

Bioinformatics

undergraduate study programme, first Bologna cycle

COURSE STRUCTURE of the study programme

The study programme consists 28 compulsory courses, 4 elective courses, and a final seminar within which the student prepares and defends a final project thesis. All courses are assigned either 3 or 6 ECTS under the European Credit Transfer and Accumulation System (ECTS). Elective courses are divided into internal electives (2) and external electives (2).

To complete the programme, a minimum of 180 ECTS must be obtained. This includes all academic requirements within individual courses of the study programme (assignments, seminars, and examinations), as well as the preparation and defence of the final project thesis, which the student defends as part of the seminar.

The following section presents the structure of the study programme by year, the compulsory and internal elective courses of the programme, and the available study tracks.

Table 1: Structure of the study programme

Year of study	Study obligation	Number	ECTS-credits (ECTS)	
			ECTS	ECTS/Year of study
1.	Compulsory Course	10	60	60
2.	Compulsory Course	10	54	60
	Internal Elective Course	1	6	
3.	Compulsory Course	8	36	60
	Internal Elective Course	1	6	
	External Elective Course	2	12	
	Seminar - Final Project Paper	1	6	

Legend:

ECTS credits (ECTS) = credit points awarded under the European Credit Transfer and Accumulation System (ECTS). The credit system facilitates student mobility and the mutual recognition of completed academic requirements.

ECTS credits represent an average estimate of the time required to complete a course and include both organized forms of instruction (lectures, seminars, seminar and laboratory exercises, fieldwork, practical training, etc.) and the student's independent work (exam preparation and other course-related obligations, etc.). One (1) ECTS credit corresponds to 25 to 30 hours of study workload. Credits are awarded upon the successful completion of the requirements for an individual course.

Table 2: First year of study

No.	Course	ECTS
1.	Analysis I – Foundations of Analysis	6
2.	Analysis II – Infinitesimal Calculus	6
3.	Algebra I – Matrix Calculus	6
4.	Algebra II – Linear Algebra	6
5.	Computer Practicum	6
6.	Programming I	6
7.	Theoretical Computer Science I	6
8.	Data Programming	6
9.	Organic Chemistry and Biochemistry	6
10.	Genetics	6

Table 3: Second year of study

No.	Course	ECTS
1.	Data Structures and Algorithms	6
2.	Introduction to Bioinformatics	6
3.	Introduction to Database Systems	6
4.	Foundations of Physics with Biophysics	6
5.	Analysis III – Functions of Many Variables	6
6.	Statistics	6
7.	Algorithms in Bioinformatics	3
8.	Introduction to Machine Learning and Data Mining	6
9.	Programming II – Concepts of Programming Languages	6
10.	Nucleotide Sequence Analysis	3
11.	Internal Elective Course I	6

Table 4: Third year of study

No.	Course	ECTS
1.	Structure of Biological Molecules	3
2.	Biotechnology	3
3.	Evolutionary and Population Genetics	6
4.	Systems III – Information Systems	6
5.	Evolutionary Biology	6
6.	Physical Chemistry with Cheminformatics	6
7.	Functional Genomics	3
8.	Mathematical Modelling in Bioinformatics	3
9.	Internal Elective Course II	6
10.	External Elective Course I	6
11.	External Elective Course II	6
12.	Seminar - Final Project Paper	6

ELECTIVE courses

Elective courses are selected by students in the second and third year of study. They are divided into internal and external electives. All elective courses are assigned 6 ECTS under the European Credit Transfer and Accumulation System (ECTS).

Below is a list of all *internal elective courses* within the study programme; however, each year the faculty offers only a selected subset (a narrower selection). Students choose their elective courses upon enrolment in the upcoming academic year.

Within the Bioinformatics study programme, four internal elective courses are accredited:

- Biomolecular Modeling (6 ECTS);
- Mathematical Chemistry (6 ECTS);
- Systems Biology Approach in Human Disease Study (6 ECTS);
- Introduction to Environmental, Conservation and Animal Ethics (6 ECTS).

Within the framework of internal electives, students may also choose courses from certain undergraduate study programmes offered by UP FAMNIT (the number of credits and brief course descriptions are available in the respective programme under the Curriculum section):

- [Mathematics](#): Introduction to Numerical Calculations; Algebra III – Abstract Algebra; Game Theory; Probability; Stochastic Processes I;
- [Mathematics in Economics and Finance](#): Stochastic Processes II;
- [Computer Science](#): Theoretical Computer Science II – Formal Languages and Computability; Theoretical Computer Science III – Information Theory; Systems I – Hardware; Systems II – Operating Systems and Computer Networks; Programming III – Concurrent Programming; Computer Networks;
- [Conservation Biology](#): Conservation Biology; Systematic Botany and Geobotany; Environmental Monitoring; Geographical Information Science and Systems; Marine Biodiversity; Protected Areas and Sustainable Use; Biogeography; Ecotoxicology; Biodiversity and Ecology of the Mediterranean; Biological Topics in English; Ecology;
- [Agronomy \(VS\)](#): Plant Biotechnology; Plant Molecular Diagnostic; Plant Breeding and Propagation.

External elective courses may be selected within accredited study programmes at higher education institutions in Slovenia or abroad. These typically include courses in the fields of mathematics, financial mathematics, computer science and informatics, biology, chemistry, physics, and agriculture. Depending on the student's interests, particularly in connection with the final project thesis in the third year, it is also possible to select courses from other academic fields. External electives may also be chosen from the pool of internal elective courses.

Each year, the faculty offers only a subset of elective courses, taking into account staffing and financial capacities as well as student interest. The final list of elective courses is published in July prior to enrolment, and students select them during enrolment for the upcoming academic year.

Within the framework of external electives in the third year, students may complete *Practical Training* in a Work Environment (lasting 3 weeks which is collectively valued at 6 ECTS). The purpose of this training is to enable students to gain professional experience in the field of mathematics. The training is carried out in a real work environment under the supervision of a qualified mentor in mathematics. Students who choose to undertake practical training must first coordinate with the study programme coordinator and then record their decision on the enrolment form when enrolling in the third year. More detailed instructions are available in the section [Practical Training](#).

For assistance and guidance in selecting elective courses and study tracks, students may consult the study programme coordinator.

Field work

Some elective courses (when selected by students from the Conservation Biology and Agronomy study programmes) are also conducted in the field (fieldwork), which constitutes a mandatory component of the

study programme. Fieldwork is intended to provide practical knowledge that builds upon the theoretical content delivered in lectures.

Fieldwork may be organized as one- or multi-day activities. Particularly in the higher years of study, it may include two- or three-day field trips in Slovenia or abroad (e.g., Istria, Cres, Lošinj, Velebit). With the support of professors, teaching assistants, and local guides, students explore the natural environment, local specificities, and research institutions, while also carrying out practical tasks. In addition to its academic value, fieldwork offers opportunities for informal social interaction, discovering new locations, and is considered one of the most popular forms of study-related activities.

Due to exposure to natural environments, students are advised to receive vaccination against tick-borne encephalitis, which is organized as part of regular medical check-ups at the Community Health Center Koper and is provided free of charge for students.

Costs associated with the implementation of fieldwork and professional excursions are charged to students based on the actual cost per participant, in accordance with applicable regulations. Each academic year, the management of UP FAMNIT determines the level of co-financing based on cost analysis and available financial resources; in previous years, the faculty has covered between 50% and 80% of the costs. The faculty will continue to strive to secure funds for partial co-financing of fieldwork in the future.

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