article (114) of the Statute of the University of Prishtina, the time management, submission and handling of the complaint are explained in detail. This is also stated in Article 21 of the Regulation for undergraduate programmes.

*Standard 4.11. If the study program includes practice stages, the intended student learning outcomes are clearly specified and effective processes are followed to ensure that those learning outcomes and the strategies to develop that learning are understood by students. The practice stages are allocated ETCS credits and the work of the students at the practical training organisations is monitored through activity reports; students during practice stages have assigned tutors among the academic staff in the study program.*

Usually, theoretical and experimental parts of the unit follow each other in parallel to complete the course and equip studentswith the appropriate practical skills for acquiring the material of the corresponding course. A certain number of hours is allocated for the practical part of each subject.

The teaching assistant is responsible for the practical part of the course, monitors and in the end of the course evaluates the students' progress. Depending in the nature of the subject, in general the ratio between the theoretical and practical part is 3:2, or 2:2 (50:50).

*Standard 4.12. In order to facilitate the practice stages, the higher education institution signs cooperation agreements, contracts or other documents with institutions /organisations /practical training units.*

Professional practice will be part of the subject in each year of study. The student must complete 100 hours of practical work per academic year and provide evidence through a document (FMNS Practical Hours Registration Form) signed by the institution where the internship was completed. The Biology Department will approve the compatibility of the internship with the program of study (Molecular Biology) for each institution. FMNS strives to establish collaborative relationships with institutions (private and public) that can serve as references for further professional practice. During the three years of undergraduate study, students must complete an internship in at least two different institutions.

*Table with the information about the program Molecular Biology:*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bachelor of Mulecular Biology BSc. – Acreditation 2022** | | | | |  |
| **Semester: I** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | M | Cell biology | 2+2 | 6 | Prof.Dr. Kasum Letaj |
| 2 | M | Zoology | 2+2+1 | 6 | Prof. Dr. Ferdije Zhushi Etemi |
| 3 | M | General and inorganic chemstry | 3+2 | 6 | Prof. Dr. Avni Berisha |
| 4 | M | Biostatistics | 2+2 | 6 | Prof.Ass.Dr. Ilir Mazreku |
| 5 | M | Mathematics for biology | 2+3 | 6 | Prof.Ass.Dr. Kajtaz Bllaca |
|  | | |  | 30 |  |
| **Semester: II** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | M | Botanics | 2+2+1 | 6 | Prof.Dr. Fadil Millaku |
| 2 | M | Physics | 2+2 | 6 | Prof. Dr. Sefer Avdiaj |
| 3 | M | Bacteriology and virology | 3+2 | 6 | Prof.Dr. Idriz Vehapi |
| 4 | M | Organic chemistry | 3+2 | 6 | Prof. Dr. Ramiz Hoti |
| 5 | M | Developmental biology | 2+2 | 6 | Prof.Dr. Kasum Letaj |
|  | | |  | 30 |  |
| **Semestri: III** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | M | Human physiology | 2+2 | 5 | F. of Medicine |
| 2 | M | Analitical chemistry | 3+2 | 6 | Prof. Ass. Dr. Jeton Halili |
| 3 | M | Human anathomy | 2+2 | 5 | F. of Medicine |
| 4 | M | Biochemistry | 3+2 | 6 | Prof. Dr. Arben Haziri |
| 5 | E | Elective course |  | 4 |  |
| 6 | E | Elective course |  | 4 |  |
|  | | |  | 30 |  |
| **Semestri: IV** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | M | Biotests with hematology | 2+2 | 5 | F. of Medicine |
| 2 | M | Animal physiology | 3+2 | 6 | Prof.Dr. Kemajl Bislimi |
| 3 | M | Genetics | 3+2 | 6 | Prof.Dr. Avdulla Alija |
| 4 | M | Imunobiology | 2+2 | 5 | Prof. Ass. Dr. Lulzim Millaku |
| 5 | E | Elective course |  | 4 |  |
| 6 | E | Elective course |  | 4 |  |
|  | | |  | 30 |  |
| **Semestri: V** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | M | Plant physiology | 3+2 | 6 | Prof.Asoc.Dr. Bekim Gashi |
| 2 | M | Medical biochemistry | 3+2 | 6 | F. of Medicine |
| 3 | M | Biological evolution | 2+0+ 2 | 6 | Prof.Dr. Kasum Letaj |
| 4 | E | Elective course |  | 4 |  |
| 5 | E | Elective course |  | 4 |  |
| 6 | E | Elective course |  | 4 |  |
|  | | |  | 30 |  |
| **Semestri: VI** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | M | Molecular genetics | 2+2 | 6 | Prof.Dr. Avdulla Alija |
| 2 | M | Animal and plant cell culture | 2+1+1 | 6 | Prof.Dr. Kasum Letaj & Prof.Asoc.Dr. Bekim Gashi |
| 3 | M | Diploma thesis |  | 6 |  |
| 4 | E | Elective course |  | 4 |  |
| 5 | E | Elective course |  | 4 |  |
| 6 | E | Elective course |  | 4 |  |
|  | | |  |  |  |

*Table with the information for the study program under assessment, Molecular Biology, elective couses according to the semester:*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | |  | 30 |  |
| **Semestri: III** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | E | Bioinformatics | 2+1 | 4 | Prof.Ass.Dr. Eliot Bytyqi |
| 2 | E | Human endocrinology | 2+1 | 4 | F. of Medicine |
| 3 | E | Hystology and histochemnistry | 2+1 | 4 | Prof. Ass. Dr. Lulzim Millaku |
| 4 | E | Laboratoric methods | 2+1 | 4 | Prof.Ass.Dr. Jeton Halili |
| 5 | E | Laboratory animals in molecular biology research | 2+1 | 4 | Prof.Ass. Dr. Ilir Mazreku |
| 6 | E | Research methods of nucleic acids and proteins | 2+1 | 4 | Prof.Ass.Dr. Ilir Mazreku |
|  | | |  |  |  |
| **Semestri: IV** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | E | Extraction techniques | 2+1 | 4 | Prof.Ass.Dr. Jeton Halili |
| 2 | E | Radiation protection and quality control | 2+1 | 4 | Prof. Ass. Dr. Gzim Hudolli  Prof. Ass. Dr. Lulzim Millaku |
| 3 | E | Fundamentals of microscopy | 2+1 | 4 | Prof. Dr. Sefer Avdiaj |
| 4 | E | Clinical biochemistry and veterinary hematology | 2+1 | 4 | Prof. Ass. Dr. Imer Haziri  Prof. Ass. Dr. Lulzim Millaku |
| 5 | E | Molecular physiology of organ systems | 2+1 | 4 | F. of Medicine |
| 6 | E | Biopsychology | 3+0 | 4 | Prof.Ass.Dr. Ilir Mazreku |
|  | | |  |  |  |
| **Semestri: V** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | E | Parasitology | 2+1 | 4 | Prof.Dr. Ferdije Zhushi Etemi |
| 2 | E | Basics of physical chemistry | 2+1 | 4 | Prof. Dr. Avni Berisha |
| 3 | E | Algalogy dhe mykology | 2+1 | 4 | Prof.Dr. Kemajl Kurteshi |
| 4 | E | Zoology – 2 (Invertebrata) | 2+1 | 4 | Prof. Dr. Ferdije Zhushi Etemi |
| 5 | E | Zoology – 3 – (Vertebrata) | 2+2 | 4 | Prof.Dr. Linda Grapci Kotorri |
| 6 | E | Plant metabolism under stress conditions | 2+1 | 4 | Prof.Asoc.Dr. Bekim Gashi |
|  | | |  |  |  |
| **Semestri: VI** | | | | |  |
| No | **M/E** | **Course** | **L/E** | **ECTS** | **Lecturer** |
| 1 | E | Ecology | 3+0 | 4 | Prof. Dr. Fadil Millaku |
| 2 | E | Computer practices | 1+2 | 4 | Prof.Ass.Dr. Eliot Bytyqi |
| 3 | E | Cellular and molecular techniques of plant identification | 2+1 | 4 | Prof.Dr. Fadil Millaku |
| 4 | E | Environmental microbiology | 2+1 | 4 | Prof.Dr. Idriz Vehapi |
| 5 | E | Medical plants | 2+1 | 4 | Prof.Dr. Fadil Millaku |
| 6 | E | Tumor biochemistry | 2+1 | 4 | F. of Medicine |

**Course:** Cell Biology (2+2)

**Status of the course:** Mandatory

**Teacher:** Prof. Dr. Kasum Letaj

**ECTS:**  6

**Course description:** In this subject, describes cells, cellular structures, organization and functioning of the molecular mechanisms of cell organelles and mechanisms regulating the cell cycle. Also described is the construction of four basic structures of animal tissues: epithelial, connective, muscular and nervous.

**Course objectives:**

The purpose of this course is that the student during the lectures and exercises expand knowledge about cells, cell structure, molecular organization and function of cell organelles. Also, the student is able to recognize the structure of building four animal organisms based tissue: epithelial, connective, muscular and nervous.

**Expected learning outcomes:**  Upon completion of this course the student will be able to:

* Describe the structure and function of cell and cell organelles as well as the basic organization of chromatin.
* Explains the differences between different types of cells and animal tissues.
* Explores with optical microscopy in cells and animal tissues.
* Distinguishes ultrastructure cells organelles based by electronic micrographs microscopy (recognize the building structure).
* Evaluates research at the cellular tissue level.

**Teaching methodology:** Lectures, discussion, practical work, seminar work.

**Evaluation methods and criteria:**

Final rating represents the sum of:

1. The successful practical work: 25%

2. First intermediary evaluation: 15%

3. Second intermediary evaluation: 20%

4. Regular attendance and involvement in discussions and seminars 10%

5. Final exam with test or oral: 30%

           Total: 100%

**Concretization tools:** Computer, projector, table, laboratory equipped with microscope, centrifuge,

**Relation between the theoretical and practical part of the study:** Relation between the theoretical and practical is 1:1.

**Literature:**

1. Elezaj, I., Letaj, K. (2012): Biologjia qelizore. Universiteti i Prishtinës. Prishtinë. ISBN:978-9951-00-144-1
2. Rexha, T. (2012): Biologjia qelizore dhe molekulare, Shtëpia botuese “Mediaprint”, Tiranë.
3. Alberts, B., Bray, D., Jonson, A., Lewis, J., Raff, M., Roberts, K., Walter, P. (1997): Esential Cell Biology, New York.
4. Alberts, B., Bray, D., Jonson, A., Lewis, J., Raff, M., Roberts, Watson, J. (2016): Molekular Biology of THE CELL. Sixth edition, New York & London.
5. Elsa, K., Çaço, B., Çeka, Xh.(2002): Bazat e histologjisë dhe embriologjisë, Shtëpia Botuese e Librit Universitar, Tiranë.

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution on student load (must correspond with learning outcomes) | | | |
| Activity | Hours | week | Total /hours |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 6/semester | - | 6 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 4/semester | - | 4 |
| Homework | 6/semester | - | 6 |
| Individual time spent studying (at the library or home) | 4 | 15 | 60 |
| Final preparation for the exam | 6/semester | - | 6 |
| Time spent in evaluation (tests, quiz, final exam) | 4/semester | - | 4 |
| Projects, presentations, etc. | 4/semester | - | 4 |
| Total |  |  | 150 |

**Course:** Zoology

**Lecturer:** Prof.Dr.Ferdije Zhushi Etemi

**Statuse of the course:** Mandatory

**ECTS:**  6

**Course description:** In this course students will learn about basic principles of zoology, such as body structure, function, reproduction, phylogeny, systematics and evolutionary development of animal organisms, starting from the most simple Protozoa and Parazoa ( Porifera-spongia), true multicellular invertebrates-Eumetazoa: Cnidaria, Ctenophora, Plathelminthes, Nemertina, Pseudocelomata-Ecdyozoa dhe Lophophozoa, Mollusca, Annelida, Arthropods, Echinodermata and Vertebrate animals (Pisces, Amphibians, Reptilia, Aves and Mammals)

**Course aims**: The aims of this course are to provide students with basic knowledge on the structure (organ systems), systematics, phylogeny, evolutionary development and classification of animal organisms. During the comparative study of characteristic representatives of animal groups, students will understand their structure, function, life cycle, ecology, as well as the differences between them.

In the laboratory exercises students will be trained to use the microscope and adequate literature to identify studied animal species and to demonstrate skills to know their body structure.

In the field work, students will be introduced to the methods for collecting animals, studying and preserving them.

**Expected learning outcomes**: After completing this course (subject), the student will have the following knowledge, skills and abilities:

* + - 1. Understands the principles of body structure and functioning of animal organisms.
      2. Demonstrates knowledge and understanding of Zoology, especially in terms of animal diversity.
      3. Understands the evolutionary development of animal groups and the phylogenetic relationships between them.
      4. Analyzes in a comparative way the body structure and functions (organ systems) of different animals groups.
      5. Understands the hierarchy of classification of animals in taxonomic categories and the application of molecular methods in their determination .
      6. Possesses skills and ability to perform dissections of animals during laboratory exercises.

**Teaching methodology**: lectures (presentations in PP), student presentations; discussions, laboratory and field exercises.

**Evaluation methods**: The evaluation of students from the theoretical part will be done twice during the semester and a final evaluation at the end of it.

First intermediate assessment – ​​test I 20%

Second intermediate assessment – ​​test II 20%

Practical exam 30%

Final exam 30%

total 100%

**Concretization tools**: the following tools will be used during lectures: blackboard, computer, projector, markers), for the laboratory: microscopes will be used (object glasses and coverslips), dissection tools, nets for collecting material in the field and jars with alcohol for animal preservation.

**The ratio between the theoretical part and exercises** is 25:75

**Basic literature**:

1.Hickman Jr, C. Roberts, L. Larson, A. J’Anson, H. Eisenhour, D.2009. Integrated Principles of Zoology, Mc Graw-Hill Science /Higher Education  
2. Matoničkin, I. Klobučar, G. & Kučinić, M. 2010. Opća zoologija. Sveučilište u Zagrebu, 467 str., Školska knjiga, Zagreb.

**Additional literature:**

Matoničkin, I. Primc-Habdija, B. & Habdija, I.1999. Beskralješnjaci, Biologija viših Avertebrata. Školska knjiga, 609 str., Zagreb.

**Literatura bazë** :

1.Hickman Jr, C. Roberts, L. Larson, A. J’Anson, H. Eisenhour, D.2005. Integrated Principles of Zoology,McGraë-HillScience/HigherEducation  
2. Matoničkin, I. Klobučar, G. & Kučinić, M. 2010. Opća zoologija. Sveučilište u Zagrebu, 467 str., Školska knjiga, Zagreb.

**Literatura shtesë:**

Matoničkin, I. Primc-Habdija, B. & Habdija, I.1999. Beskralješnjaci, Biologija viših Avertebrata. Školska knjiga, 609 str., Zagreb.

2.Triplehorn, CH. Johnson, N.2005. Borror and DeLong's Introduction to the Study of Insects, Thomson Brooks/Cole

|  |  |  |  |
| --- | --- | --- | --- |
| **Activity** | **Hours** | **Days/weeks** | **Total** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Practice work | 1 | 15 | 15 |
| Contact with lecturer/consultations | 0.5 | 6 | 3 |
| Field exercises | 1 | 5 | 5 |
| Mid-terms, seminars | 2 | 15 | 30 |
| Homework | 3 | 10 | 30 |
| Individual time spent studying (at the library or home) | 1 | 5 | 5 |
| **Total** |  |  | **150** |

**Course:** General and Inorganic Chemistry

**Professor of subject:** Prof. dr. Avni Berisha (3+2)

**Status of the subject:** Mandatory

**ECTS:** 6

**Subject content:** Some Fundamental Definitions. The States of Matter. The Properties of Matter and Its Changes. The Importance of Energy in the Study of Matter. Some Important SI Units in Chemistry. The Components of Matter. Elements, Compounds, and Mixtures: An Atomic Overview. Dalton’s Atomic Theory. The Observations That Led to the Nuclear Atom Model. The Atomic Theory Today. Elements: A First Look at the Periodic Table. Compounds: Introduction to Bonding. Compounds: Formulas, Names, and Masses. The Mole. Determining the Formula of an Unknown Compound. Empirical Formulas. Molecular Formulas. Chemical Formulas and Molecular Structures; Isomers. Three Major Classes of Chemical Reactions. Solution Concentration and the Role of Water as a Solvent. Precipitation Reactions. Acid-Base Reactions. Oxidation-Reduction (Redox) Reactions. Gases and the Kinetic-Molecular Theory. An Overview of the Physical States of Matter. The Gas Laws and Their Experimental Foundations. Thermochemistry: Energy Flow and Chemical Change. Forms of Energy and Their Interconversion. Calorimetry: Measuring the Heat of a Chemical or Physical Change. Electron Configuration and Chemical Periodicity. Characteristics of Many-Electron Atoms. The Periodic Table. Trends in the Atomic Properties. Models of Chemical Bonding. Atomic Properties and Chemical Bonds. The Ionic Bonding Model. The Covalent Bonding Model. Between the Extremes: Electronegativity and Bond Polarity. An Introduction to Metallic Bonding. The Shapes of Molecules. Intermolecular Forces: Liquids, Solids, and Phase Changes. An Overview of Physical States and Phase Changes. Types of Intermolecular Forces. Properties of the Liquid State. The Uniqueness of Water. The Solid State: Structure, Properties, and Bonding. The Properties of Mixtures: Solutions and Colloids. Types of Solutions: Intermolecular Forces and Solubility. Intermolecular Forces and Biological Macromolecules. Periodic Patterns in the Main-Group Elements. Hydrogen, the Simplest Atom. Trends Across the Periodic Table: The Period 2 Elements. Group 1A(1): The Alkali Metals. Group 2A(2): The Alkaline Earth Metals. Group 3A(13): The Boron Family. Group 4A(14): The Carbon Family. Group 5A(15): The Nitrogen Family. Group 6A(16): The Oxygen Family. Group 7A(17): The Halogens. Group 8A(18): The Noble Gases.

**Goals of the subject:** This course will teach students the fundamentals of general and inorganic chemistry, including: physical and chemical properties of matter, the electronic structure of atoms, types of chemical reactions, chemical bonding, properties of solutions, chemical reactions and chemical equilibrium, thermochemistry, the main-group elements and compounds.

**Expected results:**

After completing this course (course) the student will be able to:

1. Explain and differentiate physical and chemical characteristics of matter, as well as physical and chemical changes in matter.

2. Describe the electronic structure of atoms and the general principles governing electron configuration.

3. Understand different types of chemical reactions, the chemical bonding theories, and intermolecular forces.

4. Comprehend the ideal gas laws.

5. Define and comprehend the colligative properties of solutions

6. Describe chemical reaction rates and chemical equilibrium

7. Describe the characteristics of the main group of the elements and their compounds.

8. Solve simple numerical chemistry problems.

9. Understand the underlying basis and perform typical chemistry laboratory experiments.

**Methodology of teaching:**

The learning strategy is built on students' active participation:

* The professor describes the goals of the class through lectures.
* Key concepts and theories are given through graphic tables and other techniques.
* An interactive lesson will be utilized in combination.
* Through the debate of the problems and concerns highlighted, common conclusions will be reached.
* Group Projects
* Workshops, focus groups, and group presentations
* Additional Activities: Student-led independent study; Results presentation and Seminars

1. Textbooks, articles, maps, charts, projector, work sheets, teacher-prepared materials, and so on.

**Teaching tools/ TI:** Textbooks, articles, graphs, charts, projector, work sheets, teacher-prepared materials, and so on.

**Ratio theory/practice:** 3+2

**Literature**

* Martin Silberberg, Patricia Amateis: Chemistry : the molecular nature of matter and change, 9th edition, McGraw-Hill Education, 2 Penn Plaza, New York. 2021
* The professor's teaching materials and lecture/slides;
* I.Filipovic; S. Lipanovic; Kimia e përgjithshme/ Kimia Inorgaike (kapituj), (përkthim nga Xh. Ahmeti) Prishtinë, 1996.

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 3 | 15 | 45 |
| Theoretical exercises / laboratory | 2 | 15 | 30 |
| tutorial | 1 | 15 | 15 |
| Kontacts with teacher / consultations | 1 | 15 | 15 |
| Field Exercises |  |  |  |
| Colloquiums, seminars | 1 | 15 | 15 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 3 | 15 | 45 |
| Preparation for final exam | 1 | 15 | 15 |
| Time spent on assessment (test, quiz, final exam) | 1 | 2 | 2 |
| Projects, presentations, etc. |  |  |  |
| Total |  |  | 176 |

**Course:** Biostatistics

**Teacher:** Prof. Ass. Dr. Ilir Mazreku

**Status of the course:** Mandatory

**ECTS: 6**

**Description of the course:** Biostatistics (or biometrics) is a scientific discipline that deals with understanding, describing, systematising, correctly analyzing and interpreting the variability of biology, interpreting experiments in agriculture, or in general in biological sciences. So the biostatistics study helps the biologist, the ecologist, the agronomist, the forest or agronomist engineer, the zoo technician, the plant and animal breeder, the geneticist, the systematizer, the doctor, the zooveterinerine etc., to understand the nature of variability in biology. The content of the course includes: introduction to biostatistics, organization and stages of statistical research, probability, combinatorial, graphs, descriptive part of biostatistics, hypothesis control, variance analysis (ANOVA), t-test, correlation and regression.

**Objectives of the course:**

Students acquire basic biostatistics knowledge and their use in practice during their research work in the field of biology.

* To know to use special and general statistical methods
* To be able to make the organization and follow the stages of statistical research.
* To elaborate and comment on the results obtained from the research work.
* To be able to use different statistical programs which are increasingly facilitating scientific research work.

**Learning outcome:** At the end of this course, students will be able to:

* choose the research problem
* collection of statistical notes (source)
* record group statistics, process them and comment on them
* compare statistically data between the same or different events
* calculate the differences through signaling tests (LSD)
* calculate the ANOVA, T-test and F-test.
* be able to work mini projects from biostatistics

**Methodology of teaching:** Lectures in the PP, discussions, laboratory exercises, filed exercises, student presentations, group work

**Evaluation methodology:** Final rating represents the sum of:

* Regular attendance and evaluation of work practices 30%
* Miniprojects 20%
* Final evaluation 50%

**Concrete tools/IT:** Computer, projector, table..

**Relation between the theoretical and practical part:** Relation between the theoretical and practical is 2:2

**Literature:**

* Gerry P.and Michael J.:Experimental Design and Data Analysis for Biologists
* Bekteshi K.:Statistika elementare,2005.Prishtinë.
* Elbasani,B.:Biostatistika, 2005,Tiranë
* Mynyr Koni.:Biostatistika,2008,Tirane
* Hilmi Troni.:Statistika,Prishtine
* Paul Maiste.:Probality and statistics for Bioinformatics and Genetics,The Hopkins University,2006
* Hadzhivukoviç,S.:Statisticki metodi,1990,Novi Sad.
* Cobanovic K.:Primeri za vezbanje iz statistike,1980.Novi Sad.
* Cobanovic K.:Primeri za vezbanje iz statistike,1990.Novi Sad

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution on student load (must correspond with learning outcomes) | | | |
| Activity | Activity | Activity | Activity |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 6/semester | - | 6 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 4/semester | - | 4 |
| Homework | 6/semester | - | 6 |
| Individual time spent studying (at the library or home) | 4 | 15 | 60 |
| Final preparation for the exam | 6/semester | - | 6 |
| Time spent in evaluation (tests, quiz, final exam) | 4/semester | - | 4 |
| Projects, presentations, etc. | 4/semester | - | 4 |
| Total |  |  | 150 |

**Course:** Mathematics for Bilogy

**Teacher:** Prof.Ass.Dr. Kajtaz Bllaca

**Status of the course:** Mandatory

**ECTS: 6**

**Course description:**

This course contains basic mathematics and it enables students to better understand elementary mathematical notions so they can easily apply them to other courses.

This course consists of the following topics: Sets and operations on sets, numerical sets (the set of real numbers). Mapings and their properties (the composition of two mappings and its properties), some characteristc functions. Linear equations (linear inequalities) in one variable, and their applications. Quadratic equation and quadratic mapping; quadratic inequalities and their applications to business and economics. Exponenational mappings, exponentional equations and inequalities and their applications. Logarithms and their properties. Logarithmic functions and their graphs. Logarithmic equations and inequalities and their applications. Plane trigonometry.

**Course goals and expected learning outcomes:**

The main goal of this course is to introduce some basic mathematics to students of first year of study, so they can be able to easily apply these basic mathematical tools to solving real life problems and to other mathematics courses.

At the end of this course the student should be able to:

* **Easily use the mathematics notions from this course to other courses and in solving real life problems.**
* **Apply the notions from this course to convert different economics or financial problems into a mathematical problem (model), solve them mathematically, and economically or financially interpret the obtained solutions.**
* Apply the mathematical tools form this course to analyzing the complexity of a given algorithm.
* Analyze different cases of a given real life problem, so they can find an optimal solution to it.
* Clearly express their mathematical ideas orally and in a written form.

**Teaching methods:**

Lectures, discusssions, tutorials, tests, final exam, homework.

**Assessment:**

Periodic tests,

Homework and seminar work,

Activity,

Final exam.

**Periodic tests**

Two tests, each with maximum points 60; Exams are in writing.

**Homework and seminar work**

There will be two homework problems (which will be evaluated), one in the period before the first test and one before the second test. They will be problems of the same type as those to be done in exercises.

The deadline for submission will be one week. The maximum number of points for each problem is 10 points.

Problems are not mandatory. Those who do not choose will have zero points.

**Activity**

During exercises regularly, and in lectures occasionally will be given problems to solve independently. Students who are successful in solving these problems receive 5 points for each problem.

The maximum number of points that can be collected in this section is 20. With 10 points collected, students will have the option of exemption from the final exam.

**Final exam**

The exam is oral; verifies the understanding of the content discussed in the lectures.

The requirement to enter the final exam is a total of at least 50 points collected in two tests, homework and classroom activities.

The maximum number of points possible to get to the final exam is 40 points.

Students who through classroom activities collect at least 10 points are not required to enter the final exam, but can take grades based on two periodic tests, tasks and classroom activity.

**Improvement Exam**

Improvement of points can be done mostly in one of the tests or the final exam. After the second test, students can choose which test they want to improve their score.

Students who are not satisfied with the outcome of the final exam and who have not been subjected to the corrective test as above may enter the final exam test. This test will be at the same time the final exam for students who have requested an upgrade test in one of the two periodic tests.

**Final grade**

Points will be collected from the first test (max 60 points), the second test (max 60 points), the homework (max 20 points), the classroom activity (max 20 points) and the final exam (max 40 points). (Students who are exempt from the final exam will only collect points from the first four components.

**Grades:**

> 90% 10;

> 80% 9;

> 70% 8;

> 60% 7;

>= 45% 6.

**Literature:**

1. K.H. Bllaca: *Matematika I* (shënimet e ligjëratave).
2. R. Limani: *Kursi i matematikës elementare* (dispencë).

Terry H. Wesner, Harry L. Nustad: *Intermediate Algebra with applications, WCB Group 1991*

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution on student load (must correspond with learning outcomes) | | | |
| Activity | Activity | Activity | Activity |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 3 | 15 | 45 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 6/semester | - | 6 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 4/semester | - | 4 |
| Homework | 6/semester | - | 6 |
| Individual time spent studying (at the library or home) | 3 | 15 | 45 |
| Final preparation for the exam | 6/semester | - | 6 |
| Time spent in evaluation (tests, quiz, final exam) | 4/semester | - | 4 |
| Projects, presentations, etc. | 4/semester | - | 4 |
| Total |  |  | 150 |

**Course**: Botany

**Teacher**: Prof. Dr. Fadil Millaku

**Course status**: Mandatory (M)

**ECTS credits**: 6

**Short Description**:

The subject of Botany offers knowledge related to the anatomical and morphological characteristics of plants, the principles of systematization of plants and the main families of plants.

**Course objectives**: the objective of this course is for students to acquire knowledge of the role of plants in nature, the history and principles of plant classification, the structure of the cell, the anatomical and morphological structure of plant organs, the reproduction and propagation of plants.

**Expected learning outcomes**:

Upon completion of this course, students should be able to:

● Understand the importance of botany to society and daily life,

● Recognise the characteristics common to all plants,

● Describe various classification systems and basic characteristics of plant organisms (based on the binomial naming system),

● Describe the complexity of plant cell structure and function,

● Compare the structure and function of different plant groups,

● Compare different methods of energy production and explain the importance of energy to the well-being of plant life,

● Identify and describe the processes and individual reactions of plants during photosynthesis,

● Identify and describe the processes and individual reactions of plants in fermentation and respiration,

● Apply basic vocabulary of plant anatomy and morphology that helps them understand the development of morphological characteristics of vascular plants,

● Identify a wide range of plants growing in Kosovo,

● use the dichotomous key to identify herbaceous and fresh plants by genus and species,

● Herb and label plant specimens,

● Apply knowledge and skills acquired in the field of botany to scientific research and various projects.

**Teaching methodology**:

Lectures, group work, discussions, field work, herbarium preparation, project and seminar preparation, etc.

**Assessment methods and passing criteria**:

First assessment 20%

Second assessment 20%

Regular follow 5%

Seminar papers 20%

Final exam 35%

total 100%

**Concretization / IT tools**:

Computer, projector, table, outdoor study visits.

**The relationship between the theoretical and practical part of the study**:

The ratio between the theoretical and practical part is 3:0

**Basic literature:**

Miho A, Topuzi L, Marka J. Botanika e përgjithshme. 2015. Tiranë.

**Additional literature:**

Sherifi E. Anatomia dhe morfologjia e bimëve. 2005. Prishtinë.

Millaku F. Praktikum i Botanikës së përgjithshme. 2019. Pejë.

Mauseth J.D. Botany - an introduction to plant biology. 2017. Jones & Bartlet Learning. University of Texas, Austin. USA.

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution to the student's workload | | | |
| Activity | Activity | Activity | Activity |
| Lectures | 3 | 15 | 45 |
| Theoretical/laboratory exercises | 2 | 15 | 30 |
| Practical work | - | - | - |
| Contacts with the teacher/consultations | 1 | 5 | 5 |
| Field exercises | - | - | - |
| Assesment/Seminars | 2 | 2 | 4 |
| Homework | 1 | 10 | 10 |
| The student's independent study time (in the library or at home) | 2 | 15 | 30 |
| Final exam preparation | 2 | 5 | 10 |
| Time spent in assessment (tests, quizzes, final exam) | 2 | 3 | 6 |
| Projects or presentations | 2 | 5 | 10 |
| Total |  |  | **150** |

**Course title:** Physics

**Lecturer:** Prof. Dr.Sefer Avdiaj

**Status of the course:** Mandatory

**ECTS:** 6

**Course description:** This is a basic one-semester physics course for the molecular biology students. Inside the living organisms are many various processes some of which are physical processes. Such processes can be successfully described by the laws of physics. In this course, physical methods are used in the study of biological systems, as well as in the treatment and explanation of current biological problems. Physical methods and techniques are used to study the phenomena that occur in living organisms at all levels of their organization.

Laboratory exercises are mandatory.

**Course objectives:** The course aims to help students:

- Gaining basic knowledge of physics that enables the understanding of the basic

functions of life.

- The physical explanation of phenomena in the plant and animal world such as: blood

flow, plant nutrition, breathing, transport of matter, the process of seeing and hearing,

etc.

- Gaining skills for modeling the complex processes occurring in modern biology by

applying fundamental principles of physics

- To carry out experimental exercises that ensure that the subject of physics is better

understood, but also prepare the student for work and experimental research in biology

**Expected learning outcomes:** Upon passing the course, the student will be able to:

* Introduce and explain concepts that are relevant for the kinematics, including displacement, velocity and acceleration
* Specify and explain Newton's laws of motion.
* Introduce and explain concepts that are relevant for the mechanics, including work, energy, impulse and momentum as well as the elasticity of materials.
* Describe and explain forces and pressures that fluids exert when they are at rest and when they are in motion.
* Introduce and explain concepts that are relevant for temperature and heat.
* Describe and explain the nature of waves.
* Introduce and explain electric forces, electric fields, electric potential energy, magnetic forces, magnetic fields and electromagnetic waves.
* Understand the basic laws of optics.
* Specify and explain elementary particles, radioactivity, and ionizing radiation.
* Investigate experimentally the certain physic phenomena

**Teaching methodology:** Teaching methodology is based on: lectures, laboratory work, consultations, home work, midterm evaluations, discussion, projects, exams, work in group

**Evaluation methods and criteria**:

* First midterm evaluation 20%
* Second midterm evaluation: 20%
* Homework and projects: 10%
* Regular attendance: 5%
* Final exam: 45%
* Total 100%

**Teaching tools:** Blackboard, markers, projector, various lab equipment.

**Relation between the theoretical and practical part of the study:** The course will have 50% theoretical hours and 50% practical hours.

**Literatura**

Qerim Kamberi, Fizika e përgjithshme, Prishtinë, 1998

D. Halliday, R. Resnik, J. Walker, Fundamental of Physics- Sixth Edition, John Willey &Sons Inc,

Paul Davidovits Physics in Biology and Medicine Fourth Edition A. PRESS, 2013

Dr. S. Skenderi, Dr. R. Maliqi, Fizika për studentët e fakulteteve teknike, Prishtinë.

|  |  |  |  |
| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Contact with lecturer/consultations | 1 | 15 | 15 |
| Mid-terms | 1 | 15 | 15 |
| Homework | 1 | 15 | 15 |
| Individual time spent studying (at the library or home) | 2 | 15 | 30 |
| Final preparation for the exam | 4 | 2 | 8 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 3 | 3 |
| Projects, presentations, etc. | 2 | 2 | 4 |
| **Total** |  |  | **150** |

**Course title:** Bacteriology and Virology (3+2)

**Lecturer:** Prof.Dr. Idriz Vehapi

**Status of the course:** Mandatory

**ECTS:** 6

**Short content:**

This subject is about the general morphological and structural properties of viruses, archaea and bacteria, physiology (metabolic processes) and their importance in ecological processes in the environment and biodiversity (their role in the circulation of biogenic elements and energy). Then with the hereditary properties of microorganisms, as well as with the properties of pathogenic microorganisms and their role in causing various diseases.

**Aim and expected learning outcomes:**

The teaching program of the subject Bacteriology and Virology aims to expand knowledge about the morphology, physiology and ecology of microorganisms. Then with the hereditary properties, as well as the pathogenic ones of microorganisms.

**After completing this course, the student will be able to:**

● Describe the structure and function of virus particles and prokaryotic cells.

● To understand the importance of viruses and bacteria in the development of molecular biology.

● To define the ecological importance of viruses, bacteria and archaea in the environment and biodiversity.

● To improve the basics in molecular biology using viral models and bacterial.

● To develop basic skills through laboratory work with viruses and bacteria.

● Development of competencies to understand advanced concepts in molecular biology and advanced courses related to higher education curricula. ● Development of basic laboratory skills of bacteriology and virology, mastering the main methods in the cultivation of bacteria, isolation of pure cultures, measurement of microbial growth and evaluation of their physiological properties, respectively for the growth of viruses.

**Teaching methodology:**

Lecture, interactive lesson with students in groups, discussion, debates, illustrations, drawings, slides, models, etc.

**Evaluation Methods:**

Periodic exam I: 30%

Periodic exam II: 25%

Assignment: 10%

Attendance and activity: 5%

Final exam: 30%

Total: 100%

**Concretization tools:**

Video projector, Graphoscope, illustrations, drawings, slides, models, Microscope, Autoclave, Sterilizer, Vacuum pump, bacteriological needles, test tubes, foodstuffs for the cultivation of microorganisms, tools for sterilization.

Ratio between the theoretical and practical part of the Study: 3+2

**Literature:**

1. Stilinović B., Hrenović J. (2009): Praktikum iz bakteriologije. Kugler, Zagreb, p. 199. Juretić, N., 2002: Osnove biljne virologije, Školska knjiga, Zagreb, 319 str.
2. Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton 2008. Prescott,Harley, and Klein’s Microbiology seven edition, Published by McGraw-Hill, abusiness unit of The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas,New York, NY 10020.
3. Alexander−Strete−Niles: Lab Exercises in Organismal and Molecular Microbiology. The McGraw−Hill Companies, 2003.
4. Carter JB, Saunders VA 2011: Virology - Principles and Applications. John Wiley and Sons, New York.
5. Mujë Plakolli 2001: Mikrobiologjia e përgjithshme, botoi ETMM, Prishtinë.
6. Mujë Plakolli 2001: Praktikum për mikrobiologji, botoi ETMM Prishtinë.

|  |  |  |  |
| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 3 | 15 | 45 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Contact with lecturer/consultations | 1 | 15 | 15 |
| Mid-terms | 1 | 15 | 15 |
| Homework | 1 | 15 | 15 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 4 | 2 | 8 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 3 | 3 |
| Projects, presentations, etc. | 2 | 2 | 4 |
| **Total** |  |  | **150** |

**Subject**: Organic Chemistry

**Teacher:** Prof. dr. Ramiz Hoti (3+2)

**Status of subjects:** Obliguese

**ECTS credit**: 6 ECTS

|  |
| --- |
| **Description:** |
| Organic chemistry studies the composition, properties, and reactions of carbon compounds. Organic compounds are of particular importance for many scientific fields. Firstly, they are carriers of vital processes in living organisms. Also their use for different needs is extremely wide. Most of the products of daily consumption, fuels, food products, medicines, various preparations, plastic masses and many others are of organic composition. As such they find application in medical sciences, pharmacology, agriculture, cosmetics, food technology, construction and many other fields.  **Course content:** During this course the basic concepts of organic chemistry, chemical bonds and structure of organic molecules, properties of carbon compounds, types of isomerism and their characteristic reactions will be treated. This course includes basic knowledge of organic chemistry, classification of organic compounds and treatment of the main classes of carbon compounds, starting from hydrocarbons, organic compounds with oxygen (alcohols, phenols, aldehydes, ketones, carboxylic acids and their derivatives) and vital organic compounds (lipids, terpenes, carbohydrates, amines and amino acids, proteins, nucleic acids, enzymes and vitamins). In particular focus will be the importance of organic compounds for life processes, their use and their impact on the environment.  **Purpose and expected results:** The main focus of this course is the study of the structure of organic compounds and their relationship to their properties. Students should expand and deepen their knowledge of Organic Chemistry taking into account their interest and needs for academic and professional development. They need to know the composition and properties of organic compounds and to understand the laws of changes in these compounds that occur in nature and those obtained synthetically. To develop the student's personality in creating habits and skills for independent experimental work, proper use of chemicals, laboratory equipment and to be educated for the preservation of their health and the environment. Through this course, students will be offered sufficient information on the basics of organic chemistry.  **Course outcome:** It is expected that students will be able to:   * Know the composition and structure of organic compounds. * Understand the various chemical processes and describe organic reactions and their flowing. * Apply the rules for the presentation of formulas, chemical equations and those of naming organic compounds according to the International System "IUPAC". * Identify and classify organic compounds according to their properties and functional groups. * Analyze the composition of organic compounds. * Synthesize organic compounds through chemical reactions. * Assess the importance of organic compounds for the needs of mankind and their impact on environmental pollution.   **Teaching methodology:** Lectures with interactive learning, discussions, projects, individual and group laboratory exercises, seminars.  **Concretization / IT tools:** Projector, table, laboratory equipment, various models and other didactic tools.  **Ratio between the theoretical and practical part of the study:** The ratio between the theoretical and practical part is: 2 + 1 + 2 (Lecture: Seminar works: Labor experiments.)  **Literature**   1. K. P. Vollhard, N. E. Schore, Organic Chemistry, Structure and function (seventh ed.) *H, Freeman and Company,* USA, 2018 2. John McMurry, Organic Chemistry, (Eight ed.) Brooks/Cole Cengage Learning, Canada, Australia, JAPAN, korea, Mexico, Singapore, Spain, United Kingdom, USA, 2012. 3. R. Hoti, Kimia Organike Laboratorike, Universiteti i Prishtinës & Libri shkollor, Prishtinë, 2020.   Additional literature:   1. Francis Carey and Robert Giuliano, Organic Chemistry, (tenth ed.) Mc. Graw Hill Higher Education, Boston, Madison, New York, San Francisco, Lisbon, London, Madrid, Mexico sity, New Delhi, Santiago, Sydney, Taipei, Toronto, 2017. 2. Paula Yurkanis Bruice, Organic Chemistry, (Fourth Ed.), Prentice Hall, 2005. |
| |  |  |  |  | | --- | --- | --- | --- | | **The contribution in student loading time (should correspond with results of students learning**) | | | | | **Activity** | **Hours** | **Days/week** | **Total** | | Lectures | 2 | 15 | 30 | | Practical /lab exercise | 2 | 15 | 30 | | Colloquium, seminars | 1 | 15 | 15 | | Field exercises | - | - | - | | The contact with lecturer/consults | 1 | 15 | 15 | | Homework |  |  |  | | Time of self learning of student (library or home) | 2 | 15 | 30 | | The final preparation for exam | 5 | 5 | 25 | | Time for student evaluation (tests, quiz, final exam) | 1 | 5 | 5 | | Projects, presentations, etc. | - | - |  | | **Totali** |  |  | **150** | |

**Course:** **Course:** Developmental Biology (2+2)

**Status of the course:** Mandatory

**Teacher:** Prof. Dr Kasum Letaj

**ECTS:**  6

**Course description:** This course describes the process of gametogenesis, egg organization, fertilization and various stages of embryonic development in sea urchin, amphioxus, amphibian, reptiles, birds and mammalian.. The mechanisms of organogenesis as well as the role of genes in determining and differentiating cells are also elucidated. The process of growth, metamorphosis and regeneration is also explained.

**Course objectives:**

The purpose of this course is that the student during to deepen knowledge on the basic principles of biology development different systematically categories of animals and understand the molecular mechanisms of the processes that allow this development.

**Course objectives:**

After completion of this course the student will be able to:

1. Describe the basic principles of development biology.
2. To clarify the molecular mechanisms of important processes such as tissue differentiation process (histogenesis) and bodies (organogenesis).
3. Differentiate the different stages of embryonic development within the species as well as within different species.
4. To conduct research in the field of general embryology.

**Teaching methodology:** Lectures, discussion, practical work, seminar work.

**Evaluation methods and criteria:**

Final rating represents the sum of:

1. The successful practical work: 25%

2. First intermediary evaluation: 15%

3. Second intermediary evaluation: 20%

4. Regular attendance and involvement in discussions and seminars 10%

5. Final exam with test or oral: 30%

           Total: 100%

**Concretization tools:** Computer, projector, table, laboratory equipped with microscope.

**Relation between the theoretical and practical part of the study:** Relation between the theoretical and practical is 1:1.

**Literature:**

1. Rexha, T., Hamzaraj, E., Laknori, O. (2003): Biologjia e zhvillimit. Tiranë
2. Gilbert, F. S.( 2010): Developmental biology,Nint edition. USA
3. Wolpert, L. (1998): Principles of development, London, New York
4. Kalthoff, K. (1996) : Analysis of biological development, New York
5. Müller, A. W. (1996): Developmental Biology, Haidelberg, Germany

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution on student load (must correspond with learning outcomes) | | | |
| Activity | Hours | week | Total /hours |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 6/semester | - | 6 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 4/semester | - | 4 |
| Homework | 6/semester | - | 6 |
| Individual time spent studying (at the library or home) | 4 | 15 | 60 |
| Final preparation for the exam | 6/semester | - | 6 |
| Time spent in evaluation (tests, quiz, final exam) | 4/semester | - | 4 |
| Projects, presentations, etc. | 4/semester | - | 4 |
| Total |  |  | 150 |

**Subject**: Human Physiology (2+2)

**Professor of the subject:** Ass.Dr.Driton Vela, dr.sci

**Status of the subject:** Mandatory

**ECTS credits**: 5

**Description of the subject:** This subject deals with the basic knowledge on homeostasis, physiology of subcelular structures, physiology of excitable tissues, physiology of the blood physiology, physiology of the cardiovascular system, physiology of the respiration, physiology of the gastrointestinal system, metabolism and heat exchange, physiology of the endocrine system, physiology of the nervous system, physiology of the senses, integrative functions of the central nervous system.

**Goals of the subject:** Goals of this course are to prepare students regarding the knowledge about the bodily functions from the macroscopis scale to the microscopic one. By combining lectures and lab practise students will be able to create the link between theoretical knowledge and its practical application in understanding the basic concepts in human physiology

**Expected results:** After finishing thos course students will be able to:

* Understand the concept of homeostasis
* Understand the mechanisms of relisation and control of the human bodily functions
* Know life functions that occur in body orogans
* Learn how to directly observe organ function
* Experimentally simulate physiological processeses

**Methodology of teaching:** lectures, lab practise, seminars

**Work tools/IT:** pen, table, projector, computer, Biopac, PhysioEx

**Evaluation methods and pass criteria**: *first evaluation 35%* , *second evaluation 35%, semianrs and activity in lectures 20%, activity in practise 5%, attendance 5%*

**Theory/practise ratio** 2+2

**Literature:**

Fiziologjia e Njeriut nga Artan Shkoza.

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 2 | 15 | 30 |
| Tutorial | 1 | 15 | 15 |
| Field Exercises | - | - | - |
| Contacts with teacher / consultations | 1 | 15 | 15 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 15 | 30 |
| Preparation for final exam | 5 | 5 | 25 |
| Time spent on assessment (test, quiz, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. | - | - |  |
| Total |  |  | 150 |

**Subject:** Analytical Chemistry (3+2)

**Teachers:** Prof. Ass. Dr. Jeton Halili

**Course status:** Mandatory

**ECTS credits:** 6

**Course description:** This course's learning purpose is for students to get familiar with the theoretical underpinnings of: The function of analytical chemistry; an introduction to chemical analysis. errors in chemical analysis. handling and assessing statistical data, gravimetric techniques (characteristics of precipitate and reagents, application of gravimetric methods), chemical equilibrium and the composition of aqueous solutions. volumetric techniques (standard solutions and volumetric calculations), theory of acid-base titrations (solutions and indicators, neutralization curves for strong acids and bases, neutralization curves for weak acids and bases, buffer solutions), volumetric analysis using complexometric titrations and silver nitrate precipitation, redox titrations' fundamental ideas and uses, potentiometric techniques (reference and indicator electrodes, direct potentiometry, potentiometric titrations), introduction to spectrometric techniques (optical spectrometer instruments) Molecular absorption spectrometry (UV-Vis, IR), molecular fluorescence spectroscopy, atomic spectroscopy (absorption and emission), introduction to chromatographic methods, gas chromatography (principles and application). Liquid chromatography (principles and application)

**Course objectives:** The aim of this course is to inform students about the determination of inorganic and organic analytes, their sensitivity and selectivity, the qualitative and quantitative composition of solutions. To create the connection between theoretical knowledge and laboratory actions which are necessary for independent chemical analysis, to be equipped with knowledge which helps in the quick and correct orientation for the practical performance of analytical actions. To develop basic knowledge on the basic principles of instrumental analytical chemistry.

**Learning outcomes:** After completing this course, students will:

* To distinguish between personal, systematic and random errors.
* To implement basic statistical calculations (average, standard deviation, etc.).
* To explain the principles of gravimetric analysis.
* To explain the dissociation of acids and bases, hydrolysis and solubility of salts in aqueous solutions using the corresponding equilibrium constants.
* To calculate the pH of aqueous solutions with different chemical compositions
* To distinguish the equivalent point and the end point of the titration. To determine the primary and secondary standard
* To calculate the amount of an analyte based on the data of gravimetric and volumetric measurements.
* To explain the principles of potentiometric measurements.
* Explain Beer's law and calculate the amount of an analyte based on spectrometric measurements.
* Explain chromatographic methods for analyzing complex samples and interpret chromatograms.

**Teaching methods:** Lectures, numerical exercises, lab exercises,

**Concretization/IT tools:** Pencil, Table, Projector, Computer

**Assessment methods and passing criteria:** First assessment 25%, second assessment 30%, homework

**The relationship between the theoretical and practical part of the study:** 3+2

**Literature:**

* Skoog /West/ Holler, Fundamentals of Analytical Chemistry. Sixth Edition
* Skoog /West/ Nieman, Principles of Instrumental Analyses. Fifth Edition.
* Undergraduate Instrumental Analysis, Seventh Edition Hardcover – July 21, 2014, by [James W. Robinson](http://www.amazon.com/James-W.-Robinson/e/B001KIQ7NU/ref=dp_byline_cont_book_1), [Eileen Skelly Frame](http://www.amazon.com/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Eileen+Skelly+Frame&search-alias=books&text=Eileen+Skelly+Frame&sort=relevancerank), [George M. Frame II](http://www.amazon.com/George-M.-Frame-II/e/B00GDWP6LC/ref=dp_byline_cont_book_3).
* Mustafë R. Bacaj, Kimia Analitike I (KA-I) Prishtnë 2002.

|  |  |  |  |
| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 3 | 15 | 45 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Practice work | - | - | - |
| Contact with lecturer/consultations | 1 | 5 | 5 |
| Field exercises | - | - | - |
| Mid-terms, seminars | 2 | 2 | 4 |
| Homework | 1 | 10 | 10 |
| Individual time spent studying (at the library or home) | 2 | 15 | 30 |
| Final preparation for the exam | 2 | 5 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 3 | 6 |
| Projects, presentations, etc. | 2 | 5 | 10 |
| **Total** |  |  | **150** |

**Subject**: Human Anatomy (2+2)

**Professor of the subject:** Ass.Dr.Driton Vela, dr.sci

**Status of the subject:** Mandatory

**ECTS credits**: 5

**Description of the subject:** This subject deals with the basic knowledge of the structure of the human body, bones, muscles, articulations, hand, leg, thoracic organs, abdominal organs, pelvic organs, head and neck, peripheral nervous system, central nervous system.

**Goals of the subject:** Goals of this course are to prepare students regarding the theoretical and practical knowledge of the structure of the human body and the topographical relationship of the body structures.

**Expected results:** After finishing thos course students will be able to:

* Have proper knowledge regarding the structure of the human body
* To learn the topographical relationships of body structures
* Identifying body structures in human models
* Understand the changes in human body structures in disease

**Methodology of teaching:** lectures, lab practise

**Work tools/IT:** pen, table, projector, computer

**Evaluation methods and pass criteria**: *first evaluation 35%* , *second evaluation 35%, semianrs and activity in lectures 20%, activity in practise 5%, attendance 5%*

**Theory/practise ratio** 2+1

**Literature:**

*Principles of Anatomy and Physiology*. Tortora and Grabowski*.*

*Atlasi anatomisë së njeriut* (i shqipëruar nga Prof.Dr, Sadi Bexheti). Frank H. Netter.

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 1 | 15 | 15 |
| Tutorial | - | - | - |
| Field Exercises | - | - | - |
| Contacts with teacher / consultations | 1 | 15 | 15 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 15 | 30 |
| Preparation for final exam | 5 | 5 | 25 |
| Time spent on assessment (test, quiz, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. | - | - |  |
| Total |  |  | 120 |

**Subject**: Biochemistry (3+2)

**Teacher**: Prof. Dr. Arben Haziri

**Course status**: Mandatory

**ECTS credits**: 6

**Course conten**t: Biochemistry as a life science examines the chemistry of living organisms and the molecular basis of the changes that occur in living cells. Biochemistry has become the basis for understanding all life processes. The subject includes all groups of biomolecules (amino acids, proteins, carbohydrates, lipids), enzymes and metabolism of biomolecules.

**Course objectives**: To provide basic knowledge about the chemical composition of living beings, as well as the structure, properties and functioning of biological molecules such as proteins, carbohydrates and lipids. To become familiar with the mechanisms through which molecules react with each other. This course also offer knowledge about the compounds involved in metabolic processes, as well as the mechanisms of regulation and control of metabolic processes, and give the knowledge about the enzymes that catalyze these reactions.

**Learning outcomes**: After completing this course, the student is expected to be able to:

● Describe the structure and classification of biomolecules;

● Discuss the biological functions of all categories of biomolecules;

● Understand the mechanisms of enzymatic reactions, the factors that affect enzymatic catalysis and be able to classify enzymes;

● To analyze in detail the metabolic pathways of each category of organic compounds (amino acids, proteins, carbohydrates, lipids, nucleic acids);

● To know the relationships between metabolic pathways;

● Understand the mutual adaptation of anabolic and catabolic processes.

**Teaching methodology**: Lectures, discussions, exercises, practical work in the laboratory, consultations, homework, colloquiums, exams.

**Assessment methods and passing criteria**:

Assessment in two colloquiums 30%

Seminar work 10%

Final grade 30%

**Means of concretization/ IT**: Computers, projector, table.

**The ratio between the theoretical and practical part of the study**: The ratio between the theoretical and practical part is 3:2

**Literature**:

Nelson D., Cox M., -Lehninger Principles of Biochemsitry, Freeman, 2008.

Qerimi H., -Biochemistry, University of Prishtina, 2002.

Campbell M., Farrell Sh., -Biochemistry, Thomson Brooks, Cole, 2006.

Voet D., Voet G. J., Pratt W. Ch., -Fundamentals of biochemistry, John Wiley & Sons. Inc., 1999

Blei I., Odian G., - General Organic and Biochemistry, Freeman, 2006.

Martin W. D., Mayes A. P., Rodwell W. V., Granner K. D., -Harperov pregled biohemije, Savremena adminstracija, Belgrade, 2010.

**Volume and quantity of work required: 6 ECTS**

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| --- | --- | --- | --- |
| **Contribution to the student's workload (which must correspond to the student's learning outcomes)** | | | |
| **Activity** | **hours** | **Day/week** | **Total** |
| Lectures | 3 | 15 | 45 |
| Theoretical/laboratory exercises | 2 | 15 | 30 |
| Practical work | - | - | - |
| Contacts with the teacher/consultations | 1 | 5 | 5 |
| Exercises | - | - | - |
| Colloquiums, seminars | 2 | 2 | 4 |
| Homework | 1 | 10 | 10 |
| Student's independent study time (in the library or at home) | 2 | 15 | 30 |
| Final exam preparation | 2 | 5 | 10 |
| Time spent in assessment (tests, quizzes, final exam) | 2 | 3 | 6 |
| Projects, presentations, etc | 2 | 5 | 10 |
| **Total** |  |  | **150** |

**Subject**: Biotests and hematology (2+1)

**Professor of the subject:** Prof.Ass.Shemsedin Sadiku, dr.sci

**Status of the subject:** Elective

**ECTS credits**: 4

**Description of the subject:** This subject deals with the basic knowledge of biotests involved in determining the human physiological status, methods for determining chemical substances in human samples, analysis of blood parameters, physiological role of the blood, tests for hemostasis, immunological components of the blood, hemoglobin and its disturbances, blood group tests and transfusion.

**Goals of the subject:** Goals of this course are to prepare students regarding the theoretical and practical aspects of the analysis of human samples in determining the human health. This course connests this knoweldge in order to understand the relationship between biotests and hematology.

**Expected results:** After finishing thos course students will be able to:

* Understand the importance of determining of the chemical substances in human samples
* Understand the methods for determining the value of chemical substances in human samples
* Understand the role of the blood in the human (patho)physiology
* Learn how to use blood samples for spepcific analysis

**Methodology of teaching:** lectures, lab practise

**Work tools/IT:** pen, table, projector, computer

**Evaluation methods and pass criteria**: *first evaluation 35%* , *second evaluation 35%, semianrs and activity in lectures 20%, activity in practise 5%, attendance 5%*

**Theory/practise ratio** 2+1

**Literature:**

*Medical Physiology.* Walter F. Boron, Emile L. Boulpaep

*Harrisons Principles of Internal Medicine*. JL Jameson, A Fauci, D Kasper, S Hauser, D Longo, J Loscalzo

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 2 | 15 | 30 |
| Tutorial |  |  |  |
| Field Exercises | - | - | - |
| Contacts with teacher / consultations | 1 | 15 | 15 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 15 | 30 |
| Preparation for final exam | 5 | 5 | 25 |
| Time spent on assessment (test, quiz, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. | - | - |  |
| Total |  |  | 135 |

**Course title:** Animal Physiology

**Lecturer:** Kemajl Bislimi

**Status of the course:** Mandatory

**ECTS:** 6

**Course description:** Physiology, definition, branches of physiology, methods, homeostasis, physiological regulation, mutually negative relationship, biological reactions. The digestive system of various groups of animal and human organisms, describing the digestive physiology. Body fluids, hemolymphs, blood, plasma and blood elements as well as their role. Immunity, forms of immunity. Vascular system functions - large and small blood circulation. Respiration and some ecological aspects of respiration. Physiological anatomy of the nervous system physiology of the nervous system. The hormonal intercellular communication, the functional anatomy of the synapse. Excretion and excreting organs. Energy metabolism, direct and indirect calorimetry.

**Course objectives:** -Develop the ability to recognize and understand the processes, functions and physiological manifestations and correctly interpret the mechanisms of homeostasis,   - Expand and deepen the knowledge about the functional morphology of the cell membrane and transmembrane transport of substances in it, the physiological anatomy of the nerve and muscle cell, - to know the physiological terminology, to understand the facts, concepts, principles and physiological methods, as well as the cause-effect relation, - a deeper understanding of the functioning of digestive systems, blood circulation, respiratory, nervous, immune, excreting - develop critical thinking, and skills for collecting and processing relevant scientific physiological data from various sources and skills, to apply the knowledge gained in practice.

**Learning Outcomes**:

* Explain facts, concepts, principles and physiological methods, and describes the regulatory mechanisms of homeostasis
* Examines the different types of body fluids, describes the blood composition and the physiological role of corpuscular elements and blood plasma. It assesses the importance of organs system for circulation of body fluids.
* Explains the cellular and humoral basis of the immune response, distinguishes active immune from passive immunity and specific immunity from non-specific immunity.
* Explains the general physiological concepts for respiration, digestion, excretion, locomotor system, regulatory system (endocrine and nervous) and energy metabolism.
* Distinguishes typesof breathing organs, digestive organs and excreting organs of various systemic groups and also explains the mechanism of their functioning.
* Describes anatomy and physiology of the nerve cells.

**Teaching methodology**: Lectures, discussions, exercises, internships (in groups) in the laboratory, consultations, independent projects, intermediate evaluation, exams.

**Assessment Methods and Criteria:** First evaluation 30%, Second evaluation 30%, Practical work 20%, Other commitments 15% andAttendance 5%

Relationship between the theoretical and practical part of the study: 2 + 2

**Literature:**

* Ethem Ruka, Fiziologjia e gjallesave shtazore,Tiranë, 1999
* Dervish A. Rozhaja, Fiziologjia krahasuese, Prishtinë, 2000
* S.C. Rastogi, Essentials of animal physiology, New Age International Ltd., Publishers, 2007
* Fetah Halili, Fiziologji e përgjithshme, Prishtinë, 1997

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution to the student's workload | | | |
| Activity | Activity | Activity | Activity |
| Lectures | 3 | 15 | 45 |
| Theoretical/laboratory exercises | 2 | 15 | 30 |
| Practical work | - | - | - |
| Contacts with the teacher/consultations | 1 | 5 | 5 |
| Field exercises | - | - | - |
| Assesment/Seminars | 2 | 2 | 4 |
| Homework | 1 | 10 | 10 |
| The student's independent study time (in the library or at home) | 2 | 15 | 30 |
| Final exam preparation | 2 | 5 | 10 |
| Time spent in assessment (tests, quizzes, final exam) | 2 | 3 | 6 |
| Projects or presentations | 2 | 5 | 10 |
| Total |  |  | **150** |

**Course title:** Genetics (3+2)

**Lecturer**: Prof. Dr. Avdulla J. Alija

**Status of the course:** Mandatory

**ECTS:** 6

**Short Description:**

Recent scientific developments make Genetics of an fundamental importance for Biology in general. This course provides the opportunity to understand the principles and concepts of genetics paying particular importance to the laws of inheritance, structure and function of the genes, gene mutations as well as the ethical aspects of genetic research and their applications. As part of the course (in accordance with the objectives of the program) the following aspects are treated too: Mendelian and non-Mendelian inheritance, molecular genetics, cytogenetics, population genetics, quantitative genetics as well as cancer genetics, behavioral genetics, etc.

**Objectives:**

The objectives of this course are: To understand genetic processes at the molecular, cell and population:To analyze the changes in the genetic material and the consequences of these changes in organisms; Develop analytical techniques for gene mapping; To understand the nature of hereditary material as well as the mechanisms of protein synthesis; To understand the nature of quantitative traits; To analyze the genetic predisposition in the appearance of various diseases; To develop the ability to gather, analyze and present the data obtained from genetic experiments.

**Expected learning outcomes:**

After completion of this course the student is expected to have the following knowledge and skills:

* Understands genetic processes at the molecular, cell and population level;
* Describes and analyzes the changes in the genetic material and the consequences of these changes in organisms;
* Uses analytical techniques for gene mapping;
* Understands the nature of quantitative traits;
* Analyses the genetic predisposition in the appearance of various diseases;
* Collects, analyzes and presents data obtained from genetic experiments

**Teaching and learning methodology:**

A lecture and a theoretical exercise (or practical/lab work) per week. The teaching will be organized through interactive forms. Lectures will serve primarily to introduce topics. About one third of class meetings will be used for organized discussions on readings from the primary scientific literature. There will be discussions in the groups, presentations, seminars and homework prepared by students.

**Evaluation methods and criteria:**

Students will be evaluated on the basis of participation in class discussions and occasional written examinations. There will be a final exam too. The assessment will take part in both - practical andtheoretical part. First intermediate assessment 30%; second intermediate assessment 25%; Participation in classes, discussions and seminars 15%; final exam 30%.

**Concretisation tools**

Video beamer and PC is available for the lectures whereas the practical part will be realized in the Genetics lab.

**Relation between theoretical and practical part**

(3+2) 3 lecturing hours and 2 hours of exercise (or practical work) per week

**Literature:**

1. Hoda, A. (2008) Gjenetika ,Tiranë
2. Marinkoviç, D.(1983) Gjenetika ,Prishtinë.
3. Pierce, B.A. (2018) Genetics Essentials: Concept and Connections, New York.
4. Ayala, F. J. and Kiger, J. A., 1984. Modern Genetics. The Benjamin/Cumings Publishing Company, Inc. Menlo Park, California.
5. Griffiths, A. J. F., Miller, J. H., Suzuki, D. T., Lewontin, R. C., Gelbart, W. M., 2000. An Introduction to Genetic Analysis. W.H. Freeman and Company, New York.
6. Russell, P. J., 1998. Genetics. The Benjamin/Cumings Publishing Company, Inc. Menlo Park, California.

|  |  |  |  |
| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **Days/ week** | **Total /hours** |
| Lectures | 3 | 15 | 45/semester |
| Exercise theoretical/laboratory | 2 | 15 | 30/semester |
| Practice work | ////// | ////// | ///////// |
| Contact with lecturer/consultations | 1 | 10 | 10/semester |
| Field exercises | ///// | ////// | ///// |
| Mid-terms, seminars | 2 | 5 | 10/semester |
| Homework | ////// | ////// | 5/semester |
| Individual time spent studying (at the library or home) | ////// | /////// | 40/semester |
| Final preparation for the exam | /////// | ////// | 5/semester |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 3 | 6/semester |
| Projects, presentations, etc. | 2 | 5 | 10/semester |
| **Total** |  |  | **161/semester** |

**Course:** Immunobiology (2+2)

**Professor:** Prof. Ass. Dr. Lulzim Millaku

**Course status:** Mandatory

**ECTS**: 5

**Course description:** Evolution of immunity. Vertebrate immunity. Innate immunity. Adaptive immunity. Antibodies. Interaction of antibodies with antigens. Immunotolerance. Hypersensitivity. Immunodeficiency. Immunity to virus, bacteria, fungi and parasites. Transplantation immunology. Tumors immunology.

**Course goals:** The purpose of this course is the acquisition of new scientific knowledge on the role of the immune system in maintaining homeostasis’s entire body by the action of antigens, organization and functioning of the immune system of invertebrates and vertebrates. Special emphasis is given cellular (cell protection) and molecular (humoral protection) mechanisms innate and adaptive immunity, respectively immunity reaction (primary and secondary) and the genetic basis of this reaction.

**Expected teaching results:** After completion of this course the student will be able to:

* The role of the immune system homeostasis's ​​entire body by the action of antigens.
* Organization and function of the immune system of invertebrates and vertebrates.
* Cellular and molecular mechanisms of innate and adaptive immunity, immune reaction and genetic basis of this reaction

**Teaching methodology:** Lectures, practical and theoretical exercises, consultations, independent projects, homework, colloquiums, exams.

**Evaluation methods and criteria:**

• Participation in lectures and exercises 10%

• Exam 40%

• Colloquium I 30%

• Colloquium II 20%

**Teaching devices/TI:** Computers, Video Projector.

**Report between practical and theoretical part:** Report between theoretical and practical part is 2+2

**Literature:**

* [K. Murphy](https://www.amazon.com/Kenneth-Murphy/e/B004XILZ22/ref=dp_byline_cont_book_1), [C. Weaver](https://www.amazon.com/Casey-Weaver/e/B07BZXYDTY/ref=dp_byline_cont_book_2). (2016). Janeway's Immunobiology. 9th. Edition. Garland Science.
* Roitt, Ivan, Brustoff, Jonathan, Male, David (2001): Immunology. 6th ed. Mosby, Edinburgh, UK.
* Klein Jan (1990): Immunology. Blackwell Scientific Publications . Boston, Oxford, ondon, Edinburggh , Melbourne.
* Lika (Çekani) Mirela, Bërxholi Kristaq (2010): Imunologjia. Shtëpia Botuese e Librit Universitar, Tiranë.

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | *2* | *15* | *30* |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | *2* | *5* | *10* |
| Field exercises |  |  |  |
| Mid-terms, seminars | *2* | *5* | *10* |
| Homework | *2* | *5* | *10* |
| Individual time spent studying (at the library or home) | *2* | *15* | *30* |
| Final preparation for the exam | *2* | *5* | *10* |
| Time spent in evaluation (tests, quiz, final exam) | *2* | *5* | *10* |
| Projects, presentations, etc. | *2* | *5* | *10* |
| Total |  |  | 150 |

**Course title:** Plant physiology (3+2)

**Lecturer**: Prof. Asoc. Dr. Bekim Gashi

**Status of the course:** Mandatory

**ECTS:** 6

**Content of the course:** Introduction to plant physiology. Plant cell - function of membranes, plastids, cell wall, microbodies, vacuoles and cytoskeleton. Water and plant cells - water absorption, movement and loss. Mineral nutrition - essential nutrients. Photosynthesis - organisation of photosynthetic apparatus, photochemical reactions. The Calvin cycle and its regulation. Photorespiration. C3, C4 and CAM plants.  Physiological and ecological aspects of photosynthesis. Respiration process in plant. Growth, differentiation and development. Plant signalling. Secondary metabolism in plants, plant defense mechanisms.  Effects of light on plant growth and development. Control of flowering.  Stress physiology. Physiology of movement.

**Course objective:** The goals of this course are to: studying physical processes of individual plant cells, tissues, organs and whole plant. Understanding regulation mechanisms of physiological and metabolic processes as well as plant responses to variations in the environmental conditions.

**Learning outcomes:** The successful completion of this course will enable students to:

* Explain terms and concepts in plant physiology with appropriate interpretation.
* Explain principles and processes relevant for functioning of plant cell and whole plants.
* Analyze correlations between structure and function at cell and plant level.
* Use plant material, laboratory equipment and methods applied in plant physiology.
* Perform laboratory experiments related to plant physiology.
* Analyze results of experiments to come to the relevant conclusions.
* Apply practical skills in solving problems in plant physiology.

**Teaching and learning methods:** During the course implementation will be used different teaching methods such: presentations, group work and interactive discussion, seminars, lab work, etc.

**Evaluation methods and criteria:** Students evaluation is made by giving the percentages of participation of each evaluation during exercises in final evaluation. First evaluation: 20%, Second evaluation: 20%, Homework and other engagements 10%, Regular attendance 5%, Final exam 45%. Total 100%.

**Teaching tools/IT:** Computer, projector, microscopes, different instruments of lab equipment.

**Relation between the theoretical and practical part of the study:** The students load for this course is 3 theoretical and 2 practical hour per week.

**Main Literature:**

1. Lincoln Taiz, Eduardo Zeiger, Ian M. Moller and Angus Murphy: Fiziologjia dhe zhvillimi i bimëve, 6th edition (in Albanian). Oxford University Press, 2014.
2. Bekim Gashi: Praktikum i Fiziologjisë së bimëve (dispensë), 2015.

|  |  |  |  |
| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Activity** | **Activity** | **Activity** |
| Lectures | 3 | 15 | 45 |
| Exercise theoretical/laboratory | 2 | 15 | 30 |
| Practice work | 5 | 1 | 5 |
| Contact with lecturer/consultations | 1 | 5 | 5 |
| Field exercises | / | / | / |
| Mid-terms, seminars | 2 | 2 | 4 |
| Homework | / | / | / |
| Individual time spent studying (at the library or home) | 2 | 15 | 30 |
| Final preparation for the exam | 2.5 | 10 | 25 |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 3 | 6 |
| Projects, presentations, etc. | / | / | / |
| **Total** |  |  | **150** |

**Subject**: Medical Biochemistry (2+2)

**Professor of the subject:** Prof.Assoc.Dr.Valdete Topçiu, dr.sci

**Status of the subject:** Mandatory

**ECTS credits**: 6

**Description of the subject:** This subject deals with the basic knowledge of the molecular structure of the human cells, physiological role of the human cells, interactions between molecules in maintaining cell function, main metabolic pathways, enzime activity.

**Goals of the subject:** Goals of this course are to prepare students regarding the theoretical and practical aspects of cellular molecules, molecular interactions and their improtance in normal functioning of the human cells.

**Expected results:** After finishing thos course students will be able to:

* Understand the biochemical realctions in cells
* Understand the processes which regulate biochemical reactions in human cells
* Understand the links between cellular molecules and their disturbance in human diseases
* Learn experimental methods used in medical biochemistry

**Methodology of teaching:** lectures, lab practise, seminars

**Work tools/IT:** pen, table, projector, computer

**Evaluation methods and pass criteria**: *first evaluation 35%* , *second evaluation 35%, semianrs and activity in lectures 20%, activity in practise 5%, attendance 5%*

**Theory/practise ratio** 2+2

**Literature:**

Lehninger Principles of Biochemistry. DL Nelson, MM Cox.

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 1 | 15 | 15 |
| Tutorial | 1 | 15 | 15 |
| Field Exercises | - | - | - |
| Contacts with teacher / consultations | 1 | 15 | 15 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 15 | 30 |
| Preparation for final exam | 5 | 5 | 25 |
| Time spent on assessment (test, quiz, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. | - | - |  |
| Total |  |  | 150 |

**Course:** Biological evolution (2+0+2)

**Status of the course:** Mandatory

**Teacher:** Prof. Dr. Kasum Letaj

**ECTS:**  6

**Course description:**

In this subject are described: theories, arguments and factors of biological evolution, speciation and the formation of high taxonomic units (macroevolution). It will also be described: the pathways of evolution, molecular evolution, and the biological origin and evolution of man.

**Course objectives:** The purpose of the course is that students during the lectures will recognize the theories, the arguments, the factors and the routes of evolution, as well as the process of speciation and the formation of high taxonomic units. Likewise, students will be familiarizing with the elementary (time and space) changes of organisms under current conditions and the influence of a variety of environmental conditions.

**Course objectives:** Upon completion of this course lectures, the students will be able to:

* Understand the theories of historical evolution of life beings.
* Explain the variability of life beings as result of relations between the individuals of same populations.
* Analyze the factors that brought to biological evolution and creation of new species.
* Build concepts for biological evolution
* Assess the impact of changes of genetics in the appearance of new species.

**Teaching methodology:** Lectures, discussion, seminar work.

**Evaluation methods and criteria:**

Final rating represents the sum of:

First intermediary evaluation: 25%

Second intermediary evaluation: 25%

Regular attendance and involvement in discussions and seminars 20%

Final exam with test or oral: 30%

Total: 100%

**Concretization tools:** Computer, projector, table, laboratory equipped with microscope, centrifuge.

**Relation between the theoretical and practical part of the study:** Relation between the theoretical and practical is 2:0.

**Literature:**

1. *Zyri Bajrami, Mynyr Koni: Teoria e evolucionit. Tiranë 2000*
2. Mark Ridley: Evolution, thirr edition, 2004, Blackwell Publishing.
3. Roger Lewin and Robert A. Foley: Principles of Human Evolution, second edition, 2004, Blackwell Publishing.

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution on student load (must correspond with learning outcomes) | | | |
| Activity | Hours | Week | Total /hours |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | - | - | - |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 8/semester | - | 8 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 15 | 30 |
| Home works | 6/semester | - | 6 |
| The time required for individual studies (at the library or home) | 4 | 15 | 60 |
| Final preparation for the exam | 6/semester | - | 6 |
| Time spent during the evaluation (tests, quiz, final exam) | 4/semester | - | 4 |
| Projects, presentations, etc.. | 6/semester | - | 6 |
| Total |  |  | 150 |

**Course:** Molecular Genetics (2+2**)**

**Lecturer:** Prof. dr. Avdulla Alija

**Course status:** Mandatory

**ECTS: 6**

**Short description:**

Molecular Genetics addresses the structure, function, and regulation of the molecules involved in heredity - DNA, RNA, and proteins. A large weight is given to the molecular mechanisms of gene action in prokaryotes and eukaryotes, including discussions of chromosome structure and replication, mutagenesis and DNA repair, recombination mechanisms, transposition, transcriptions, and translation controls. Genetic applications and issues including genetic engineering, biotechnology as well as numerous molecular techniques including DNA purification, PCR and gene cloning will be discussed too.

**Objectives:**

To provide an in-depth study of advanced topics in genetics and to ensure that students have a broad base of knowledge in the molecular genetics of prokaryotic, eukaryotic, and viral genetic systems. To learn and apply modern approaches of the Molecular Genetics.

**Expected learning outcomes:**

After completion of this course the student is expected to have the following knowledge and skills:

* Describes the structure, formation and function of DNA, RNA and proteins;
* Understands concepts and mechanisms of molecular genetics, as well experimental approaches used in contemporary molecular genetics research;
* Utilizes the main experimental approaches in Molecular Genetics research;
* Analyzes and interprets the Molecular Genetics data;
* Formulates hypotheses derived from Molecular Genetics studies.

**Teaching and Learning methodology:**

The teaching will be organized through interactive forms. The topics in advanced molecular genetics will be introduced through lectures reading and discussion of selected research papers from the primary literature. Lectures will serve primarily to introduce topics. There will be discussions in the groups, presentations, seminars and homework prepared by students.

**Assessment methods and criteria:**

Students will be evaluated on the basis of participation in class discussions and occasional written examinations. There will be a final exam too. The assessment will take part in both - practical and theoretical part. First intermediate assessment 30%; second intermediate assessment 25%; Participation in classes, discussions and seminars 15%; final exam 30%.

**Concretization tools:** Video beamer and PC is available for the lectures whereas the practical part will be realized in the Genetics lab.

**Ratio between theoretical and practical part: 50:50** (2+2) 2 lecturing hours and 2 hours of exercise (or practical work) per week

**Literature:**

1. Krebs, J. E, Goldstein, E. S. and Kilpatrick, S. T.2018. Lewin’s genes XII . Jones & Bartlett Learning.
2. Alberts, B., Johnoson A.D., Lewis, J., Morgan, D. Raff, M., Roberts, K. and Walter, P. 2014. Molecular Biology of the Cell. W. W. Norton & Company; Sixth edition.
3. Singer, M. and Berg, P. 1996. Genes and Genomes – a changing perspective. University Science Books. Mill Valley, California.
4. Watson, J. D., Hopkins, N. H., Roberts, J. H., Steitz, J. A., &Weiner, A. M. 1987. Molecular Biology of the Gene. The Benjamin/Cumings Publishing Company, Inc. Menlo Park, California

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **Days/ week** | **Total /hours** |
| Lectures | 2 | 15 | 30/semester |
| Exercise theoretical/laboratory | 2 | 15 | 30/semester |
| Practice work | ////// | ////// | ///////// |
| Contact with lecturer/consultations | 1 | 10 | 10/semester |
| Field exercises | ///// | ////// | ///// |
| Mid-terms, seminars | 2 | 2 | 4/semester |
| Homework | ////// | ////// | 10/semester |
| Individual time spent studying (at the library or home) | ////// | /////// | 15/semester |
| Final preparation for the exam | /////// | ////// | 20/semester |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 3 | 6/semester |
| Projects, presentations, etc. | 2 | 5 | 10/semester |
| **Total** |  |  | **135/semester** |

**Course:** Animal and Plant Cell Culture (2+1+1)

**Teacher:** Prof. Dr. Kasum Letaj & Prof.Asoc.Bekim Gashi

**Course status:** Mandatory

**ECTS: 6**

**Content of the course:** Animal cell culture: basic composition of cell culture media and culture conditions. Primary cell culture. Methods of quantitation and characterisations of the cells. Growth curves and measurement of cell survival. Methods of cell growth synchronisation. Cell fusion and differentiation in the culture. Plant cell culture: Technical laboratory demands for in vitro cultures. Conditions for optimal donor plant growth. Media preparations. Phytohormones: groups, influence in tissue culture and their effects. Protoplast culture. Plant cell technology. Cell and tissue culture. Micropropagation.

**Course objective:** This course provides ungraduated-level knowledge of in animal and plant cell culture theory and practice. This course will develop the capabilities of knowledge ability, comprehension and applications of plants and animal in cell culture systems, and how cell and tissue culture contributes to global sustainability. It will also develop the practical skills of students to successfully culture plant and animal cells.

**Learning outcomes:** The successful completion of this course will enable students to:

* to analyse the growth conditions in the animal cell kulture
* to correlate the basic techniques and processes in the cell culture with the knowledge of cell biology
* to apply the techniques of cell culture establishment and cell manipulation in the culture
* to interpret and make conclusions about the data obtained by the experimental work during practical exercises
* to explain the regulating mechanisms in cell processes: regulation of cell cycle, signalling, senescence, apoptosis and connect them with the use of practical techniques in cell culture
* Explain the various components of plant tissue culture media, e.g. minerals, growth factors, hormones, and what governs the choice of components,

**Teaching and learning methods:** During the course implementation will be used different teaching methods such: presentations, group work and interactive discussion, seminars, lab work, etc.

**Evaluation methods and criteria:** Students evaluation is made by giving the percentages of participation of each evaluation during exercises in final evaluation. First evaluation: 20%, Second evaluation: 20%, Homework and other engagements 10%, Regular attendance 5%, Final exam 45%. Total 100%.

**Teaching tools/IT:** Computer, projector, microscopes, different instruments of lab equipment.

**Relation between the theoretical and practical part of the study:** The students load for this course is 2 theoretical and 2 practical hour per week.

**Main Literature:**

1. Masters J. R. W. (2000): Animal cell culture 3. iz. Oxford University Press, Oxford.
2. Butler M (2004): Animal cell culture & technology, 2. iz. Bios Scientific Publishers, London i New York.
3. Valbona Sota dhe Efigjeni Kongjika: Kulturat Bimore Indore dhe Qelizore. Universiteti i Tiranës, Tiranë, Albania, 2013.
4. Selected publications (original scientific papers and review papers) in the field of cell culture.

**Main literature:**

1. Masters J. R. W. (2000): Animal cell culture 3. iz. Oxford University Press, Oxford.
2. Butler M (2004): Animal cell culture & technology, 2. iz. Bios Scientific Publishers, London & New York.
3. Valbona Sota dhe Efigjeni Kongjika: Kulturat Bimore Indore dhe Qelizore. Universiteti i Tiranës, Tiranë, Albania, 2013.

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| --- | --- | --- | --- |
| Contribution to the student's workload | | | |
| Activity | Activity | Activity | Activity |
| Lectures | 3 | 15 | 45 |
| Theoretical/laboratory exercises | 2 | 15 | 30 |
| Practical work | - | - | - |
| Contacts with the teacher/consultations | 1 | 5 | 5 |
| Field exercises | - | - | - |
| Assesment/Seminars | 2 | 2 | 4 |
| Homework | 1 | 10 | 10 |
| The student's independent study time (in the library or at home) | 2 | 15 | 30 |
| Final exam preparation | 2 | 5 | 10 |
| Time spent in assessment (tests, quizzes, final exam) | 2 | 3 | 6 |
| Projects or presentations | 2 | 5 | 10 |
| Total |  |  | **150** |

**Title of subject:** Bioinformatics

**Professor of subject:** Prof.Ass.Dr. Eliot Bytyqi &Ass.Dr. Naim Berisha

**Status of the subject:** Elective

**ECTS:** 4

**Short description:** This course is designed to introduce the most important fundamental concepts, methods and tools used in Bioinformatics. Topics include databases in bioinformatics, nucleic acid and protein sequence and structure, protein structure prediction, protein folding, protein-protein interactions. Emphasis will be placed on understanding and utilizing these concepts and algorithms.

**Goals of the subject:** The course aims to provide students with theoretical and practical knowledge about bioinformatics. Techniques and applications of bioinformatics in molecular-biological and biochemical research are given. The objective is to help students quickly reach the frontier of bioinformatics and be able to use bioinformatics tools to solve problems in their research.

**Expected results:** After completing this course, the student will be able to:

● Use and develop tools to compare and analyze biological data.

● Apply the methodologies used for database searching, and determine the accuracy of database searching.

● Designs, implements, and evaluates computer-based systems, processes, components, or programs related to molecular biology research contexts.

● Analyzes and evaluates bioinformatics data to discover patterns, critically evaluate conclusions, and generate predictions for subsequent experiments.

● Evaluates research methodology in the context of bioinformatic analysis of DNA and protein sequence data.

● Demonstrate the ability to obtain quantitative results from mathematical and statistical models through analytical and computational methods.

**Methodology of teaching:** Lectures, discussions, practical work, seminar work

**Evaluation Methods:**

● Successful practical work: 25%

● First intermediate assessment; 15%

● Second intermediate assessment: 20%

● Regular attendance and engagement in discussions and seminars 10%

● Final exam with test or oral: 30%

Total: 100%

**Means of concretization:** Pen, table, projector, and computer.

**Rapport between theoretical and practical part:** 2:1

**Literature:**

1. Arthur M. Lesk, Introduction to Bioinformatics Oxford University Press.v

2. Ignacimuthu SJ . Basic Bioinformatics Narosa Publishing House.

3. Yadav Neelam. A Hand Book of Bioinformatics. Anmal Publications Pvt.Ltd.

4. Kraëetz. Stephen A. Introduction to Bioinformatics: A Theoretical and Practical Approach, Humana Press

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| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 1 | 15 | 15 |
| tutorial |  |  |  |
| Kontacts with teacher / consultations | 6/semester | - | 6 |
| Field Exercises |  |  |  |
| Colloquiums, seminars | 4/semester | - | 4 |
| Homework | 6/semester | - | 6 |
| Self study time student (at the library or at home) | 1 | 15 | 15 |
| Preparation for final exam | 1 | 15 | 15 |
| Time spent on assessment (test, quiz, final exam) | - | - | - |
| Projects, presentations, etc. | 4/semester | - | 4 |
| Total |  |  | **95** |

**Subject**: Human Endocrinology (2+1)

**Professor of the subject:** Ass.Dr.Merita Emini-Sadiku, dr.sci

**Status of the subject:** Elective

**ECTS credits**: 4

**Description of the subject:** This subject deals with the basic knowledge of the hormones and their structure, endocrine glands and their products, pituitary hormones, pineal gland, thyroid and parathyroid glands, hormones of the digestive system, hormones of the respiratory system, hormones of the cardiovascular system, hormones of the urinary system, hormones of the reproductive organs.

**Goals of the subject:** Goals of this course are to prepare students regarding the theoretical and practical knowledge of the endocrine glands, physiological role of the hormones, detecting hormones in body tissue samples.

**Expected results:** After finishing thos course students will be able to:

* Have proper knowledge regarding the structure of the endrocrine glands
* Learn the imapct of hormones in human physiology
* Learn methods for detecting hormones
* Understand the role of hormones as therapeutical drugs

**Methodology of teaching:** lectures, lab practise

**Work tools/IT:** pen, table, projector, computer

**Evaluation methods and pass criteria**: *first evaluation 35%* , *second evaluation 35%, semianrs and activity in lectures 20%, activity in practise 5%, attendance 5%*

**Theory/practise ratio** 2+1

**Literature:**

Fiziologjia e Njeriut nga Artan Shkoza.

*Medical Physiology*. Walter Boron, Emile L Boulpaep.

*Harrisons Principles of Internal Medicine*. JL Jameson, A Fauci, D Kasper, S Hauser, D Longo, J Loscalzo

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 1 | 15 | 15 |
| Tutorial | - | - | - |
| Field Exercises | - | - | - |
| Contacts with teacher / consultations | 1 | 15 | 15 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 15 | 30 |
| Preparation for final exam | 5 | 5 | 25 |
| Time spent on assessment (test, quiz, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. | - | - |  |
| Total |  |  | 120 |

**Course:** Histology and histochemistry (2+1)

**Professor:** Prof. Ass. Dr. Lulzim Millaku

**Course status:** Elective

**ECTS**: 4

**Course description:** The Histology and Histochemistry subject program serves students for a complete and scientifically based training in bachelor studies in the field of molecular biology. Through this course, students will get to know the cells and tissues of organisms better using different microscopic techniques. Special emphasis will be given to the structure-function relationship in different tissues and organs and the role of stem cells in tissue regeneration.

**Course goals:** The general concepts given in this course provide students with theoretical and practical knowledge of the technology of preparing cyto-histological preparations for more in-depth studies, both at the tissue and cellular level.

**Expected teaching results:** After completion of this course the student will be able to:

* to understand how cells join together to perform functions for which they are specialized.
* how organized groups of cells (tissues) are arranged to form the organ systems of the body.
* recognize and interpret microscopic images of tissues.

**Teaching methodology:** Lectures, practical and theoretical exercises, consultations, independent projects, homework, colloquiums, exams.

**Evaluation methods and criteria:**

• Participation in lectures and exercises 10%

• Exam 40%

• Colloquium I 30%

• Colloquium II 20%

**Teaching devices/TI:** Computers, Video Projector.

**Report between practical and theoretical part:** Report between theoretical and practical part is 2+1

**Literature:**

* M. Ross, P. Wojciech. 2015. [Histology: A Text and Atlas, with Correlated Cell and Molecular Biology, 7th Edition](https://www.amazon.com/Histology-Atlas-Correlated-Molecular-Biology/dp/0781772001/ref=sr_1_1?qid=1666905609&refinements=p_27%3A+Wojciech%5CcM.D.+Pawlina&s=books&sr=1-1&text=M.D.+Pawlina%2C+Wojciech). Lippincott Williams & Wilkins.
* B. Young et al. *2014.* Wheater's Functional Histology, 6th ed.*,* Elsevier.

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 2 | 5 | 10 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 5 | 10 |
| Homework | 2 | 5 | 10 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 2 | 5 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 5 | 10 |
| Projects, presentations, etc. | 2 | 5 | 10 |
| Total |  |  | 120 |

**Subject:** Laboratory Methods (2+1)

**Teachers:** Prof.Ass.Dr. Jeton Halili

**Course status:** Elective

**ECTS:** 4

**Course description:** Subject objectives, experimentation strategy, chemical laboratory settings, standard equipment, and general work guidelines. Securing procedures in the lab. The significance of cleaning lab equipment and glassware, washing techniques. Measuring temperature, the volume of liquids, the mass of solids, laboratory heating and cooling, mixing, trapping gases, gathering gaseous products, and solvent evaporation. Centrifugation. filtration and crystallization. Distillation and fractional distillation, sublimation. Chromatographic techniques: column chromatography, thin layer chromatography, paper chromatography, gas and liquid chromatography.

**Course objectives:** The use of numerous laboratory techniques is necessary for experimental study in the field of chemistry. To successfully solve the difficulties stated, a variety of actions are taken while conducting experiments that involve the application of laboratory procedures. Many scientific and research sectors, including medical, pharmaceutical, agricultural sciences, etc., constantly require the chemical analysis of various materials. Permanent laboratory research, which calls for the use of laboratory procedures from the preparation of samples through the extraction of final results, can help to realize these objectives. The objective of this course is to prepare students for their experimental mastery in the most professional manner while also providing them with sufficient knowledge of the fundamental procedures used in chemistry and biology laboratories.

**Learning outcomes:** After completing this course, students will:

* To be familiar with the working procedures and equipment in the chemistry lab.
* Recognize the fundamental ideas behind laboratory procedures.
* Employ the necessary experimental approaches for product purification and component separation.
* To group laboratory methods based on the use they are put to.
* To assess the value of laboratory methods for resolving issues that arise during analysis and synthesis
* Use laboratory equipment correctly
* Execute fundamental laboratory processes
* Concisely and clearly record laboratory experimental results.

**Teaching methods:** Lectures, numerical exercises, lab exercises,

**Concretization/IT tools:** Pencil, Table, Projector, Computer

**Assessment methods and passing criteria:** First assessment 20%, second assessment 20%, Final exam (written and oral): 50%.

**The relationship between the theoretical and practical part of the study:** 2+1

**Literature:**

* Introduction to General, Organic, and Biochemistry in the Laboratory 10th Edition by Morris Hein (Author), Judith N. Peisen (Author), James M. Ritchey (Author) 2011
* Frederick. A Bettelheim, Joseph M. Landsberg, Laboratory Experiments for General, Organic and Biochemistry (fourth Ed.) Paperback, Wadsëorth Publishing Company; 5th edition (June 2003)
* Biochemistry Laboratory: Modern Theory and Techniques, 2nd Edition. 2012

|  |  |  |  |
| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 0 | 5 | 5 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 2 | 4 |
| Homework |  |  |  |
| Individual time spent studying (at the library or home) | 2 | 15 | 30 |
| Final preparation for the exam | 1 | 8 | 8 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 8 | 8 |
| Projects, presentations, etc. |  |  |  |
| **Total** |  |  | **100** |

**Subject:** Laboratory animals in molecular biology research (2+1)

**Teacher:** Prof. Ass. Dr. Ilir Mazreku

**Course status:** Elective

**ECTS:** 4

**Course description:**

- Defining the basic notions and rules of work, research methods and models as two of the central points in biological science experiments. The importance of laboratory research and research methodology, trying to implement the newest methodologies. The equipment that must be used in the laboratory, which must be more and more precise. Acquaintance of students and other accompanying personnel with the basic rules of work in the laboratory. Information about vivarium and care for laboratory animals. Knowledge of experimental models of plants or laboratory animals. To be familiar with the term extrapolation and the possibility of extrapolating results from animal models to humans. Ethics of working with laboratory animals. Caring before, during and after the experiment.

Course goals: Development of theoretical and practical knowledge about the central processes in the biological sciences, which are the research model and the experiment. Recognize animal species that are suitable for experimentation and that can be extrapolated to human diseases. To develop critical thinking that experiment is the surest way to achieve acceptable results. Develop skills to recognize the risks that can occur in laboratories and vivariums, as well as the ways to avoid these risks. Gain skills to apply the acquired knowledge in practice.

**Expected learning outcomes:**

- Explains the research methodologies in the experiment

- Recognizes and counts the steps of experimental phases

- Lists the animal species used as research models

- Discusses ethical and moral aspects when using live animal models in research

- Argues the advantages and disadvantages of different animal models in specific scientific research

**Teaching methodology:** Lectures, discussions, exercises, practical work (in groups) in the laboratory, consultations, independent projects, colloquiums, exams.

**Assessment methods and passing criteria:** First assessment 40%, Second assessment 40%, Practical part and other commitments 15%, Regular attendance 5%.

**Concretization/IT tools:** computers, video projector, tools and equipment for experimental work in the laboratory, visits to laboratories/vivariums of research-scientific institutions, etc.

**The ratio between the theoretical and practical part of the study: 2+2**

**Literatura**-Laboratory Safety Manual, Environmental Health and Safety Department, University of Washington 2017

-General laboratory safety training, University of Southern Maine

-[America's Lab Report](https://www.nap.edu/read/11311) Investigations in High School Science, Susan R. Singer, Margaret L. Hilton, and Heidi A. Schweingruber,  2006.

-Laboratory animal, Facilities & operations , Hilton J. Kleins , Planning and Designing Research Animal Facilities Jack R. Hessler and Noel D.M. Lehner , 2009  
-Laboratory Safety Rules and Regulations, Advanced Instructional Systems, Inc. and George Wahl and Maria Gallardo-Williams, 2011

-Fiziologjia eksperimentale, Fetah Halili, dispence, 2004

-National Competent Authorities for the implementation of Directive 2010/63/EU on the pr otection of animals used for scientific purposes, 2014.

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| --- | --- | --- | --- |
| Contribution to the student's workload | | | |
| Activity | Activity | Activity | Activity |
| Lectures | 2 | 15 | 30 |
| Theoretical/laboratory exercises | 1 | 15 | 15 |
| Practical work | - | - | - |
| Contacts with the teacher/consultations |  | 5 | 5 |
| Field exercises | - |  | - |
| Assesment/Seminars | 4 | - | 4 |
| Homework | - | - |  |
| The student's independent study time (in the library or at home) | 2 | 15 | 30 |
| Final exam preparation | 8 | - | 8 |
| Time spent in assessment (tests, quizzes, final exam) | 2 | 2 | 4 |
| Projects or presentations | 2 | 2 | 4 |
| Total |  |  | **100** |

**Course**: Research methods of nucleic acids and proteins (2+1)

**Lecturer:** Prof.Ass.Dr. Ilir Mazreku

**Status of the course:** Elective

**ECTS kredi**: 4

**Short Description:**

After successfully completing this course, students will have a theoretical and practical understanding of basic research techniques on nucleic acids and proteins, will be able to connect theoretical knowledge of biochemistry with practical knowledge of the field to understand biological processes and their technical implementation in the laboratory, and will understand the basic technical terminology used in this field's laboratory work, will be able to grasp and acquire particular molecular biology procedures that they will come across later in their studies and professional employment, as well as apply and utilise electrophoretic techniques for the investigation of proteins.

**Objectives:**

Course objectives include teaching students the fundamentals of studying nucleic acids and proteins, as well as techniques for analysis and how to interpret the results.

**Expected learning outcomes:**

After completing this course students should be able to:

● To choose the right method for protein extraction and their subsequent analysis,

● Isolation of DNA from different tissues (1 hour lecture + 4 hours practice),

● Isolation of RNA (1 hour lecture + 4 hours practice),

● To apply and use electrophoresis techniques for the study of proteins (DS-PAGE, "Electrophoresis in native conditions", 2-D electrophoresis and "Western blotting"),

● Polymerase chain reaction (PCR)

**Teaching methodology:**

Traditional lectures, application of interactive teaching and learning strategies that promote constructive thinking through reading and writing, group work, discussion, project-based learning, problem solving, laboratory and field work, and video projector presentations etc.

**Assessment methods and passing criteria:**

First assessment: 30% / Second assessment 25% / Homework or other commitments 10% / Regular attendance 5% / Final exam 30% = Total 100%

**Means of concretization/ IT:**

Projector, Llaptop, Herbized medicinal plants (species), practical work in nature

**The ratio between the theoretical and practical part of the study:** The ratio between the theoretical and practical part is: 30 hours of theory and 30 hours of practiceLiteratura

* Ausubel F M. Short protocols in molecular biology: a compendium of methods from current protocols in molecular Biology. 2003. John Wiley & Sons.
* Berk A. Molecular cell biology. 2008. W.H. Freeman.

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Activity** | **Activity** | **Activity** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work | 1 | 7 | 7 |
| Contact with lecturer/consultations | 1 | 8 | 8 |
| Mid-terms, seminars | 4 | 2 | 8 |
| Homework | 1 | 3 | 3 |
| Individual time spent studying (at the library or home) | 1 | 9 | 9 |
| Final preparation for the exam | 1 | 12 | 12 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 6 | 6 |
| Projects, presentations, etc. | 1 | 2 | 2 |
| **Total** |  |  | 100 |

**Subject:** Extraction techniques (2+1)

**Teachers:** Prof. Ass.Dr. Jeton Halili

**Course status:** Elective

**ECTS :** 4

**Course description:** The course will address the basic concepts of extraction techniques as part of separation methods in analytical chemistry. The course will consist of a series of lectures also enmeshed with laboratory exercises, and the student will be recognized with various extraction techniques, such as solid phase extraction, supercritical extraction, ultrasonic extraction, microwave extraction, extraction Chelex® 100 Resin.

**Course objectives:** Students within this course will acquire basic theoretical concepts for the extraction techniques. Be provided with sufficient knowledge of extraction techniques, theoretical skills and practical skills to use the equipment for laboratory purposes. To develop their personality by creating habits and skills for independent experimental work, proper use of relevant equipment in different experimental conditions and situations.

**Learning outcomes:** After completing this course, students will:

* To know simple extraction:
* Continuous extraction.
* Liquid - liquid extraction.
* Solid - liquid extraction.
* Supercritical extraction technique.
* Ultrasonic extraction.
* Microwave extraction.
* Use of the apparatus, techniques and laboratory methods and their behavior in the laboratory.
* Developing skills for independent scientific activity, using information from various sources.

**Teaching methods:** Lectures, numerical exercises, lab exercises,

**Concretization/IT tools:** Pencil, Table, Projector, Computer

**Assessment methods and passing criteria:** First assessment 20%, second assessment 20%, Final exam (written and oral): 50%.

**The relationship between the theoretical and practical part of the study:** 2+1

**Literature:**

* Dauglas Preston, Lincoln Chlid, Extraction, 2012.Frederick. A Bettelheim, Joseph M. Landsberg, Laboratory Experiments for General, Organic and Biochemistry (fourth Ed.) Paperback, Wadsëorth Publishing Company; 5th edition (June 2003)
* Herminia Dominguez, Maria Gonzalez Munoz, Water Extraction of Bioactive Compounds, 2017.
* John R. Dean, Extraction Techniques in analytical Sciences, 2010.
* Roger Smith, Handbook of Analytical Separations, 2013.
* C. E. Meloan, Chemical Separation, principles, techniques, and experiments, John Wiley & Sons Inc, New York, 2005.

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work |  |  |  |
| Contact with lecturer/consultations |  | 5 | 5 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 2 | 4 |
| Homework |  |  |  |
| Individual time spent studying (at the library or home) | 2 | 15 | 30 |
| Final preparation for the exam | 1 | 8 | 8 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 8 | 8 |
| Projects, presentations, etc. |  |  |  |
| **Total** |  |  | **100** |

**Course:** Radiation protection and quality control(2+1)

**Professor:** Prof. Ass. Dr. Gzim Hodolli; Prof. Ass. Dr. Lulzim Millaku

**Course status:** Elective

**ECTS**: 4

**Course description:**

* Basic concepts of Electromagnetic waves and their applications.
* Dosimetry of ionizing radiation
* Theoretical aspects of protection from ionizing and non-ionizing radiation
* Types of ionizing radiation exposures and classification of areas
* Sources of ionizing radiation (radionuclides and radiation generators)
* Quality control of radiation sources.
* Basic Biological Interactions of Radiation
* Modification of Cell and Tissue Response to Radiation

**Course goals:** This is intended to provide sufficient information for the safe use of radiation sources in laboratories, where ionizing radiation sources are in use. In general, this course covers radiation physics phenomena, radiation metrology, ionizing radiation protection, quality control of ionizing radiation sources.

The main goal of this course is for students to know how to correctly assess the potential of the risk from ionizing radiation as well as the forms of protection from it.

**Expected teaching results:** Upon finishing this course students are expected to:

* Know well the physical and biological effect of radiation and protection from ionizing radiation,
* The dangers of ionizing radiation with a special consideration for the uses of ionizing radiation in medicine and in laboratories,
* Relevant ways and procedures for protection from ionizing radiation.
* Must know how radiation measuring equipment works, and be able to use it.
* Know how to protect personnel, patients, the public and the environment from the negative effects that ionizing radiation can have.

**Teaching methodology:** Lectures, practical and theoretical exercises (in the Oncology Clinic - Radiotherapy and in the field), consultations, independent projects, homework, colloquiums, exams.

**Evaluation methods and criteria:**

• Participation in lectures and exercises 10%

• Project 30%

• 1st Colloquium 30%

• Colloquium II 30%

**Teaching devices / TI:** Computers, Video Projector, Radiation Generator (Computed Tomography, Medical Linear Accelerators) GM Radiation Detector, Ionization Chamber, and Semiconductor Detectors.

**Report between practical and theoretical part:** Report between theoretical and practical part is 2+1

**Literature:**

1. Kostandin Dollani, “Dozimetria dhe mbrojtja nga rrezatimi”, Tiranë, 2007.
2. Marenglen Spiro; Teodor Karaja; Fatbardha Babani; “BIOFIZIKA”, Tiranë, 2001.
3. Washington, Charles M., Leaver, Dennis. Principles and Practice of Radiation Therapy. St. Louis, MO: Mosby Elsevier Publishing, Inc., 4th.ed. 2015. ISBN: 978-0-323-28752-

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| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 2 | 5 | 10 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 5 | 10 |
| Homework | 2 | 5 | 10 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 2 | 5 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 5 | 10 |
| Projects, presentations, etc. | 2 | 5 | 10 |
| Total |  |  | 120 |

**Course:** Fundamentals of Microscopy (2+1)

**Lecturer: Prof. Dr.**  Sefer Avdiaj

**Statusi i lëndës:** Elective

**ECTS**: 4

**Content**

This introductory course in which students will gain knowledge of the basic principles and application of optical microscopy and electron microscopy. In terms of electron microscopy, two types will be included: transmission electron microscopy and scanning electron microscopy. Students will also acquire basic knowledge for the preparation of biological samples for both optical and electron microscopy.

**Purpose of the course and learning outcomes**

The goals of the course are the acquisition of theoretical and experimental knowledge of microscopy including light and electron beam. Then equipping students with basic knowledge for working with optical and electronic microscopes so that, as molecular biologists, they gain skills in using both optical and electronic microscopes.

Expected outcomes of the course:

- to acquire the basic skills necessary for processing and independent interpretation of optical microscopy samples.

- to be able to prepare biological samples for optical microscope and electron microscope.

- to be able to apply and use the methods for the preparation of biological samples for the ultrastructure of research cells and tissues.

- to know how to analyze and interpret the biological ultrastructures obtained by the above techniques and evaluate their quality.

**Forms of teaching and learning**

Lectures, discussions, numerical and laboratory exercises, consultations, homework, colloquiums, and exams.

**Evaluation methods**

Laboratory 30%; 2 colloquiums or final exam. Each colloquy gets 35% (2x35%=70%) or the final exam 70%.

**Equipment for teaching**

Laboratory equipment, different microscopes, simulations from the Internet, markers, erasers, charts, computers, projectors.

**Raporti ndërmjet pjesës teorike dhe ushtrimeve është 2:2**

**Literatura:**

1. Abramowitz M. (2003): Microscope. Basics and Beyond.
2. Debashis Mukhejri (2017): Electron Microscopy: A Versatile Tool for Material Characterization
3. An Introduction to Electron Microscopy – booklet from ThermoFisher Scientific company
4. Bredbury, S. (1989): Introduction to the Optical Microscopy, Revised Edition, Oxford Univ. Press.
5. Bozzola, J.J., Russell, L.D. (1998): Electron Microscopy. Principles and Techniques for Biologist. 2nd Edition, Jones and Bartlett Publishers.
6. Robards, A.W., Wilson, A.J. (1993): Procedures in Electron Microscopy. John Wiley & Sons Ltd.

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| --- | --- | --- | --- |
| **Activity** | Hours | Day/Week | Total |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work |  |  |  |
| Contact with lecturer/consultations |  | 5 | 5 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 2 | 4 |
| Homework |  |  |  |
| Individual time spent studying (at the library or home) | 2 | 15 | 30 |
| Final preparation for the exam | 1 | 8 | 8 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 8 | 8 |
| Projects, presentations, etc. |  |  |  |
| Total |  |  | **100** |

**Course:** Veterinary Clinical Biochemistry and Hematology (2+1)

**Professor:** Prof. Asoc. Dr. Imer Haziri**;** Prof. Ass. Dr. Lulzim Millaku

**Course status:** Elective

**ECTS**: 4

**Course description:** Veterinary Clinical Biochemistry and Hematology - is an experimental subject. The duration of the course is in a period of 15 weeks, which lasts from 30 hours of lectures and 30 hours of exercises. Lectures startet with teaching units Concepts of normality in Clinical Veterinary Biochemistry and the end with a Clinical Biochemistry in poultry.

**Course goals:** The main point of the course "Veterinary Clinical Biochemistry and Hematology" is the students' knowledge and information related to the rest of Veterinary Clinical Biochemistry and Hematology (theoretical and practical).

**Expected teaching results:** After completion of this course the student will be able:

- To have basic knowledge in the part of "Veterinary Clinical Biochemistry and Hematology" including: the essence of Clinical Biochemistry, Veterinary Hematology (taking into account the purpose and application of the methods of this subject);

- Knowledge related to: Use of materials (blood, urine, etc.) for various biochemistry analyses; General biochemical indicators of blood, their reference values and deviations of these values in different abnormal conditions (diseases) in different animal organisms;

- To have knowledge and skills in the use and application of laboratory techniques and methods in the field of Veterinary Clinical Biochemistry and Hematology.

**Teaching methodology:** Lectures, practical and theoretical exercises, consultations, independent projects, homework, colloquiums, exams.

**Evaluation methods and criteria:**

• Participation in lectures and exercises 10%

• Exam 40%

• Colloquium I 30%

• Colloquium II 20%

**Teaching devices/TI:** Computers, Video Projector.

**Report between practical and theoretical part:** Report between theoretical and practical part is 2+1

**Literature:**

1. Morag. G. Kerr. Veterinary Laboratory Medicine: Biochemistry and Haematology, 2nd Edition. Wiley-Blackwell. New Jersy . USA. ISBN: 978-0-632-04023-0
2. [Douglas J. Weiss](https://b-ok.xyz/author/Douglas%20J.%20Weiss), [K. Jane Wardrop](https://b-ok.xyz/author/K.%20Jane%20Wardrop). Veterinary Hematology, 6 edition. Wiley-Blackwell. 2010.
3. [Mary Anna Thrall](https://b-ok.xyz/author/Mary%20Anna%20Thrall), [et al](https://b-ok.xyz/author/et%20al). Veterinary hematology and clinical chemistry. 2nd ed. Wiley-Blackwell. 2012.

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 2 | 5 | 10 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 2 | 5 | 10 |
| Homework | 2 | 5 | 10 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 2 | 5 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | 2 | 5 | 10 |
| Projects, presentations, etc. | 2 | 5 | 10 |
| Total |  |  | 120 |

**Subject**: Molecular Physiology of the Organ Systems (2+1)

**Professor of the subject:** Ass.Dr.Driton Vela, dr.sci

**Status of the subject:** Elective

**ECTS credits**: 4

**Description of the subject:** This subject deals with the basic knowledge of the molecular physiology of the cell, molecular physiology of the sceletal muscles, molecular physiology of the blood vessels, molecular physiology of the heart, molecular physiology of the blood, molecular physiology of the gastrointestinal system, molecular physiology of the respiratory system, molecular physiology of the urinary system, hormone physiology, neurotransimiter physiology.

**Goals of the subject:** Goals of this course are to prepare students regarding the theoretical aspects of the physiological role of the molecules produced by human cells. Students will also learn the practical role of this knowledge in determining the health status of humans.

**Expected results:** After finishing thos course students will be able to:

* Understand the physiological role of the moleculues produced by human cells
* Understand the control mechanisms and the dysregulation of the molecules produced by human cells
* Learn methods for detecting molecules in different hman tissues

**Methodology of teaching:** lectures, seminars

**Work tools/IT:** pen, table, projector, computer, Biopac, PhysioEx

**Evaluation methods and pass criteria**: *first evaluation 35%* , *second evaluation 35%, semianrs and activity in lectures 20%, activity in practise 5%, attendance 5%*

**Theory/practise ratio** 2+1

**Literature:**

Fiziologjia e Njeriut nga Artan Shkoza.

*Medical Physiology*. Walter Boron, Emile L Boulpaep.

*Harrisons Principles of Internal Medicine*. JL Jameson, A Fauci, D Kasper, S Hauser, D Longo, J Loscalzo

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| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory |  |  |  |
| Tutorial | 1 | 15 | 15 |
| Field Exercises | - | - | - |
| Contacts with teacher / consultations | 1 | 15 | 15 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 15 | 30 |
| Preparation for final exam | 1 | 8 | 8 |
| Time spent on assessment (test, quiz, final exam) | 1 | 2 | 2 |
| Projects, presentations, etc. | - | - |  |
| Total |  |  | 100 |

**Subject:** Biopsychology (3+0)

**Teacher:** Prof. Ass. dr. Ilir Mazreku

**Course status:** Elective

**ECTS:** 4

**Course description:** Biopsychology as a scientific interdisciplinary study deals with the study of the living part of the organism and the connection with the cognitive and behavioral part. From the construction of a cell to the neurochemistry of neurons, genetics, hormones and their effects, as well as the various disorders that come as a result of changes in various biological structures are part of the study of this discipline. During this course, the students of the Department of Biology will try to develop a biological perspective on the psychological processes.

**Course goals:** Students will gain basic knowledge from biopsychology and their use in practice during their research work in the field of biology.

• To know the biology of behavior, structures, functions and main disorders

• develop and deepen knowledge of the functional neuroanatomy of the nervous system, neurophysiology, generation, transmission and integration of nerve signals and their neurochemistry

• acquire basic knowledge about the implication of heredity and the biology of the main psychological processes, feeling, perception, thinking, memory, consciousness and learning

**Upon completion of this course, students will be able to:**

● explain the construction and function of the central and peripheral nervous system and the different forms of cellular communication and the implication of neurotransmitters in human behavior

● analyze the genetic, neurological and hormonal basis in the regulation of behavior

● understand that the hypothalamus is the bridge between the nervous system and the endocrine, neuroendocrine and immune systems.

● explain the biological basis of the sleep-wake cycle

● explain brain evolution and behavior and relate mental illnesses to motivation, stress, emotions.

**Teaching methodology:**

Frontal lecture combined with case discussions (from the material previously prepared and distributed to students), interactive learning with the student at the center, group work, discussion, etc. For illustration and reinforcement of facts and concepts, visual materials will be chosen, such as slides, figures, schemes, computer simulation programs which support the program content and deepen the knowledge in the special chapters of the subject. Appropriate methods and strategies of teaching and learning will be selected that motivate and promote the active learning of the student.

**Assessment methods and passing criteria:**

40%- First intermediate assessment

40% - The second intermediate assessment

20%- Evaluation of the seminar work, presentation, class activity, participation in quizzes.

Concretization tools/ IT: Computer, projector, board.

The ratio between the theoretical and practical part of the study: The ratio between the theoretical and practical part is 3+0

**Literature:**

**Primary**

1. John Pinel, 2016, Biopsychology, Publisher Allyn and Bacon, Boston, USA

**Secondary/Additional**

1. Fetah Halili, 2000. Fiziologjia e përgjithshme, Universiteti i Prishtinës, Prishtinë
2. Artan Shkoza, 2009. Fiziologjia e njeriut, Ilar, Tiranë, Shqipëri

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| --- | --- | --- | --- |
| Contribution to the student's workload | | | |
| Activity | Hours | Day/Week | Total |
| Lectures | 3 | 15 | 45 |
| Theoretical/laboratory exercises | 0 |  |  |
| Practical work |  |  |  |
| Contacts with the teacher/consultations |  | - | 6 |
| Field exercises |  |  |  |
| Assesment/Seminars |  | - | 4 |
| Homework |  | - | 6 |
| The student's independent study time (in the library or at home) | 2 | 15 | 30 |
| Final exam preparation |  | - | 12 |
| Time spent in assessment (tests, quizzes, final exam) |  | - | 2 |
| Projects or presentations |  | - | 1 |
| Total |  |  | 100 |

**Course:** Parasitology

**Lecturer:** Ferdije Zhushi Etemi

**Status of the course: Elective**

**ECTS:** 4

**Course Description**: This course will provide students with an introduction to the general biology of the parasitic Protists (protozoans), Plathelmintes, and arthropods of humans and domestic animals. Lectures will emphasize the morphology, form and function, life cycles, symptoms and pathogenesis of representative taxa from these major parasitic groups. With this course students will be able to appreciate the impact that parasites have had on human civilizations throughout history. It has been estimated that over 60% of the species on this planet employ parasitic lifestyles.

**Course objectives**: The aim of this course is to equip students with the basic knowledge about parasitic animals that attack human and domestic animal health. During the lab exercises students will have opportunity to identify and study commonly occurring parasites.

**Expected Learning outcomes**: Upon completion of this course, student will be able to:

* Demonstrate an understanding of the biology of parasitic animals
* Describe the basic biology, physiology, morphology, life history, behavior, phylogeny and ecology of selected parasite species
* Discuss the parasite-host relationship and the effects parasites have on their hosts.
* Examine the prepared fixed specimens in the lab
* Analyze the impact that parasites have had in humans and domestic animal health during the history

**Teaching methodology**: Lectures in Power point presentation and discussions about taught topics, laboratory work, assignments.

**Evaluation methods:**

* First exam : 20%
* Laboratory work exam: 30%
* Assignment: 10%
* Final exam:40%
* Total: 100%

**Concretization tools/IT:** Computer, projector, whiteboard, microscope, microscopic slides, preserved specimens,etc.

**Relation between theory and practice:** 2+2

**Literature**:

* + Larry S. Roberts: Foundation of Parasitology, 9th edition, Copyright: 2013   
    Publisher: McGraw-Hill Publishing Company
  + Carl Zimmer: Parasite Rex: Inside the Bizarre World of Nature's Most Dangerous Creatures

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| --- | --- | --- | --- |
| **Contribution to the student Workload ( this should correspond to student’s learning outcomes)** | | | |
| **Activity** | **Hours** | **Day/week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Contact with lecturer/consultations | 0.5 | 15 | 7.5 |
| Homework | 0.5 | 15 | 7.5 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 5 | 5 | 25 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 3 | 3 |
| Projects, presentations, etc. | 1 | 2 | 2 |
| **Total** |  |  | 100 |

**Title of subject : Fundamentals of Physical Chemistry**

**Professor of subject: Prof. dr. Avni Berisha**

**Status of the subject: Mandatory**

**ECTS kredi: 4 (2+1)**

**Subject content:** Fundamentals. Atoms, ions, and molecules. Bulk matter. Energy. Biochemical thermodynamics. The First Law. The Second Law. Phase equilibria. Chemical equilibrium. Thermodynamics of ion and electron transport. The kinetics of life processes. The rates of reactions. Complex biochemical processes.Colligative properties: vapor pressure, depression of freezing point (cryoscopy), elevation of boiling point (ebullioscopy), osmosis, osmotic pressure. Biomolecular structure. Microscopic systems and quantization. The chemical bond. Computational biochemistry. Macromolecules and self-assembly. Determination of size and shape. The control of shape. Levels of structure. Biochemical spectroscopy. Optical spectroscopy and photobiology. General features of spectroscopy. Vibrational spectra. Ultraviolet and visible spectra. Radiative and non-radiative decay. Photobiology. Magnetic resonance. Principles of magnetic resonance. The information in NMR spectra. The information in EPR spectra.

**Goals of the subject:** Physical chemistry provides the basis for the behavior of macromolecules and molecular assemblies that play essential roles in all living creatures. Physical principles govern the stability of proteins and nucleic acids, the pace of biochemical events, and the transport of chemicals across biological components; they enable us to define the structure and reactivity of complex biological systems and make sense of their operation.

The starts with a series of chapters focusing on energy conversion in biological cells and the factors that stabilize proteins, nucleic acids, and cell membranes. It then examines the rates of chemical reactions, how rates can help characterize the mechanism of a reaction, and how enzymes influence reaction rates. Another section, examines how concepts of physical chemistry can be used to establish the "rules" that govern the assembly of complex biological structures, while the last section, describes the major techniques in biochemistry that are being applied to further our understanding of biochemical processes and systems.

**Expected results:**

Students must comprehend, interpret, and apply the following physical chemistry concepts:

- fundamental thermodynamic concepts

- changes in energy during chemical reactions and physical processes

- chemical equilibrium

- ionic solution interactions - ionic conductivity

- concepts of Galvanic cells and Nernst equation

- pH measurements

- fundamentals of chemical kinetics

- fundamentals of ultraviolet radiation

**Methodology of teaching:**

The learning strategy is built on students' active participation:

* The professor describes the goals of the class through lectures.
* Key concepts and theories are given through graphic tables and other techniques.
* An interactive lesson will be utilized in combination.
* Through the debate of the problems and concerns highlighted, common conclusions will be reached.
* Group Projects
* Workshops, focus groups, and group presentations
* Additional Activities: Student-led independent study; Results presentation and Seminars

1. Textbooks, articles, maps, charts, projector, work sheets, teacher-prepared materials, and so on.

**Teaching tools/ TI:** Textbooks, articles, graphs, charts, projector, work sheets, teacher-prepared materials, and so on.

**Ratio theory/practice:** 2+1

**Literature**

* Peter Atkins, Julio de Paula: Physical Chemistry for the Life Sciences, 2nd edition, Oxford University Press, 2015.
* The professor's teaching materials and lecture/slides;
* Klostermeier, D.; Rudolph, Markus G: Biophysical chemistry. CRC Press, (2017)
* Peter Atkins, Julio de Paula: Elements of Physical Chemistry. Oxford University Press; 7th edition (2017)

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution in the student load | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 1 | 15 | 15 |
| tutorial |  |  |  |
| Kontacts with teacher / consultations | 1 | 5 | 5 |
| Field Exercises |  |  |  |
| Colloquiums, seminars | 1 | 5 | 5 |
| Homework | 2 | 14 | 28 |
| Self study time student (at the library or at home) | 1 | 10 | 10 |
| Preparation for final exam | 2 | 1 | 2 |
| Time spent on assessment (test, quiz, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. |  |  | **100** |

**Subject:** Algalogy and mycology (2+1)

**Professor :** Prof. Dr. Kemajl Kurteshi

**Status of the subject:**  Elective

**ECTS**: 4

**Course description:** This course includes knowledge of unicellular eukaryotes belonging to the Protista kingdom, Algae, general characteristics and systematic categories will be explained within the subject: Cyanophyta, Pyrrophyta, Chrysophyta, Xanthophyta, Bacillariophyta, Rhodophyta, Phaeophyta, Charophyta. Fungi: general characteristics. Systematic categories: subdivision Myxomycotina, subdivision Eumycotina: class Chytridiomycetes, Oomycetes, Ascomyecetes, Basidiomycetes**.**

**Course goals:** This course aims to equip students with knowledge of Eukaryotic organisms of the Protista group as well as skills for their identification and classification**.**

**Expected learning outcome: :** 1. To use the systematic categories for the classification of algae and fungi

2. To know the spread and importance of protists for man and his well-being

3. Distinguish protists that have animal characteristics from those that have plant characteristics

4. To know the types of protists that cause diseases in humans

5. To know the characteristics of the kingdom of Fungi, their classification, structure and role

**Forms of teaching and learning**: lectures, seminar work, laboratory exercises and field.

**Evaluation methodology;**

• First test (colloquium): 20%

• Assessment from the practical/laboratory part: 30%

• Regular attendance and engagement in discussions 10%

• Final exam: 40 %

Total: 100%

**Concretization tools/ IT:** Computer, projector, table, microscope, herbarium, microscopic preparations**.**

**The ratio between the theoretical and practical part of the study: 2+1**

**References :**

**-** Dinabandhu Sahoo, Joseph Seckbach, 2015: **The Algae World**

-Robert Edward Lee 2008: Phycology

-Fabian Cassan, , 2008, Plants, algae and fungi-

-Kevin Kavanagh, 2017: Fungi

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| --- | --- | --- | --- |
| **Contribution to the student Workload ( this should correspond to student’s learning outcomes)** | | | |
| **Activity** | **Hours** | **Day/week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Contact with lecturer/consultations | 0.5 | 15 | 7.5 |
| Homework | 0.5 | 15 | 7.5 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 5 | 5 | 25 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 3 | 3 |
| Projects, presentations, etc. | 1 | 2 | 2 |
| **Total** |  |  | 100 |

**Course:** Zoology-**(**Invertebrate) (2+1)

**Lecturer:** Prof. Dr. Ferdije Zhushi Etemi

**Status of the course:** Elective

**ECTS:** 4

**Course description:** This course presents a study of invertebrate animal groups, their body structure, function, reproduction, distribution, ecology and classification. The object of the study will be: Protozoans, Parazoa (Porifera-spongia) and true multicellular invertebrates-Eumetazoa: Cnidaria, Ctenophora, Plathelminthes, Nemertina, Pseudocelomata-Ecdyozoa and Lophophozoa, Mollusca, Annelida, Arthropods and Echinoderms.

**Course aim:** The aim of this course is to equip students with knowledge about the basic principles of diversity, role and taxonomy of invertebrate animals. During comparative studies of the representative species of invertebrate animal groups, students will understand the structure, function and their distribution.

In the laboratory exercises students will be trained to use the microscope and adequate literature to identify studied animal species and to demonstrate skills in animal dissection.

**Learning outcomes**: **After the completion of this course, student will be able to:**

1. Understand principles of animal structure and function

2. Identify the representatives of the main invertebrate animal groups

3. Describe the structure and the ecology of the studied animals

4. Classify animals in taxonomic categories, according to hierarcy

5. Identify the microscopic slides

6. Demonstrate skills in animal disssection

7.Value the diversity of the living world and the importance of its protection

**Teaching methodology:** Lectures (PP), lab and field exercises, student presentation and debates.

**Evaluation methods and criteria:**

First exam 20%

Second exam 20%

Lab/practical work exam 30 %

Final exam 30%

Total 100%

**Concretization tools**: projector, computer, white board, in the laboratory: microscopes, microscopic slides, alkohol for preservation of specimens, dissection tools, insect pins, collection nets

**Ratio between theory and practice: 75:25**

**Basic literature:**

1. Esma Rugova: Morphology and systematics of Invertebrates (manuscript).Prishtina, 2006

2. Hickman, Roberts, Larson: Integrated Principles of Zoology, 14-th edition, 2013

3. Cleveland P Hickman Jr., Lee Kats and Cleveland Hickman Jr.: Laboratory studies in animal diversity. Fourth edition, 2009

**Aditional literature:**

1.Triplehorn, CH. Johnson, N.2005. Borror and DeLong's Introduction to the Study of Insects, Thomson Brooks/Cole

2. literature from the internet

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **Days/week** | **Total** |
| Lectures | 2 | 15 | 30 |
| Exercise laboratory | 1 | 15 | 15 |
| Practice work |  |  |  |
| Contact with lecturer/consultations | 0.5 | 6 | 3 |
| Field exercises |  |  |  |
| Mid-terms, seminars | 5 | 2 | 10 |
| Homework | 2 | 1 | 2 |
| Individual time spent studying (at the library or home) | 1 | 10 | 10 |
| Final preparation for the exam | 2 | 10 | 20 |
| Time spent in evaluation (tests, final exam) | 2 | 4 | 8 |
| Projects, presentations, etc. | 1 | 2 | 2 |
| **Total** |  |  | **100** |

**Course title:** Zoology (Vertebrate) (2+1)

**Lecturer:** Prof.Dr. Linda Grapci Kotorri

**Status of the course:** Elective

**ECTS:** 4

**Course description:** Chordates group characteristics, their relationship with other groups of the animal world. Origin of chordates and fossil evidences on chordates predecessors. Subtype Tunicata, their distribution, phylogeny and regressive evolution. Vertebrates-their distribution, development and origins systematic. Fish morphology, distribution, classification and development. Amphibia with tail and tailless - morphology, distribution and their importance in the further evolution of vertebrates. General characteristics of reptiles. Organization, geographic distribution and transfer of aquatic life into the terrestrial one. Classification and systematic of birds. General features. Morphology, development, classification and their migration. The transformation of respiratory organs of vertebrates of water, land and air. Mammals that produce eggs, marsupiala and placental. Morphology, classification, geographic distribution and evolutionary radiations.

**Course goal:** The student will gain knowledge about the anatomic structure of animals, their origin, systematic, and their importance.

**Learning outcomes:** Upon completion of the course, the student will be able to:

* Know to describe type of chordates
* Compare their anatomic structure
* Projects different programs about their conservation and breeding
* Projects plans for growing animals for the food industry purposes
* propose measures for the protection of endangered animal species

**Teaching methodology:** Lectures in PP, discussion and group work.

**Evaluation methodology:** seminar work 20%, practical exam 30%, final exam 50%, Total 100%.

The final grade will be calculated as follows: 51%- 60% = 6, 61% -70% = 7, 71% - 80% = 8, 81% - 90% = 9, 91%-100% =10.

**Tools used in teaching and learning/ IT**: laptop, video projector, microscopy and stereomicroscopy, equipment for field work

**Ratio between theory and practical part: 2+2+1**

**Literature**:

* Zoologjia e kurrizoreve.2015 (authorized lectures)
* Manual of Zoology – Ayyar E.K. and Ananthakrishnan, T.NVol II. Part I.Viswanathan Pvt. Ltd. 1992.
* A. Dimofski (1991) Zoologjia e Vertebrorẽve,
* Kotpal R. L. A.(2009)Modern text book of Zoology: Vertebrates

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **Week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work | 1 | 15 | 15 |
| Contact with lecturer/consultations | 0.5 | 10 | 5 |
| Mid-terms, seminars | 1 | 5 | 5 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 1 | 10 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 5 | 5 |
| **Total** |  |  | **10** |

**Course:** Plants metabolism during stress conditions(2+1)

**Lecturer:** Prof. Asoc. Dr. Bekim Gashi

**Status of the course:** Elective

**ECTS:** 4

**Short course description:** Introduction: stress conditions, mechanisms of resistance, adaptation, acclimatization, tolerance; phases of response to stress, model plants in stress physiology. Abiotic stress: shortage of water and drought; temperature stress; increased salt content in the soil; anoxia and hypoxia; light and UV stress; air and water pollution. Biotic stress: competition between plant species; response to the predator and pathogen attack. Pollution impact on the plants (heavy metals, atmospheric pollution and xenobiotics); resistance mechanisms; pollution of water and soil; the use of chemicals in agriculture. Plant surface protection and secondary metabolites: surface protection: cutin, suberin, waxes; secondary metabolites: terpenoids, phenolic compounds, nitrogen-containing compounds: biosynthesis, distribution in plants, function. Evaluation of cell damage caused by oxydative stress (lipid peroxidation, protein carbonyls). Enzymatic and non-enzymatic antioxidants important role as natural antioxidant. Naturally antioxidants in plant cells: enzymatic and peptide defence mechanisms (catalases-CAT, peroxidases-POD, superoxide dismutases-SOD, glutathione and other proteins) and nonenzymatic mechanisms, phenolic defence compounds; nitrogen compounds (alkaloids, amino acids and amines), cartenoids and chlorophyll derivatives.

**Course objective:** The goal of this course is to give students a greater understanding the role of abiotic and biotic stress on plant and their physiological role on response to these conditions.

**Learning outcomes:** The successful completion of this course will enable students to:

* Explain specific effects of different abiotic and biotic stress conditions on plants by implementation of fundamental knowledge of plant physiology.
* Describe morphological, physiological and metabolic adaptations of plants native on habitats with constantly or frequently present stressful conditions, with explanation of significance of these adaptations.
* Analyze plant tolerance mechanisms and acclimation to moderate stress conditions, with few examples.
* Interpret the plant responses to environmental changes caused by anthropogenic impacts with description of mechanisms of plant response
* Apply experiments by using basic laboratory methods and instruments to gain experience in planning and performing research in the field of plant stress physiology
* Analyze data obtained from experiments to interpret results of research.
* Discuss the data obtained from the experiments to interpret the research results.

**Teaching methodology:** During the course implementation will be used different teaching methods such: presentations, group work and interactive discussion, seminars, lab work, etc.

**Evaluation methods:** Students evaluation is made by giving the percentages of participation of each evaluation during exercises in final evaluation. First evaluation: 20%, Second evaluation: 20%, Homework and other engagements 10%, Regular attendance 5%, Final exam 45%. Total 100%.

**Teaching tools/IT:** Computer, projector, microscopes, different instruments of lab equipment.

**Ratio between the theoretical and practical part:** The students load for this course is 2 theoretical and 1 practical hour per week + 1 seminar/individual work hour per week.

**Basic Literature:**

* Shabala, S. 2017. Plant Stress Physiology, 2nd Edition. CAB International, Oxfordshire, UK.
* Buchanan, B., Gruissem, W., and Jones, R. L. 2015. Biochemistry and Molecular Biology of Plants, 2nd Edition. John Wiley & Sons, Oxford, UK.

**Additional Literature:**

* Selected publications (original scientific papers and review papers) in the field of stress physiology in plants.
* Taiz, L., Zeiger, E. Moller, I.M., Murphy, A. 2015. Plant Physiology and Development 6th edition. Sinauer Associates, Inc Publishers Sunderland, Massachusetts U.S.A.

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **Week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work | 1 | 15 | 15 |
| Contact with lecturer/consultations | 0.5 | 10 | 5 |
| Mid-terms, seminars | 1 | 5 | 5 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 1 | 10 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 5 | 5 |
| **Total** |  |  | **10** |

**Course**: Ecology (3+0)

**Teacher**: Prof. Dr. Fadil Millaku

**Course status**: Elective (E)

ECTS:4

**Short Description**:

Among the key topics, it will cover:

• The importance of Ecology as a science

• Description and definition of natural populations

• Water, life in water and its role in wide ecological aspects

• Factors affecting population distribution and abundance

• Applicable and global ecology

**Course objectives**: students have the opportunity to acquaintance with the subject and tasks of Ecology as a science, as well as gaining students' knowledge and applying this knowledge in practice.

**Expected learning outcomes**:

Upon completion of this course the student will be able to:

• Demonstrate an understanding of the scientific method including field analysis

• Demonstrate an understanding of basic concepts of ecology, including the structure and function of ecosystems, population dynamics, and energy flow

• Demonstrate an understanding of the factors that affect the abundance and diversity of species within a community and describe the different types of interactions between members

• Through teaching, fieldwork and scientific reports, students will demonstrate competence in the use of relevant technologies and techniques for data collection and analysis

• To gain knowledge about the general overview of the historical development of biological diversity in Europe and in particular in Kosovo.

**Teaching methodology**:

Lectures, discussions, practical field work, seminar work.

**Assessment methods and passing criteria**:

• Class assessment 20%

• Field work 10%

• Seminar 10%

• Final assessment 60%

**Concretization / IT tools**:

Computer, projector, table, outdoor study visits.

**The relationship between the theoretical and practical part of the study**:

The ratio between the theoretical and practical part is 3:0

**Basic literature:**

* Molles, M. & Sher, A. (2019): Ecology: Concepts and Applications - 8th edition. Mc Graw Hill.
* Begon, M., Townsend, C.R., Harper, J.L. (2006): Ecology: From Individuals to Ecosystems. Wiley-Blackwell.

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **Week** | **Total /hours** |
| Lectures | 2 | 15 | 30 |
| Exercise theoretical/laboratory | 1 | 15 | 15 |
| Practice work | 1 | 15 | 15 |
| Contact with lecturer/consultations | 0.5 | 10 | 5 |
| Mid-terms, seminars | 1 | 5 | 5 |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 1 | 10 | 10 |
| Time spent in evaluation (tests, quiz, final exam) | 1 | 5 | 5 |
| **Total** |  |  | **100** |

**Title of subject:** Computer practices (1+2)

**Professor of subject:** Prof. Ass. Dr. Eliot Bytyçi

**Status of the subject:** Elective

**ECTS:** 4

**Short description:** In this course, it will be about the basic concepts of information technology and communication, about the methods and ways of presenting professional and scientific work and the analysis of the results of biological data.

**Goals of the subject:** The student should be able to apply the knowledge gained through this course as an auxiliary device in the studies of professional subjects of molecular biology, but also during his subsequent professional and academic work.

**Expected results:** After completing this course, the student will be able to:

● to be able to understand the concepts of information and communication technology, computer parts, certain software for data presentation and analysis;

● to be able to apply the acquired concepts, especially during the presentations of their professional and academic work, but also during the collection, placement and analysis of data;

● to practice thinking logically about the problems presented during the interrelationship of molecular biology and data, their analysis and the presentation of their results.

**Methodology of teaching:** Lectures, discussions, exercises, consultations, homework, colloquia, final exam.

**Evaluation Methods:**

Seminar work and homework (20%), First periodical assessment (40%), Second periodical assessment (40%).

**Means of concretization:** Pen, table, projector, and computer.

**Rapport between theoretical and practical part:** 2:1

**Literature:**

Computer science: an overview. J. Gleen Brooksheer, 13th edition, 2019

Practical exercises for Excel, Powerpoint from ECDL

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| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 1 | 15 | 15 |
| Theoretical exercises / laboratory | 2 | 15 | 30 |
| tutorial |  |  |  |
| Kontacts with teacher / consultations | 1 | 5 | 5 |
| Field Exercises |  |  |  |
| Colloquiums, seminars | 1 | 5 | 5 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 14 | 28 |
| Preparation for final exam | 1 | 10 | 10 |
| Time spent on assessment (test, quiz, final exam) | 2 | 1 | 2 |
| Projects, presentations, etc. | 1 | 5 | 5 |
| Total |  |  | **100** |

**Course**: Cellular and molecular plant identification techniques (2+1)

**Teacher**: Prof. Dr. Fadil Millaku

**Course status**: Elective (E)

**ECTS credits**: 4

**Short Description**:

The objective of this course is to provide students with the latest data on plant taxonomy based on molecular biology methods. Protocols discussed in this subject include DNA extraction from both fresh plant samples and herbarium specimens. Clarifications based on laboratory protocols are provided in this subject in revised form and chronology. Topics such as the chloroplast genome, mitochondrial DNA, and new methods for detecting appropriate nucleotide polymorphism (SNP) markers are described.

**Course objectives**: Acquaintance of students with taxonomic work techniques and their use in plant taxonomy.

**Expected learning outcomes**:

Upon completion of this course the student will be able to:

● Isolation of plant DNA samples,

● DNA extraction from herabrized plant samples,

● Nuclear RNA,

● RAPD in plant taxonomy,

● Application of FLOW cytometry to the topic of plant taxonomy.

**Teaching methodology**:

Traditional lectures, application of interactive teaching and learning strategies that promote constructive thinking through reading and writing, group work, discussion, project-based learning, problem solving, laboratory and field work, and video projector presentations etc.

**Assessment methods and passing criteria**:

• Class assessment 20%

• Field work 10%

• Seminar 10%

• Final assessment 60%

**Concretization / IT tools**:

Computer, projector, table, outdoor study visits.

**The relationship between the theoretical and practical part of the study**:

The ratio between the theoretical and practical part is 3:0

**Basic literature:**

* Besse, P. Molecular Plant Taxonomy – Methods & Protocols. 2020. Springer protocols.

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| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 1 | 15 | 15 |
| tutorial |  |  |  |
| Kontacts with teacher / consultations | 1 | 5 | 5 |
| Field Exercises |  |  |  |
| Colloquiums, seminars | 1 | 5 | 5 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 14 | 28 |
| Preparation for final exam | 1 | 10 | 10 |
| Time spent on assessment (test, quiz, final exam) | 2 | 1 | 2 |
| Projects, presentations, etc. | 1 | 5 | 5 |
| Total |  |  | **100** |

**Course title:** Environmental microbiology (2+1)

**Teacher**: Prof.dr. Idriz Vehapi

**Course status**: Elective (E)

**ECTS credits**: 4

**Short content**

This course deals with the legality and the concepts of interaction between microorganisms and the environment, the influence of ecological factors on microorganisms, the role of microorganisms in matter and energy circulation, the ways of life-cycle interaction between microorganisms and the environment, and microorganisms ability to live in extreme conditions.

**The aim and results expected of learning:**

The Environmental microbiology course aims to develop knowledge about the relationship between microorganisms and the environment, between microorganisms and other organisms, the role of microorganisms in the circulation of matter in the environment, and the ability of microorganisms to live in environments with extreme conditions

After completing this course students will be able to:

* Describe ways of interaction between microorganisms and the environment.
* Define the role of ecological factors in the life of microorganisms.
* Understand and describe the ways and role of microorganisms in the biogeochemical circulation of C, N, S, P, etc.
* Understand the ways of co-existence of microorganisms: examples of symbiosis, mutual dependence, water and terrestrial environment conditions.
* Understand the ability of microorganisms to live in environments with extreme conditions.

**Teaching methodology:**

1. Lecture from the previously prepared material

2. Discussion

3. Practical work

4. Seminar work

**Assessment methods:**

First Assessment: 30%

Second Assessment: 25%

Homework or other assignments: 10%

Regular attendance: 5%

Final Exam: 30%

Total: 100%

**The means of concretization:** Videdoprojector, Graphoscop, illustrations, drawings, slides, microscope models, autoclaves, sterilizers, vacuum pumps, and labs, test tubes, microorganism cultivation mediums, sterilization tools.

Relationship between the theoretical and practical parts of the Debate: 2 + 1

**Basic literature :**

1. Prescot, L. M. HARLEY., P. J. and D. A. KLEIN (1999): MICROBIOLOGY, 4th edition, McGraw-Hill, faqet 831-906.
2. Tortora, Funke, Case (1986): Microbiology an Introduction. Faqe: 700-726

**Additional literature:**

1. Muje Plakolli: Mikrobiologjia e pergjithshme, botoi ETMM, Prishtine, 2001.
2. Alexander−Strete−Niles: Lab Exercises in Organismal and Molecular Microbiology., The McGraw−Hill Companies, 2003
3. MYUNG-BO KIM (2008): PROGRESS IN ENVIRONMENTAL MICROBIOLOGY., by Nova Science Publishers, Inc. New York
4. I.L. Pepper and C.P. Gerba (2004): Environmental Microbiology A Laboratory Manual., Elsevier Academic Press 30 Corporate Drive, Suite 400, Burlington, MA 01803, USA 525 B Street, Suite 1900, San Diego, California 92101-4495, USA 84 Theobald's Road, London WC1X 8RR, UK

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Activity** | **Activity** | **Activity** |
| Lectures | 2 | 15 | 30 |
| Exercise laboratory | 1 | 15 | 15 |
| Contact with lecturer/consultations |  |  |  |
| Field exercises | 1 | 5 | 5 |
| Mid-terms, seminars |  |  |  |
| Homework |  |  |  |
| Individual time spent studying (at the library or home) | 1 | 15 | 15 |
| Final preparation for the exam | 2 | 12 | 24 |
| Time spent in evaluation (tests, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. | 2 | 2 | 4 |
| **Total** | 2 | 1 | 2 |
| **Activity** |  |  | 100 |

**Course title:** Medicinal Plants

**Lecturer:** Prof. Dr. Fadil Millaku

**Status of the course:** Elective

**ECTS:**  4

**Course description:** Course on Medical plants will include medical and aromatic plants that are applicable to pharmaceuticals and traditional medicine. Contemporary methods of identifying, using, harvesting and processing of medicinal and aromatic herbs and fruit trees, preservation of medicinal herbs, aromatic herbs and fruit trees, and their cultivation will be learned.

**Course objectives:** The recognition of students with medicinal and aromatic plants and their use in traditional and pharmaceutical medicine.

**Expected learning outcomes:** Upon the completion of this course, students will be able to:

* Understand the importance of having medicinal herbs for humanity
* Recognize the medicinal and aromatic plants as well as the mountain fruits that grow in Kosovo as wild or cultivated plants.
* Learn the techniques of harvesting and using medicinal herbs
* Recognize medical and aromatic plants as semi-processed products.
* Learn the spread and use of medical herbs
* Learn to preserve and cultivate medicinal and aromatic herbs.

**Teaching methodology:** Traditional lectures, implementation of interactive teaching and learning strategies that encourage constructive thinking through reading and writing, group work, discussion, learning through projects, problem solving, laboratory and field work as well as video projecting presentations.

**Evaluation methods and criteria**: First Assessment: 30% / Second Assessment 25% / Homework or other commitments 10% / Regular attendance 5% / Final exam 30% / Total 100%

**Concretization tools:** Projector, Laptop, Herbarised Medicinal plants, practical outdoor work.

**Relation between the theoretical and practical part of the study:** 40:60

**Literature to be used:**

* Millaku, F. (2015): Praktikum i Botanikës, Universiteti “Haxhi Zeka” Pejë
* Rexhepi, F. (2003): Bimët mjekësore, USAID, Prishtinë
* Ben-Erik van Wyk (2017): Medical plant of the wold, Revised Edition

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| --- | --- | --- | --- |
| **Contribution on student load (must correspond with learning outcomes)** | | | |
| **Activity** | **Hours** | **Days/week** | **Total** |
| Lectures | 2 | 15 | 30 |
| Exercise laboratory | 1 | 15 | 15 |
| Contact with lecturer/consultations | 1 | 6 | 6 |
| Field exercises | 2 | 8 | 16 |
| Mid-terms, seminars | 2 | 2 | 4 |
| Homework | 1 | 10 | 10 |
| Individual time spent studying (at the library or home) | 1 | 10 | 10 |
| Final preparation for the exam | 1 | 10 | 10 |
| Time spent in evaluation (tests, final exam) | 1 | 2 | 2 |
| Projects, presentations, etc. | 1 | 2 | 2 |
| **Total** | **13** | **80** | **105** |

**Subject**: Tumor Biochemistry (2+1)

**Professor of the subject:** Ass.Dr.Goneta Gashi, dr.sci

**Status of the subject:** Elective

**ECTS credits**: 4

**Description of the subject:** This subject deals with the basic knowledge of the molecular physiology of the cell devision and its disturbances, molecular mechanisms in tumor, oncogenes and tumor supressor genes, viruses and cancer, tumor cell metabolism, metastasis, angiogenesis dhe lymphangiogenesis, immune system and tumors, hormones and cancer.

**Goals of the subject:** Goals of this course are to prepare students regarding the theoretical aspects of oncogenesis, tumor metabolism, molecular mechanisms of tumor progression, therapeutical possibilities in the fight against tumors.

**Expected results:** After finishing thos course students will be able to:

* Understand the molecular mechanisms in tumor initiation and progression
* Understand the spread of tumors in different parts of the body
* Learn methods for detecting tumor markers
* Learn methods used for early tumor identification

**Methodology of teaching:** lectures, lab practise

**Work tools/IT:** pen, table, projector, computer

**Evaluation methods and pass criteria**: *first evaluation 35%* , *second evaluation 35%, semianrs and activity in lectures 20%, activity in practise 5%, attendance 5%*

**Theory/practise ratio** 2+1

**Literature:**

Robbins Basic Pathology. Vinay Kumar, Abul Abbas, Jon Aster

|  |  |  |  |
| --- | --- | --- | --- |
| Contribution in the student load (something that should correspond with the results of student learning) | | | |
| Activity | Hour | Day/Week | In total |
| Lectures | 2 | 15 | 30 |
| Theoretical exercises / laboratory | 1 | 15 | 15 |
| Tutorial | - | - | - |
| Field Exercises | - | - | - |
| Contacts with teacher / consultations | 1 | 15 | 15 |
| Homework |  |  |  |
| Self study time student (at the library or at home) | 2 | 15 | 30 |
| Preparation for final exam | 1 | 5 | 5 |
| Time spent on assessment (test, quiz, final exam) | 1 | 5 | 5 |
| Projects, presentations, etc. | - | - |  |
| Total |  |  | 100 |

**1.8. A SWOT analysis of the educational process's content**

**A. Strengths**

* Support from the Kosovo Accreditation Agency, an impartial government body tasked with monitoring and advancing the caliber of Kosovo's higher education system.
* Legal framework required for the creation of study plans and the regulation of issues pertaining to teaching and learning
* Experience gained through trainings and help offered by the Quality Coordinator, and Quality Vice-Chancellor in developing the framework of a study program. Active engagement of all academic, administrative, and student personnel in designing the study program's structure.

**B. Weaknesses**

● The small number of teachers who are willing to teach in English

● Lack of interdisciplinary programs offered in English

**C. Opportunities**

● Cooperation through various staff and student exchange programs such as Erasmus plus and others

● Greater internationalization

**D. Threats**

● Weak labor market in Kosovo

● Emigration of young people outside of Kosovo.

## Students

*Standard 5.1. There is a clear and formally adopted admission procedure at institutional level that the study program respects when organizing students’ recruitment. Admission requirements are consistently and fairly applied for all students*.

The UP Statute and the Regulation for Bachelor Studies, both of which are available on the FSHMN website, govern the steps and requirements for enrolling students in the Bachelor of Science in Molecular Biology program. The regulations are explicit and outline the thorough admittance process. All applicants for enrollment are treated equally and uniformly regarding the admission requirements.

*Standard 5.2. All students enrolled in the study program possess a high school graduation diploma or other equivalent document of study, according to MEST requirements.*

The program allows for the registration of the following:

any person with a high school diploma. If the students come from nations or generations that did not have a final matures test, the points for the competition will be calculated differently for these candidates in accordance with bachelor studies regulations in order to bring the total back to 100%.

*Standard 5.3. The study groups are dimensioned so as to ensure an effective and interactive teaching and learning process.*

The planned enrollment of 30 students ensures more efficiency in lectures, while smaller groups are formed for seminars and practical practice (8-12 students per group). Teaching is structured consistently (full-time). The teacher is required to deliver and discuss the syllabus (syllabus) with the students on the first day of each topic.

To guarantee that student staff and teachers regularly communicate on academic concerns, teacher contacts are also supplied in the curricula.

*Standard 5.4. Feedback to students on their performance and results of assessments is given promptly and accompanied by mechanisms for assistance if needed.*

Responses to student performance and evaluation findings are provided right away, no later than 10 days following the test. The student has the option to appeal if they are dissatisfied with the assessment. The faculty administration is required to form an evaluation committee to address this. Both the UP Act and the Bachelor studies Regulation detail every step of this mechanism's process.

*Standard 5.5. The results obtained by the students throughout the study cycles are certified by the academic record.*

The 'SEMS electronic system' is where all exam results are kept track of during the study term. SEMS also creates hard copies of the minutes that are then signed by the teacher and delivered to the administration of the academic unit where the student's file is generated and records are retained for statistical analysis.

*Standard 5.6. Flexible treatment of students in special situations is ensured with respect to deadlines and formal requirements in the program and to all examinations.*

Students who need extended deadlines for their assessments must submit their requests to the Senate via their representatives. If the Senate grants the request, the additional deadlines that are requested by the students and necessary for the assessment of their academic performance are held.

*Standard 5.7. Records of student completion rates are kept for all courses and for the program as a whole and included among quality indicators.*

Administrative staff assists students and keeps track of all administrative activities as well as each student's development. The electronic student management system (SEMS) and a duplicate file are the two data management systems used by the faculty.

*Standard 5.8. Effective procedures are being used to ensure that work submitted by students is original..*

Supervisors oversee student work to make sure it is original before submission. Additionally, the subject of the students' diplomas is addressed at Department meetings. A copy of the topic is also stored in the open-access academic unit archives and libraries (University Library and National Library of Kosovo). Supervisors advise their charges to pay attentive and steer clear of plagiarism. The University of Pristina's Code of Ethics regulates procedures and other topics relating to plagiarism.

*Standard 5.9. Students’ rights and obligations are made publicly available, promoted to all those concerned and enforced equitably; these will include the right to academic appeals.*

All agreements governing students' rights and obligations are made available, disseminated to all parties involved, and enforced uniformly. Among these documents is the right to academic appeals. They have their own organization where all students can register in order to protect students' rights. Each student organization has a charter that is accepted by its members and follows the general guidelines set forth by the university's Governing Board. The ideals of equal opportunity and nondiscrimination will be covered by the status; the interests of students will be represented in the university by these bodies:

* Parliament of Students at university level
* Student Council at the Faculty level.

*Standard 5.10. The students’ transfer between higher education institutions, faculties and study programs is clearly regulated in formal internal documents.*

The Regulation on the Mobility of UP Academic Staff and Students (no. 2111, date: 14.07.2017), which is available on the UPHP website, clearly governs the movement of students between institutions of higher education, faculties, and study programs.

*Standard 5.11. Academic staff is available at sufficient scheduled times for consultation and advice to students. Adequate tutorial assistance is provided to ensure understanding and ability to apply learning.*

Each member of the academic staff posts the schedule for consultations on the door of his or her office, keeping in mind that this amount of time is adequate for consultations and providing guidance to students. Additionally, the course syllabus and charge form for each program include the number of hours allocated to counseling with students.

**Student’s mobility**

Numerous ERASMUS + mobility agreements, which are overseen by the Office for International Affairs and provide considerable opportunities for student exchanges, have been signed by the University of Pristina. At partner universities, students might stay for a few months to a year to study or do research. Four international agreements for staff and student exchange have currently been signed by the Department of Biology:

* University of Pristina - Ebersealde University for Sustainable Development (Germany),
* University of Pristina - University of Konstanz (Germany)
* University of Pristina - Pamukkale University (Turkey)
* University of Pristina - University of Milan (Italy)

**SWOT analysis for students:**

**A. Strengths**

The existing transparent and public legal infrastructure, which supports every process related to recruitment, student progress monitoring, assessment, and completion of studies

* The electronic system (SEMS) through which students' attendance at lectures is evidenced, student progress is recorded and forwarded, and reports with necessary statistical data are generated
* Small groups in lectures and exercises / practices that ensure higher efficiency,
* Involvement of students in all decision-making levels at UP,
* Transparent system of student evaluation methods, deadlines,
* Administrative support during their studies,
* Motivation for distinguished students (providing scholarships for excellent students),
* The only university in the country that offers accommodation in dormitories and provides food in the canteen at an affordable cost for Kosovar families.

**B. Weaknesses**

Lack of sufficient campaigns for media promotion of UP study programs that would inform interested parties,

* Lack of professional counseling for students with emotional problems (psychologist),
* Lack of provision of health services (doctor, dentist, etc.).

**C. Opportunities**

* ERASMUS mobility programs for students,
* Engaging students in various research projects and enabling them to conduct independent research.

**D. Threats**

* Orientation of students towards other fields of study,
* Insufficient support for science and research in the country

## Research

*Standard 6.1. The study program has defined scientific/applied research objectives (on its own or as part of a research centre or interdisciplinary program), which are also reflected in the research development plan of the institution; sufficient financial, logistic and human resources are allocated for achieving the proposed research objectives.*

The goal of this program's scientific study is explicitly stated in its mission statement for the Bachelor of Biology degree within the biology department. The study program's goals for scientific research are in line with other national initiatives as well as the University of Pristina's scientific research and development strategy. The availability of funds is constrained and insufficient to carry out research projects. It should be mentioned that while MEST and UP support some small research initiatives with symbolic funding, the remaining research is carried out thanks to the staff's dedication to securing funding from outside sources.

**List of projects completed or in progress during the last five years:**

**List of projects that have been completed in the last five years or are ongoing:**

* The Albanian Alps/Bjeshket e Nemuna as potential of UNESCO Biosphere Reserves for transboundary ecosystem management and conflict prevention' Funded by the German Academic Exchange Service (DAAD), 2019.
* Phytochemical analyzes and biological assays of some plant species traditionally used in Kosovo. Funded by the US Embassy in Pristina, 2018-19.
* Kosovo Environmental Program: Conservation of Biodiversity through the Red Book of Animal Species in Kosovo. Funded by SIDA for the Ministry of Environment and Spatial Planning, Implementing Partner: Faculty of Natural Mathematical Sciences of UP, 2016 - 2020.
* Bio-monitoring of Environmental Pollution in Kosovo (air and water pollution): Improvement of risk assessment, public awareness, and eventual remediation activities. Funded by: ÖAD, "IMPULSE" Project partners: University of Salzburg and University of Pristina. Implementation period: 2016-2018.
* Environmental Health Studies, Funded by: Austrian Development Cooperation, HERAS Program. Project partners: University of Salzburg and University of Pristina. Implementation period: 2017-2019.
* The genus Achillea: morpho-anatomical, phytochemical, and molecular plant features - a case study for conservation of natural resources, funded by: HERAS – Higher Education, Research and Applied Science (Kosovo) (Austrian Development Agency). Implementation period: 2018-19.
* "First limnological and herpetological characterization of Lake Liqenat, Kosovo", Financed by HERAS - Higher Education, Research and Applied Science (Kosovo) (Austrian Development Agency). Implementation period: 2018-2019.
* Transboundary cooperation for sustainable ecosystem management as a contribution to conflict prevention. Funded by the German Academic Exchange Service (DAAD). Implementation period: 2018.
* Cooperative Transboundary Learning for Ecosystem Management and Sustainable Development in the Sharr Mountain region: Financed by the European Union Office in Kosovo, Cross-Border Cooperation Program. Implementation period: 2015/2017.
* Phytochemical fingerprinting and therapeutical potential of different Sage (Salvia) species. Funded by the University of Milan. Implementation period: 2016.
* Analysis of Phthalate Concentration in Toys and Children's Products, Financed by the Ministry of Education, Science and Technology, Republic of Kosovo. Implementation period: 2015.
* Ethnobotanical knowledge, a new trajectory to enhance research capacities at the Univ. of Pristina, Funded by the US Embassy in Pristina. Implementation period: 2014-15.
* Investigation of some rare species of aquatic insects in spring areas in Kosovo', financed by the Ministry of Education, Science and Technology. Implementation period: 2014-2015.

*Standard 6.2. Expectations for teaching staff involvement in research and scholarly activities are clearly specified, and performance in relation to these expectations is considered in staff evaluation and promotion criteria.*

The explicit definition of the teaching staff's participation in research activities is represented in the case of the teaching staff's advancement. The Regulation on the Procedures for Employment and Advancement of Academic Staff in UP governs this subject in accordance with legal requirements (no. 465, dated 02.03.2018). The Department of Biology's teaching team is dedicated to carrying out this regulation.

*Standard 6.3. Clear policies are established for defining what is recognized as research, consistent with international standards and established norms in the field of study of the program.*

The Statute of the University of Pristina governs academic staff promotions (articles 176 - 191). All academic promotions, from associate professor to full professor, require publications in foreign journals, and the number of publications is increased with rising academic rank. The acknowledgment of research activities is in accordance with worldwide standards, and regarding the acknowledgment of the scientific contribution of each University staff member, the standards have been established by MEST and with the University's internal regulations (no. 465, dated 02.03. 2018).

*Standard 6.4. The academic staff has a proven track record of research results on the same topics as their teaching activity.*

The CVs of each regular member of the Department of Biology that are published on the FSHMN website as well as the filing of their CVs on the electronic declaration platform of the Kosovo Accreditation Agency are proof that the academic staff has a documented history of their involvement in research and teaching activities. The participation of workers in research is further demonstrated by tracking through external platforms like PubMed, ISI Web of Knowledge, Research Gate, Google Scholar, etc.

*Standard 6.5. The academic and research staff publish their work in speciality magazines or publishing houses, scientific/applied/artistic products are presented at conferences, sessions, symposiums, seminars etc. and contracts, expertise, consultancy, conventions, etc. are provided to partners inside the country and/or abroad.*

The academic staff of the Department of Biology publishes the results of their research as publications in academic journals that have undergone peer assessment. It also takes part in other activities like scientific conferences, projects, and other domestic and international activities. In this sense, the Department of Biology is wholly committed to helping the University of Pristina carry out its research strategy and action plan.

**Conferences list**

The Department of Biology at FMNS organized two scientific conferences in 2018:

1. BOOM 2018 (Balkan Odonatological Meeting) (Balkan Odonatological Meeting) 3–10 August 2018 Pristina

2. September 28–29, 2018, Pristina, Albanian Conference on Biology & Environment

**Publication list**

**2022**

* Milić, Mirta, et al. "The hCOMET project: International database comparison of results with the comet assay in human biomonitoring. Baseline frequency of DNA damage and effect of main confounders." Mutation Research/Reviews in Mutation Research 787 (2021): 108371.
* Mehmeti, Valbonë, Jeton Halili\*, and Avni Berisha. "Which is better for Lindane pesticide adsorption, graphene or graphene oxide? An experimental and DFT study." Journal of Molecular Liquids 347 (2022): 118345
* Jeton Halili, Avni Berisha\*, An experimental and theoretical analysis of supercritical carbon dioxide extraction of Cu(II) and Pb(II) ions in the form of dithizone bidentate complexes. Accepted for publication in Turkish Journal of Chemistry.
* Bislimi, Kemajl, Jeton Halili, Hazbije Sahiti, Mentor Bici, and Ilir Mazreku. "Effect of Mining Activity in Accumulation of Heavy Metals in Soil and Plant (Urtica dioica L)." Journal of Ecological Engineering 22, no. 1 (2021): 1-7.
* Troni, Naser, Ramiz Hoti, Jeton Halili, Dario Omanovic, Fisnik Laha, and Fatbardh Gashi. "Water Quality Examination in the Stream Sediment of River Sitnica–the Assessment of Toxic Trace Elements." Journal of Ecological Engineering 22, no. 2 (2021)
* Bislimi, Kemajl, Ilir Mazreku, Jeton Halili, Valbona Aliko, Kushtrim Sinani, and Liridon Hoxha. "Effects of vitamin C and magnesium L-threonate treatment on learning and memory in leadpoisoned mice." Journal of Veterinary Research 65, no. 2 (2021): 217-223.

**2019**

* Kurti F, Giorgi A, Beretta G, Mustafa B, Gelmini F, Testa C, Angioletti S, Giupponi L, Zilio E, Pentimalli D, Hajdari A, (2019). Chemical composition, antioxidant and antimicrobial activities of essential oils of different Pinus species from Kosovo. Journal of Essential Oil Research, <https://doi.org/10.1080/10412905.2019.1584591>.
* Asllani F, Schürz M, Bresgen N, Eckl E, Alija A, (2019). [Genotoxicity risk assessment in fish (Rutilus rutilus) from tëo contaminated rivers in the Kosovo](https://www.sciencedirect.com/science/article/pii/S004896971931856X). Science of the Total Environment <https://doi.org/10.1016/j.scitotenv.2019.04.321>.
* Dalo1, E., Sadikaj R., Sahiti S., (2019). Assessment of Accumulation of Heavy Metals and Lipid Peroxidation in Common reed (Phragmites australis) in the Albanian Part of Lake Ohrid. Journal of Ecological Engineering, https://doi.org/10.12911/22998993/102794

**2018**

* Alija, A.J., Bresgen, N., Bojaxhi, E., Krenn, M., Bajraktari,N, Eckl, P.M. (2018) River pollution in the Kosovo: cyto- and genotoxic effects of ëater samples in the primary rat hepatocyte assay. Toxicology and Industrial Health (accepted for publication).
* Sopjani, M., Millaku, L., Nebija, D., Dermaku-Sopjani, M., Emini, M. (2018) The Glycogen Synthase Kinase-3 in the Regulation of Ion Channels and Cellular Carriers. Current Medicinal Chemistry. DOI: 10.2174/0929867325666181009122452.
* Zhushi-Etemi F., P. Bytyqi, M. Musliu & R. Ceka (2018): Distribution of butterfly species (Lepidoptera: Papilionoidea) in the protected area " Mirusha Ëaterfalls" in Kosovo. Natura Croatica. <https://doi.org/10.20302/NC.2018.27.19>
* Sahiti, H., Bislimi, K., Dalo, E., Murati, K.(2018): Effect of ëater quality in hematological and biochemical parameters in blood of common carp (Cyprinus carpio) in tëo lakes of Kosovo. Natural and Engineering Sciences, Volume 3(3): 323-332. DOI: 10.28978/nesciences.468987
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* Mustafa B, Hajdari A, Mustafa V, Pulaj B (2018). Natural Heritage in the Republic of Kosovo: Looking for Potential UNESCO Sites. Landscape Online. V0ll. 63.
* Mustafa B,Nebija B., Hajdari A, (2018). Evaluation of essential oil composition, total phenolics, total flavonoids and antioxidant activity of *Malus sylvestris* (l.) Mill. fruits. Research, Vol. 23, pp. 1-85.
* Hajdari A, Pieroni A, Jhaveri M, Mustafa B, Quave C, (2018) Ethnomedical Remedies among Slavic Speaking People in South Kosovo. Ethnobiology and Conservation Vol. 7.
* Hajdari A, Giorgi A, Beretta G, Gelmini F, Buratti S, Benedetti S, MerkouriA, Mala X, Kabashi S, PentimalliD, Pulaj B, Mustafa B. (2018). Phytochemical and sensorial characterization of *Hyssopus officinalis* subsp. *aristatus* (god) Nyman (Lamiaceae) by GC–MS, HPLC–UV–DAD, spectrophotometric assays and e-nose ëith aid of chemometric techniques. European Food Research and Technology, 1-15
* Alija AJ, Bresgen N, Bojaxhi E, Krenn M, Bajraktari ID, Eckl PM. (2018). River pollution in the Kosovo: Cyto-and genotoxic effects of ëater samples in the primary rat hepatocyte assay. Toxicology and industrial health, 0748233718773027
* Karaouzas I, IbrahimiH, ËaringerJ. (2018).[The larva of Rhyacophila palmeni McLachlan 1879 (Trichoptera: Rhyacophilidae) from Greece and Kosovo ëith notes on ecology and zoogeography including a key to the knoën Greek.](about:blank) Zootaxa 4514 (1), 97-106
* Ibrahimi H, D Devetak, C Pizzigalli, L Hoxha. (2018). [First record of the genus Boreus Latreille, 1816 from the Republic of Kosovo](about:blank) SPIXIANA 41 (1), 12-12.
* Bilalli A, IbrahimiH, MusliuM. (2018). [Prvi nalazi faune tulara (Insecta: Trichoptera) planina Karadak, zapadni Balkan](about:blank). Natura Croatica: Periodicum Musei Historiae Naturalis Croatici 27 (1), 143-151.
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* Oláh J, AndersenT, BeshkovS, CiubucC, CoppaG, IbrahimiH. (2018).[Unified phylogenetic species concept: taking subspecies and race out of science: postmodern theory applied to the Potamophylax cingulatus group (Trichoptera, Limnephilidae).](about:blank) Opusc. Zool. Budapest, 2018, 49(1): 77–89
* Ibrahimi H, KotoriLG, KucinicM, StamenkovicVS, RimcheskaB, BilalliA. (2018). [A Study of Trichoptera of the Blinajë Hunting Reserve Including the First Records of Ironoqua dubia (Stephens, 1837) (Limnephilidae) from the Hellenic Ëestern Balkans](about:blank). Journal of the Entomological Research Society 20 (1), 11-19
* Musliu M, BilalliA, DurmishiB, IsmailiM, IbrahimiH. (2018).[Ëater Quality Assessment of the Morava e Binçës River Based on the Physicochemical Parameters and Ëater Quality Index](about:blank). Journal of Ecological Engineering Vol 19, 6
* Ibrahimi H, KučinićM. (2018). First Record of Beraea pullata (Curtis, 1834)(Insecta, Trichoptera) for Albania. Acta entomologica slovenica 26, 1.
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* Haider, C., Ferk, F., Bojaxhi, E., Martano, G., Stutz, H., Bresgen, N., Knasmüller, S., Alija, A., Eckl, P.M. (2017) Effects of β-Carotene and Its Cleavage Products in Primary Pneumocyte Type II Cells. Antioxidants. 6(2). pii: E37. doi: 10.3390/antiox6020037.
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* Zhushi, F., Bytyçi, P.,Ismaili, M., Musliu,M.(2017): Contribution to the knoëledge of Nymphalidae fauna (Lepidoptera: Rhopalocera) in Kosovo. Trakia Journal of Sciences No2, pp101-105,2017
* Grapci-Kotorri L. (2017).A study of the Trichoptera of the Blinaje Hunting Reserve including the first records of the Ironoqua dubia (Stephens,1837) (Limnephilidae) from the Hellenic Ëestern Balkans. Journal of the Entomological Research Society.

**Conferenc atendance**

**2018**

* Mustafa B., Hajdari . A. ruajtja e natyrës në kosovë: dikur, sot dhe në të ardhmen / Nature Conservation in Kosovo: Past, Present and Future. Albanian Conference of Biology and Enviroment (ACBE 2018).
* Hajdari A, Mustafa B, Nebija D. Përbërja kimike e vajrave esencialë nga lloje pishash (Pinus spp.) prej Kosove / Chemical Composition Of Essential Oils In Pine Species (Pinus Spp.) From Kosovoë. Albanian Conference of Biology and Enviroment (ACBE 2018).
* Pulaj B. Veçoritëmorfo-anatomike të bimës endemike achillea alexandri-Regis bornm. & rudsky / Morpho-Anatomical Properties of The EndemicPlant Achillea Alexandri- Regis Bornm. & Rudsky, Albanian Conference of Biology and Enviroment (ACBE 2018).
* Nebija D. Mustafa B, Hajdari A, përfitimet shëndetësore prej bimëve mjekësore që përmbajnë fitoestrogjene / The Health Benefits of Medicinal Plants that ContainPhytoestrogens.Albanian Conference of Biology and Enviroment (ACBE 2018).
* Asllani F, Schürz M, Bresgen N, Eckl P, Alija A.Vlerësimi i citotoksicitetit dhe gjenotoksicitetit të mostrave të ujit nga lumi drenica dhe sitnica: një hulumtim dyvjeçar / Cytotoxicity andGenotoxicity Risk Assessment of Ëater Samples from Drenica and SitnicaRiver: A Tëo Year Investigation, Albanian Conference of Biology and Enviroment (ACBE 2018).
* Sinanaj RexhajQ, AlijaA, BresgenN,Eckl  P. Të dhëna mbi vetitë toksikologjike të ujërave të lumit sitnica (kosovë) / Data on Toxicological Properties of Ëaters from the SitnicaRiver (Kosovo), Albanian Conference of Biology and Enviroment (ACBE 2018).
* Alija A, Asllani F, DreshajS,SchürzM, BresgenN, Eckl P. Ndotja e ajrit dhe ujit në kosovë: vlerësimi i rrezikut të gjenotoksicitetit / Air snd Ëater Pollution in the Kosovo: Genotoxicity Risk Assessment, Albanian Conference of Biology and Enviroment (ACBE 2018).
* Mala X, Pulaj B. Lloje të reja në florën e Kosovës / Neë Species for the Flora ofKosovo, Albanian Conference of Biology and Enviroment (ACBE 2018).
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* Sahiti, H., Bislimi, K., Mazreku, I., Sadikaj, R., Dalo, E Effect ff Vitamin E in Reducing of Oxidative Stress Induced by Heavy Metals In Carp Cyprinus Carpio. Albanian Conference of Biology and Environment (ACBE2018)

**2017**

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*Standard 6.6. Research is validated through: scientific and applied research publications, artistic products, technological transfer through consultancy centres, scientific parks and other structures for validation.*

The publication of research findings in scholarly and applied journals with peer assessment serves to validate the findings.

*Standard 6.7. Each academic staff member and researcher has produced at least an average of one scientific/applied research publication or artistic outcome/product per year for the past three years.*

From assistants to those with the highest academic rank, every member of the academic staff in the Department of Biology has published more than one scientific publication year over the last three years, and their CVs can attest to this.

*Standard 6.8. Academic and research staff publish under the name of the institution in Kosovo they are affiliated to as full time staff.*

The entire research work of full-time academic staff at the Department of Biology is published under the affiliation of the University of Prishtina.

*Standard 6.8. Academic staff are encouraged to include in their teaching information about their research and scholarly activities that are relevant to courses they teach, together with other significant research developments in the field.*

The outcomes of their study are frequently used in the teaching process, serving as a source of pertinent data for certain teaching units in the courses they instruct.

*Standard 6.9. Policies are established for ownership of intellectual property and clear procedures set out for commercialization of ideas developed by staff and students.*

Academic staff publishing with a university affiliation is required to respect intellectual property. The Code of Ethics and other rules, in addition to national legislation, govern intellectual property rights in the United Provinces. Anyone interested in commercializing their innovations should submit a patent application to MEST.

*Standard 6.10. Students are engaged in research projects and other activities*

Most of the time, students participate directly in research projects, while those who do not participate directly in project activities nevertheless gain indirect access to research experiences and outcomes through lectures.

Students who work on master's degrees acquire experience in the particular research subject. Most often, the findings from these studies are published in a variety of journals with students serving as first or co-authors.

**SWOT analysis for research:**

**A. Strengths**

* The diversity of scientific publications and research conducted by the biology staff department,
* Active participation in international scientific conferences of the academic staff,
* A significant number of scientific publications in peer-reviewed journals,
* Cooperation with international institutes and universities for joint scientific research projects, but also at the level of doctoral studies,
* The possibility of applying the results of scientific research in practice, such as multi-dimensional research of flora and fauna,
* Organization of scientific conferences.

.**B. Weaknesses**

* Insufficient access to international projects due to restrictions on travel in EU countries or even the political situation of Kosovo,
* Limited funding for scientific research that is provided by the university or the Ministry of Education, Science and Technology,
* Lack of staff to support the administrative procedure for the collection and development of research projects within the faculty;
* Lack of university incentives for scientific research and interdisciplinary collaboration across other academic departments,
* The small number of research institutions in the natural sciences in the country,
* Long bureaucratic procedures for project implementation.

1. **Oportunities**

* Institutions, businesses, and other interested parties can collaborate and seek advice based on the experience and findings of scientific study.
* Increasing international cooperation for joint research,
* The application of human resources (academic personnel and students) to the quantitative and qualitative expansion of scientific undertakings, particularly interdisciplinary ones;
* Involvement of students in scientific work.

**D. Threats**

• Unchanged research staff due to limited funding and financial incentives, as well as because teaching is more financially motivated

• High unemployment in the country.

## Resources and infrastructure

*Standard 7.1. The adequate long-term implementation of the study program is ensured in quantitative terms as regards premises, human resources and equipment. At the same time, it is guaranteed that qualitative aspects are also taken into account.*

The FMNS Department of Chemistry and the Faculty of Medicine will work together to implement the BSc Molecular Biology Study Program. However, there are only a limited number of teaching positions available for this study program as well as for other programs in the Department of Biology and other Departments of FMNS.

*Standard 7.2. There is a financial plan at the level of the study program that would demonstrate the sustainability of the study program for the next minimum three years.*

The Department of Biology (which includes this study program) has an annual budgetary plan for the chemicals, consumables, equipment, transportation, and accommodation required for laboratory and field work, ensuring the study program's viability in the years to come.

*Standard 7.3. The higher education institution must demonstrate with adequate documents (property deeds, lease contracts, inventories, invoices etc.) that, for the study program submitted for evaluation it possesses the following, for the next at least three years:*

*a) owned or rented spaces adequate for the educational process;*

*b) owned or rented laboratories, with the adequate equipment for all the compulsory disciplines within the curriculum, wherever the analytical syllabus includes such activities;*

*c) adequate software for the disciplines of study included in the curriculum, with utilisation licence;*

*d) library equipped with reading rooms, group work rooms and its own book stock according to the disciplines included in the curricula.*

The Department of Biology, which is a part of FMNS, has a building of its own; it has never rented a space elsewhere. While the laboratory apparatus is owned by the university and is not available for rental.

*Standard 7.4. The number of seats in the lecture rooms, seminar rooms and laboratories must be related to the study groups’ size (series, groups, subgroups); the applicative activities for the speciality disciplines included in the curricula are carried out in laboratories equipped with IT equipment.*

The allocation of students into groups ensures that each group member has a seat in the lecture halls, seminar rooms, and laboratories. Computer hardware is provided in the labs to aid in the teaching process.

**Table 14. IT infrastructure.**

Academic staff

• 28 PCs

• 25 laptops

• 10 Projectors

**Classrooms, laboratories, cabinets, etc. In the Department of Biology**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Lecture hall** | **Laboratories** | **Library** | **Cabinets** | **Administration** | **Total** |
| 5 | 11 | 1 | 19 |  | 36 |
| 262m2 | 501m2 | 30m2 | 228m2 | 30m2 | 051 m2 |

*Standard 7.5. The education institution’s libraries must ensure, for each of the study programs:*

*a) a number of seats in the reading rooms corresponding to at least 10% of the total number of students in the study program;*

*b) a number of seats in the group work rooms corresponding to at least 10% of the total number of students in the study program;*

*c) their own book stock from Albanian and foreign speciality literature, enough to cover the disciplines within the curricula, out of which at least 50% should represent book titles or speciality courses of recognized publishers, from the last 10 years;*

*d) a book stock within its own library with a sufficient number of books so as to cover the needs of all students in the cycle and year of study the respective discipline is provided for;*

*e) a sufficient number of subscriptions to Albanian and foreign publications and periodicals, according to the stated mission.*

The University Library, which is located on the university campus, is used by biology department students. The UP library provides access to numerous biology-related books as well as online databases like ScienceDirect, BioOne, etc. Additionally, there are 3 tiny libraries where students can read within the FSHMN framework. It should be emphasized that UP has limited resources for the study course textbooks, thus the teaching staff tries to give them or provide students with other literary sources (online books, scientific journals and other materials from the Internet).

The syllabus for each subject includes a list of all the reading materials offered to students in the program. The majority of the literature is in Albanian, with some also being in English, for most subjects.

*Standard 7.6. The infrastructure and facilities dedicated to the implementation of the program is adapted to students with special needs.*

Most of the time, the faculty facility's infrastructure and instructional spaces are unsuitable for students with special needs.

*Indicator of performance 7.1: For the provision and improvement of infrastructure and resources, formal plans are developed and their execution and efficacy are regularly assessed.*

*Indicator of performance 7.2: Infrastructure and resource development are supervised by a senior staff member. 2.*

*Indicator of performance 7.3: Student usage and satisfaction surveys are just two of the techniques used to continuously check the efficacy and relevance of infrastructure and services. Resources and infrastructure are changed in response to evaluation and comments.*

The equipment’s used in the biology department's laboratories.

|  |  |  |
| --- | --- | --- |
| **No** | **Device name** | **pieces** |
| 1 | Advanced Stream Flowmeter | 1 |
| 2 | Actinometer | 3 |
| 3 | Animal Activity monitor | 2 |
| 4 | Blood pressure meter CONTEC 08A | 1 |
| 5 | STOMACHER apparatus ( for homogenization ) | 1 |
| 6 | Water bath (thermal) | 6 |
| 7 | Ultrasonic bath | 1 |
| 8 | Blender | 2 |
| 9 | Centrifuge | 6 |
| 10 | Centrifuge Technical for cooling | 2 |
| 11 | Chlorophyll content meter | 1 |
| 12 | Chlorophyll florescence meter FSMII | 1 |
| 13 | Water Distillatory | 4 |
| 14 | Dissolved oxygen meter | 1 |
| 15 | Dual Oxygen electrode amplifier model 203 | 4 |
| 16 | Lents 30x70 | 3 |
| 17 | Ecology simulation CD ROM | 1 |
| 18 | Horizontal Electrophoresis | 2 |
| 19 | Vertical Electrophoresis | 2 |
| 20 | Electrophoresis tank | 1 |
| 21 | Refrigerator | 6 |
| 22 | Drying oven | 1 |
| 23 | GC system (GC/FID & GC/MS), 7890A, Agilent, | 1 |
| 24 | GPS | 5 |
| 24 | GC/ECD Agilent 6890 | 1 |
| 25 | Atomic absorption spectroscopy analytik jena contrAA 300 | 1 |
| 26 | IR spectrometer | 1 |
| 27 | Geo-thermometers | 10 |
| 28 | Hybridizer | 1 |
| 29 | Hygrometer | 1 |
| 30 | Homogenization | 1 |
| 31 | Hse Stimulator | 4 |
| 32 | Incubator MEMMERT | 1 |
| 33 | Kamer | 1 |
| 34 | Sonny microscope camera | 1 |
| 35 | Stereomicroscope camera GXCam | 1 |
| 36 | Chemograph | 2 |
| 37 | Horizontal chamber for TLC 10cm x 10cm | 1 |
| 38 | Horizontal chamber TLC 20cm x 10cm | 1 |
| 39 | Electrophoresis chamber | 1 |
| 40 | Dyeing chamber | 6 |
| 41 | Mammal traps | 5 |
| 42 | Lux meter digital | 3 |
| 43 | Ultraviolet lamp | 15 |
| 44 | Microscope Crestron | 2 |
| 45 | Micro DOC system for documentation of gel electrophoresis AC input 230V | 1 |
| 46 | Microscope VANOX OLYMPUS (Universal microscope) | 1 |
| 47 | Microscope | 5 |
| 48 | Microscope (MIOTIC) | 1 |
| 49 | Microscope invert | 1 |
| 50 | Microscope JENA | 1 |
| 51 | Microscope LEICA | 1 |
| 52 | Microscope monocular | 10 |
| 53 | Microscope Motic | 5 |
| 54 | Microscope MRP 2000 PREMIERE | 15 |
| 55 | Microscope OLYMPUS | 1 |
| 56 | Microscope optic trinocular Zeiss Axiostar plus | 1 |
| 57 | Microtome | 3 |
| 58 | Mixer magnetic (VORTEX) | 1 |
| 59 | Model of human skeleton | 1 |
| 60 | Oxygen meter | 1 |
| 61 | OPPM Oxygen partial pressure module | 4 |
| 62 | Oscillography | 1 |
| 63 | Real time-PCR-HRM | 1 |
| 64 | Magnetic mixer | 2 |
| 65 | Scales | 5 |
| 66 | Analytic scale | 1 |
| 67 | Magnetic mixer | 1 |
| 68 | Ph Meter | 6 |
| 69 | Ph meter portable | 2 |
| 70 | Plate Reader UV-VIS | 1 |
| 71 | Pneumograph | 1 |
| 72 | Porometer | 1 |
| 73 | Projector | 12 |
| 74 | Psychrometer | 2 |
| 75 | Laboratory refractometer | 1 |
| 76 | Laboratory refractometer Zeiss | 1 |
| 77 | Electric plate | 5 |
| 78 | Electro fisher net | 1 |
| 79 | D-net for macroinvertebrate collection | 1 |
| 80 | Entomologic net | 5 |
| 81 | Net for terrestrial insect collection | 1 |
| 82 | Surberi net | 1 |
| 83 | Secchi disc | 1 |
| 84 | Spectrophotometer, Thermospectronic Genesys 10 UV | 1 |
| 85 | Spectrophotometer (Analytijena) | 1 |
| 86 | Spirolab | 1 |
| 87 | Spirometer | 3 |
| 88 | Stereomicroscope (MOTIC-SMZ-161) | 10 |
| 89 | Sterilisator | 3 |
| 90 | Dry Sterilizator MEMMERT | 1 |
| 91 | Stimulator 6020 | 4 |
| 92 | Magnetic Stimulator | 1 |
| 93 | Thermometers | 10 |
| 94 | Thermostat | 2 |
| 95 | Transducer Amplifier | 2 |
| 96 | Turbid meter | 1 |
| 97 | Dryer (oven) | 1 |
| 98 | PCR | 1 |
| 99 | Digital Thermo-hygrograph | 2 |
| 100 | Thin Layer Chromatography Limonat | 1 |
| 101 | Vacuum pomp Air Cadet | 2 |
| 102 | TLC- Cab-UVIS Visualizer | 1 |
| 103 | rqPCR | 2 |
| 104 | ELISA reader | 2 |
| 105 | Inverted microscopy | 1 |
| 106 | Fluorescence microscope | 1 |
| 107 | PCR cabinet | 1 |
| 108 | Cell line sterile box | 1 |
| 109 | Heamatocitometer | 1 |
| 110 |  |  |

**Tabular presentation of equipment and means of materialization at the Department of Chemistry**

|  |  |  |
| --- | --- | --- |
| **Nr.** | **Item description - model - type** | **Sasia** |
| 1 | FTIR spectroscopy, Shimatzu 1300s | 1 |
| 2 | Set kutia me pjesë te spektroskopit Set box of spectroscope parts | 1 |
| 3 | pH meter vision portable | 4 |
| 4 | Oxygen meter (portable) | 1 |
| 5 | Automatic technic balance | 9 |
| 6 | Rotatory evaporator (Heidolph) | 7 |
| 7 | UV box (Betrachter) | 1 |
| 8 | Drying furnace (Memmert) | 8 |
| 9 | Vacuum pomp, for filtering | 1 |
| 10 | Melting point apparatus Buchi 545 | 1 |
| 11 | Vessel dryer | 5 |
| 12 | Magnetic stirring heater | 29 |
| 13 | Heater with grid | 1 |
| 14 | Laboratory water bath | 9 |
| 15 | Potentiostat (Autolab) | 3 |
| 16 | pH- meter | 8 |
| 17 | Water distiller GLF | 3 |
| 18 | Micropipette | 16 |
| 19 | Gas chromatograph GC-ECD (Agilent) | 1 |
| 20 | Analytical balance (Skaltec) | 6 |
| 21 | Conductometer HANA | 6 |
| 22 | Supercritical extraction equipement | 1 |
| 23 | Polarimeter | 2 |
| 24 | Refractometer | 2 |
| 25 | Thermostat | 2 |
| 26 | Spectrophotometer | 1 |
| 27 | Spectrophotometer UV-VIS (Shimadzu) | 1 |
| 28 | Potentiostat Palmens (portable) with laptops | 3 |
| 29 | Potentiostat Print Stone | 1 |
| 30 | Ultrasound bath | 1 |
| 31 | Chronometer | 1 |
| 32 | Calcinating kiln | 4 |
| 33 | Turbidimeter | 1 |
| 34 | OT meter | 2 |
| 35 | Voltmeter | 1 |
| 36 | Autoclave | 1 |
| 37 | Seaving equipment | 1 |
| 38 | Centrifuge | 2 |
| 39 | Thermohygrometer | 1 |
| 40 | Laboratory mill | 2 |
| 41 | I oH meter Knick | 1 |
| 42 | Electrolyzer | 1 |
| 43 | Potentiostat 10 | 4 |
| 44 | HPLC pomp | 1 |
| 45 | Injector | 1 |
| 46 | Detector | 1 |
| 47 | Oxygen pressurized cylinder | 1 |
| 48 | Spectrophotometer UV-VIS | 1 |
| 49 | Pressurized acetylene | 1 |
| 50 | Atomic absorber (Perking) | 2 |
| 51 | Atomic absorber (Buch) | 1 |
| 52 | Analyzer (Metrohm) | 1 |
| 53 | Buch Pomp, model 420 | 1 |
| 54 | Perking Elmer MHS-10 | 1 |
| 55 | Polarograph (Metrohm 747) | 1 |
| 56 | Sieve for soil samples | 1 |

The 2041 m2 space is used by the Chemistry Department. Both retired teachers and academic employees with established working connections have access to cabinets. Each one of them has access to the internet, computers, and printers, which are essential tools for the job. There are few instances where they are utilized by two or more teachers, however the majority of cabinets are used by one teacher (mostly full professors) (assistants).

It would be ideal if the classrooms and laboratories used for lectures and exercises were larger following the revision of the educational system. The confusion in the teaching schedule during the working days of the week is caused by the high number of courses for the Chemistry department and the big number of student groups. Additionally, the department needs a cabinet with a computer, and the rector has promised to fulfill this request as quickly as possible.

The working tools are offered in two sections. The first portion relates to the administration of the faculty, including the dean's office, and the second part to the furniture in the cabinets and the instructional materials required for the Chemistry department's classes to run well.

The Department of Biology and Chemistry has rooms, classrooms, research labs, cabinets, and amphitheaters.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Departments | classroom | Laboratories for students and researchers | library | teachers' hall | teachers' offices | administration and common space | **totally** |
| **Chemistry** | **3** | **11+13** | **1** | **-** | **20+ 1 (shefi)** | **6** | **55** |
|  | **210 m2** | **1151 m2** | **160 m2** |  | **281 m2** | **239 m2** | **2041 m2** |
| Biology | 5 | 11 | 1 | - | 19 | hallway | 37 |
|  | 262 m2 | 501 m2 | 30 m2 |  | 228` m2 | 30 m2 | 1051 m2 |

**SWOT analysis for infrastructure and resources:**

**A. Strengths**

**●** The number of laboratories or laboratory equipment for each course is sufficient for this program,

● The availability of laboratory supplies, chemical reagents, and concretization tools for students to complete their practical assignments has expanded in recent years.

● Electronic classroom monitoring system

**B. Weaknesses**

● Bad conditions in classrooms, laboratories, office spaces for work and studies,

● Lack of technical staff for the maintenance of existing equipment,

● There are no funds for the purchase of textbooks for organized courses,

**C. Opportunities**

**●** Construction of the FMNS facility and creation of modern infrastructure

**D. Threats**

● The key institutions' inability to resolve the issue of building the FMNS facility,

1. RECENT EVOLUTION AND DEVELOPMENT MENTIONED SINCE PRIOR EVALUATION (IF ANY)

|  |  |  |
| --- | --- | --- |
| **Recommendation of the Expert Team in the previous External Review Report** | **The solution that the provider has implemented in addressing the recommendation** | **Other relevant comments** |
|  |  |  |
|  |  |  |

# Anex (if there is any)

Anex Ia: Syllabuses of couses in study program are in the separated follder

Anex II: CV- e staff, separated in different follder

Anex III: Program comparition

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Comparition of program Molecular Biology (UP -UZ) | | | | | | |
|
| **Semestri** | **Molecular biology , Universiteti i Prishtinës** | **O/Z** | **ECTS** | **Molecular biology, University of Zagreb** | **ECTS** | **O/Z** |
| **Semestri I** | Cell biology | O | 6 | Biologji e qelizës | 8 | O |
| Zoology | O | 6 | Kimi e përgjithshme dhe inorganike | 12 | O |
| General and inorganic chemistry | O | 6 | Physical Education and Health Culture 1 | 0 | O |
| Bacteriology and virology | O | 6 | Zoology | 10 | O |
| Mathematics for biology | O | 6 |  |  |  |
|  | | | | | | |
| **Semsetri II** | Botany | O | 6 | Botany | 10 | O |
| Physics | O | 6 | Physics | 6 | O |
| Biostatistics | O | 6 | Mathematics | 6 | O |
| Organic chemistry | O | 6 | Organic chemistry | 8 | O |
| Developmental biology | O | 6 | Physical Education and Health Culture 1 | 0 | O |
|  | | | | | | |
| **Semestri III** | Human physiology | O | 6 | Bacteriology and virology | 9 | O |
| Analitical chemistry | O | 5 | Fundamentals of Physical Chemistry | 12 | O |
| Bioinformatics | O | 5 | Statistics | 5 | O |
| Biochemistry | O | 6 | Physical Education and Health Culture 1 | 0 | O |
| Human anathomy | Z | 4 | Human anathomy | 3 | Z |
| Human Endrocrinology | Z | 4 | Marine Biology | 4 | Z |
| Histology and Histochemistry | Z | 4 | Geology and Paleontology | 5 | Z |
| Laboratory methodos | Z | 4 | Model Organisms in Molecular Biology | 4 | Z |
| Model animals in research of molecular Biology | Z | 4 | Environmental microbiology | 5 | Z |
| Research methods for proteins and nucleic acids | Z | 4 | Zoology – 2 (Invertabrates) | 4 | Z |
|  | | | | | | |
| **Semsetri IV** | Biotests and me hematology | O | 5 | Biochemistry – I – | 9 | O |
| Animal physiology | O | 6 | Plant physiology | 7 | O |
| Genetics | O | 6 | Genetics | 9 | O |
| Biological evolution | O | 5 | Physical Education and Health Culture 1 | 0 | O |
| Extraction teqniques | Z | 4 | Analitical chemistry | 6 | Z |
| Radiation and quality control | Z | 4 | Histology and Histochemistry | 5 | Z |
| Fundamentals of microscopy | Z | 4 | Model Organisms in Molecular Biology | 4 | Z |
| Clinical biochemistry in veterinary | Z | 4 | Principles of Paleontology | 3 | Z |
| Molecular physiology of systems of organs | Z | 4 | Field Course in Botany and Zoology | 3 | Z |
| Tumor biochemistry | Z | 4 | Field Course in Botany and Zoology (english) | 3 | Z |
| Environmental microbiology | Z | 4 | Introduction to Electron Microscopy | 5 | Z |
|  |  |  | Introduction to Electron Microscopy (English) | 5 | Z |
|  | | | | | | |
| **Semestri V** | Plant physiology | O | 6 | Animal physiology | 8 | O |
| Medical biochemistry | O | 6 | Biochemistry– II – | 7 | O |
| Imunobiology | O | 6 | Developmental biology | 7 | O |
| Fundamentals of physical chemistry | Z | 4 | Biotests | 4 | Z |
| Algalogy and micology | Z | 4 | Imunology and imunogenetics | 5 | Z |
| Zoology – 2 (Invertabrates) | Z | 4 | Plant Metabolism under Stressful Conditions | 5 | Z |
| Zoology – 3 – (Vertebrates) | Z | 4 | Radiobiology | 4 | Z |
| Plant methabolism in stress condition | Z | 4 |  |  |  |
| Biopsicology | Z | 4 |  |  |  |
|  | | | | | | |
| **Semestri VI** | Molecular genetics | O | 6 | Biological evolution | 7 | O |
| Plant and animal cell culture | O | 6 | Plant and animal cell culture | 5 | O |
| Diploma thesis | O | 6 | Molecular genetics | 8 | O |
| Ecology | Z | 4 | Seminar Paper | 5 | O |
| Computer practice | Z | 4 | Ecology | 5 | Z |
| Molecular teqniques of plant identification | Z | 4 | Genomics | 5 | Z |
| Parasitology | Z | 4 | Laboratory Skill Training | 4 | Z |
| Medical plants | Z | 4 | Methods of Nucleic Acids Research | 5 | Z |
|  | Z | 4 | Methods of Protein Research | 5 | Z |
|  | Z |  | Computer practice | 5 | Z |
|  | Z |  | Introduction to Forensic Biology | 4 | Z |
|  |  |  | Zoology – III – (Vertebrates) | 5 | Z |
| **Percentage os similarity between programs of University of Pristhina and University of Zagreb: 72% (O 91% dhe Z 52%)**  **\*O-Mandatory**  **Z-Elective** | | | | | | |

https://www.pmf.unizg.hr/biol/studiji/preddiplomski\_studij/preddiplomski\_sveucilisni\_studij\_molekularna\_biologija

4. Budgeting and financial plan

4.1. Regular staf (full time)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Full time staff** | | | | |
| No | Title | Nr. i stafit akademik | Paga bruto | Gjithsej |
| 1 | Ordinary Professor | 10 | 1428 | 14.280 |
| 2 | Asociated Professor | 8 | 1280 | 10.240 |
| 3 | Assistent Professor | 2 | 1136 | 2.272 |
| 4 | Assistent | 10 | 772 | 7.720 |
| 5 | Total academic staff | 30 | 4616 | 34512 |

4.2. Budget (supplies)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Teaching supplies Year I-III (2022-2024)** | | | | |
| No | Description | Ammount/Month | months x 12 | Total/Year |
| 1 | Chemical reagents (Year I) | 1000 | 12 | 10.000 |
| 2 | Chemical reagents (Year I and II) | 2000 | 12 | 24.000 |
| 3 | Chemical reagents (Year I, II, III) | 2500 | 12 | 30.000 |

4.3. Operational expences

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Operational expences in Faculty level** | | | | |
| No | Description | Ammount/Month | months x 12 | Total/Year |
| 1 | Electricity | 1535,54 | 12 | 18426,48 |
| 2 | Water | 3147,26 | 12 | 37767,2 |
| 3 | Heating | 5026,66 | 12 | 60319,94 |
| 4 | Telephone | 101,9 | 12 | 1222,82 |
| 5 | Waste | 6479 ne kuader te Up-së | 12 | 77748 |
| 6 | Fixed cleaning operational expences | 5951,38 | 12 | 71416,56 |
| 7 | Security | 2815,44 | 12 | 33785,28 |
| Total | | 25057,18 | 12 | 300686,28 |