

**FACULTY OF SCIENCE
UNIVERSITY OF SPLIT**

BECOME A STUDENT!

Approved Master Studies
in English

Environmental Physics

Astrophysics and Elementary
Particles Physics

Molecular Biology

Data Science and Engineering



Projekt je sufinancirala Europska unija iz fonda: Europski socijalni fond, financijsko razdoblje 2014.–2020.
www.strukturnifondovi.hr

Sadržaj publikacije isključiva je odgovornost Prirodoslovno-matematičkog fakulteta u Splitu

**INTERNACIONALIZACIJA DIPLOMSKIH STUDIJSKIH PROGRAMA NA
PRIRODOSLOVNO-MATEMATIČKOM FAKULTETU U SPLITU**

Molecular biology - a new graduate study program at Faculty of Science, University of Split, Croatia

General information

Duration of studies: 4 semesters (2 academic years).

120 ECTS credits and the title of master of molecular biology (mag. mol. biol.) upon graduation.

Enrolment requirements:

Holders of bachelor's degrees who have completed one of the following university undergraduate study programmes may apply for enrolment: Molecular Biology, Biology, Biology and Chemistry. As a general rule, these holders of bachelor's degrees may enrol into a programme without having any bridging courses. The right to enrol into the programme is given to holders of bachelor's degrees based on their position on the performance rank, without additional testing of the candidate's knowledge, skills and competencies.

Students coming from related undergraduate study programmes in the areas of science, biotechnical and biomedical as well as interdisciplinary study programmes, and acquired at least 180 ECTS, may apply for enrolment. A special expert committee will decide on exams for the bridging courses on an individual basis

You will learn about...

- Biological processes at the molecular level and the functioning of living organisms;
- Applications of molecular biology in order to improve human health, food production, environmental preservation;
- How to use information communications technology in acquiring and processing data
- Devise experiments that take into account the principles of scientific methods and experimental approaches to resolving scientific issues;
- Choose methods and materials for research in line with ethical principles stemming from national and international laws and directives.
- Assess sources of literature along with choosing relevant data in order to argument and present one's own scientific results and the results of others.
- Critically assess scientific and social aspects in applying molecular biology;
- Participate in teamwork and adapt to the requirements of the working environment;
- Disseminate acquired knowledge in one's own country and in the international community through educational and research activities;

I Semester	ECTS
Molecular Cell Biology	8
Genomics and Molecular Genetics of Eukaryotes	7
Biochemistry III	4
Advanced Laboratory Course in Biochemistry	2
Bioinformatics	5
Research Methodology	4
Total mandatory courses	30

II Semester	ECTS
Molecular Biotechnology	7
Molecular Microbiology	5
Biostatistics	6
Epigenetics	3
Proteomics	3
Total mandatory courses	24
Total elective courses	6

III Semester	ECTS
Developmental biology	3
Biology of aging	4
Carcinogenesis and mutagenesis	3
Basic Immunology	5
Total mandatory courses	15
Total elective courses	15

IV Semester	ECTS
Graduate Thesis	30
Total mandatory and elective courses	30

Employment opportunities

- Public (state) and private higher education and research institutions (institutes)
- Research and a career in clinical practice (e.g., medical genetics, molecular medicine, regenerative medicine)
- Chemical and pharmaceutical laboratories and biotechnology (from start-ups to larger companies)
- Public administration in the areas of chemistry, ecology and health (e.g., in assessing risks, genetic engineering and biological infectology)
- Government agencies and other bodies engaged in programs involving the analysis, safety and quality of samples of food, drugs, air, water, waste as well as animal tissue and consumer protection
- Product development (therapeutics and diagnostics), production and quality control in the chemical and pharmaceutical industry
- Production, sale, servicing of medicinal devices and equipment
- Sale and distribution of medical reagent, chemicals, sets and other consumables.
- Business management in chemical, biomedical, biotechnological and pharmaceutical companies
- Patents (national / international organizations and companies)
- Non-traditional professions: science journalists, scientific journal editors, science popularizer, scientific advisors, medical illustrations, educational films.

Additional possibilities

- Student internships
- Involvement in research
- Participation in conferences
- Science popularization activities



Enviromental physics

You will learn...

- To understand physical processes in the ocean and the atmosphere.
- What governs atmospheric weather?
- What governs ocean currents?
- Why and how fast is climate change occurring?
- How to model carbon fluxes in the oceans and how are they linked to physics?
- What types of tsunamis exist?
- What is the likelihood of any extreme event in nature?

Overview

Enrolment requirements: A bachelor's degree at the undergraduate study of Physics or at a related study with the addition of differential exams

Duration of studies: 4 semesters (2 academic years)

120 ECTS credits and the title of master of physics (mag. phys.) upon graduation.

Courses	I Semester	ECTS	II Semester	ECTS
Quantum Physics II		6	Introduction to Data Analysis	5
Introduction to Fluid Mechanics		6	Meteorology II	5
Meteorology I		5	Ocean Physics II	5
Ocean Physics I		5	Nuclear Physics	5

	III Semester	ECTS	IV Semester	ECTS
Introduction to Data Analysis		6	Graduate Thesis	30
Meteorology II		6		
Ocean Physics II		6		
Nuclear Physics		6		

In each semester a series of elective courses is offered.

Additional possibilities

Field trips including hands-on sessions on ocean and atmospheric measurements

Involvement in research and conference participation

Science popularization activities

More info at: www.studyphysics.com.hr



Astrophysics & Elementary particle physics

You will learn...

- Standard Model of Particle Physics
- General Relativity and Cosmology
- Structure and evolution of stars
- Origin and evolution of galaxies
- Utilise modern methods in statistical physics to analyse data
- Simulate events in Particle Physics

Overview

Enrolment requirements:

A bachelor's degree at the undergraduate study of Physics or at a related study with the addition of differential exams

Duration of studies: 4 semesters (2 academic years)

120 ECTS credits and the title of master of physics (mag. Phys.) upon graduation.

I Semester	ECTS
Quantum Physics II	6
Astrophysics I	6
Symmetries in Physics	5
Special Relativity	4

II Semester	ECTS
Astrophysics II	6
Elementary Particle Physics I	6
Nuclear Physics	5
Stochastic Simulations in Classical and Quantum Physics	6

III Semester	ECTS
General Relativity and Cosmology	6
Elementary Particle Physics II	6
Data Analysis in High Energy Physics	6

IV Semester	ECTS
Graduate Thesis	30

In each semester a series of elective courses is offered.

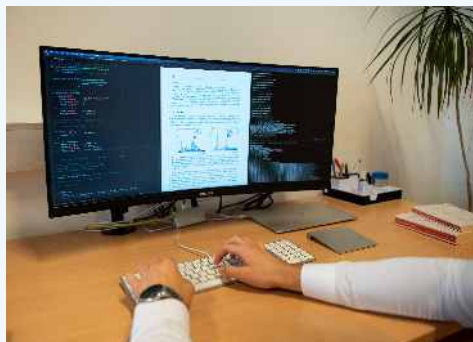
Additional possibilities

Field trip to CERN

Involvement in research and conference participation

Science popularization activities

More info at: www.studyphysics.com.hr



Data Science and Engineering

Upon completion of this graduate study programme, potential data scientists and engineers will be able to offer the following skills and competencies:

Organisation and integration of data:

1. Collect, receive, store and transform data
2. Manage data from various heterogeneous sources
3. Analyse and investigate data
4. Report on data using methods in descriptive statistics and visualisation

Machine learning:

1. Create predictive models from data using the advanced machine learning method
2. Empirically evaluate machine learning models
3. Expand and combine machine learning, especially deep neural networks
4. Respond to real life challenges in machine learning, such as missing data

Application to specific areas:

1. Identify and access fundamental problems in bioinformatics and medical data
2. Analyse data and learn complex network models
3. Applying the processing of a natural language to sound, multi-lingual or user-generated texts
4. Position existing machine learning algorithms within a wider context of artificial intelligence

Engineering:

1. Write a computer program which is effective and sustainable
2. Specify computer architectures that can work with large datasets
3. Create distributed and parallel development framework for data intensive computing
4. Analyse and critically review data systems

Other practical aspects:

1. Write summaries, convincing and empirically reliable reports
2. Include ethical considerations in the area of data
3. Collaborate with colleagues with the aim of effectively managing joint work on a project
Position work applied within a suitable theoretical framework



Overview

Enrolment requirements: Completed undergraduate program in Informatics, Mathematics and Informatics, Informatics and Technics, Computing, i.e., completed undergraduate programme acquiring at least 180 ECTS credits along with determining bridging courses which must not exceed the number of ECTS credits stipulated in the Regulation on the Study System for Undergraduate and Graduate University Programmes at the Faculty of Science in Split.

Duration of studies: 4 semesters (2 academic years)

120 ECTS credits and the title of Master of Science in Data Science and Engineering upon graduation. More information about courses can be found at <https://www.pmfst.unist.hr/> List of courses

I Semester	ECTS	II Semester	ECTS
Introduction to Data Science	10	Machine Learning	10
Scientific Programming	8	Data Management	7
Linear Algebra, Optimization and Statistics	7	Data Visualization	5
Data and Ethics	5	First Year Project	8

III Semester	ECTS	Elective course	ECTS
Deep Learning	5	Learning Analytics	5
Distributed and Parallel Computing	5	Natural Language Processing	5
Thesis - preparation	5	Algorithm in Bioinformatics	5
		Network Analysis	5
		Machine Learning in Bionformatics and Medicine	5
		Business Analytics	5

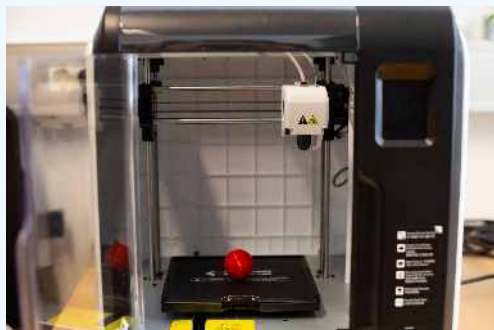
IV Semester	ECTS
Master's Thesis	30

Three elective courses (15 ECTS) are chosen	
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Employment possibilities

Students who have graduated can be employed in business entities with which the Faculty has established cooperation, i.e., IT companies, companies which in their business have the need for developing proprietary programs and solving problems using computers, at jobs that include the ability to perform mathematic modelling, programming and an analytical manner of thinking, as well as applying information-communication techniques.

More info at: <https://www.pmfst.unist.hr/>





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