

University of Trento
Department of Mathematics
English-taught Masters
www.maths.unitn.it/en



UNIVERSITY
OF TRENTO - Italy

Department of Mathematics



The Department of Mathematics

The Department of Mathematics dates back to the seventies, when the University of Trento, then a private foundation, decided to open up to scientific and technological research. This attracted to Trento many high-level researchers and academics, and among them mathematicians Mario Miranda, Enrico Giusti, Giuseppe Da Prato, Giovanni Zacher, Luigi Salvadori, Alberto Tognoli. Their imprinting can still be perceived, even after some of them left Trento, and still has an impact on some of the main research areas pursued at the university, such as calculus of variations, evolution equations, complex and real algebraic geometry, group theory, mathematical physics.

Since then however, other research areas have been developed, and currently there are nine research groups, covering many of the main fields of modern mathematics. Apart from the areas mentioned above, they include mathematical logic and theoretical computer science, nonlinear partial differential equations, numerical approximation, stochastic processes, as well as the field of mathematical models applied to biology, cryptography and error correction codes, and didactics of mathematics.

The doctoral school in mathematics was created at the beginning of the nineties, offering 4 to 5 Ph.D. positions per year. Thanks to this programme, many young researchers started their careers and became university professors, researchers in research centres and businesses, or teachers.

The department of mathematics has three active research laboratories.

The Laboratory of Didactics and Communications of Mathematics was founded in the nineties. Its research focuses on methods and materials - texts and software - for the didactics of mathematics. The laboratory actively promotes mathematics education outside the university, in cooperation with the school system and science museums.

The Laboratory of Industrial Mathematics and Cryptography (CryptoLabTN) was founded in 2010. Its activities include: internships for Bachelor's and Master's students, R&D projects with companies or institutions on cryptography and industrial mathematics, consulting on cryptography and digital security, courses for professionals and companies, outreach activities to raise awareness on cryptography and industrial mathematics.

The Laboratory of Mathematical and Computational Biology pursues two main research lines. The first is eco-epidemiology, where the spread of infectious diseases is studied through models generally based on ordinary or partial differential equations, and often also considering stochastic effects, or completely stochastic simulations. The second area of research is that of systems nutrition, mainly studying intestinal function, which is the gateway between diet/environment and molecular physiology.

Living in Trento

Trento is a city of around one hundred thousand inhabitants, located in the Dolomites mountain region, Trentino, of which it is the capital. Trento is a cosmopolitan city, with highly developed and organized modern social services. The city contains a picturesque Medieval and Renaissance historic centre, with ancient buildings such as the cathedral and the Castello del Buonconsiglio. The city often ranks high out of all 103 Italian cities for its quality of life, standard of living and business and job opportunities.

In order to facilitate the arrival and stay of international students, the University of Trento operates a “Welcome office”. The Welcome office provides international students with a dedicated service by supporting them in the necessary administrative procedures related to their arrival and stay in Trento. The office facilitates the integration of international students in the University and in town and encourages the multi-cultural exchange between international and national students. The Welcome office periodically organizes initiatives and social and cultural events open to all international guests with the aim to help them settle down, both at University and in the local community.

International students who come to Trento participating in a bilateral agreement, or in an international mobility programme are entitled to on-campus accommodation at affordable costs.

Opera Universitaria is the provincial institution responsible for the management and organisation of student accommodation facilities and for organising non-resident students in different categories for accommodation purposes.

International students have free access to the five university libraries and receive a University card to access the six University canteens in Trento.





Master of Science in Mathematics

The Master Degree in Mathematics aims to form scientists and professionals having a deep knowledge of the theoretical principles that are the base of mathematical sciences. Secondly, a variety of study plans regarding various applications of mathematics are offered. The course is divided into four curricula:

- **Advanced Mathematics** is generally for students who want to continue their studies at doctorate level, as it includes a large spectrum of areas of mathematics.
- The curriculum on **Teaching and Scientific Communication** prepares students, on one side, for school teaching and, on the other, to work in the field of the Scientific dissemination which is more and more important because of science museums and shows.
- **Mathematics for Life Sciences** offers two distinct study plans:
 - *Modelling, Statistics and Analysis of Biosystems*: studies the models used to investigate various complex biological systems. Among others, models of epidemic spread are studied.
 - *Modelling and Simulation for Biomedical Applications*: yields competences in mathematics, numerical computation, physics, physiology, applicable to a range of disciplines in medicine, the pharmaceutical industry, sanitary services.
- **Coding Theory and Cryptography** introduces the theoretical and practical aspects of modern cryptography and Error Correction Codes. It shows, how important methods adopted in mobile phones, smart cards, browsers or decoders are constructed starting from very refined algebraic and geometric theoretical instruments. It proposes two particular study plans: *stage-oriented* and *research-oriented*.

Programme overview

Degree Awarded	Master of Science in Mathematics
Intake	September
Duration	2 years
Teaching Language	English
Application deadlines	non-EU citizens living abroad: January/February each year
Admission requirements	Bachelor's degree in Mathematics or related fields; B1 English language knowledge
Tuition fees and funding	Students may benefit from partial or total exemption from university tuition fees and grants to cover part of the living expenses
Further information	http://international.unitn.it/math
Contacts	mastermaths@unitn.it

Career opportunities

There is a demand for mathematicians and statisticians across a range of sectors, for example, in industry and banking, medicine and IT, as well as in many fields of engineering and different government departments. According to a survey carried out by Almalaurea, graduates usually find a job within 3 and a half months from graduation day.

Graduates of the Master's course in Mathematics will be able, by properly choosing the optional curriculum and activities, work in:

- companies and industry;
- laboratories and research centers;
- the field of the scientific culture dissemination;
- services;
- Public Administration.

with several range of interest, like computer science, cryptography, finance, engineering, medical science, communication, scientific and academic research and in general in all areas where flexible thinking, computational and computer science competences, a good familiarity with management analysis and treatment of numerical data is useful.

In particular, graduates can carry out expert work as application technicians and statistical technicians. The specificity of their mathematical education gives them the opportunity to easily acquire the competences needed for the professions of statistical mathematicians and for most of the profiles in Information Technologies.

If you are keen to use your mathematical skills in your chosen career, a traineeship in a relevant company will be helpful. The department of mathematics actively promotes students for internship positions. Our students are welcomed by national and international companies where they can apply their skills in mathematics and critical thinking.

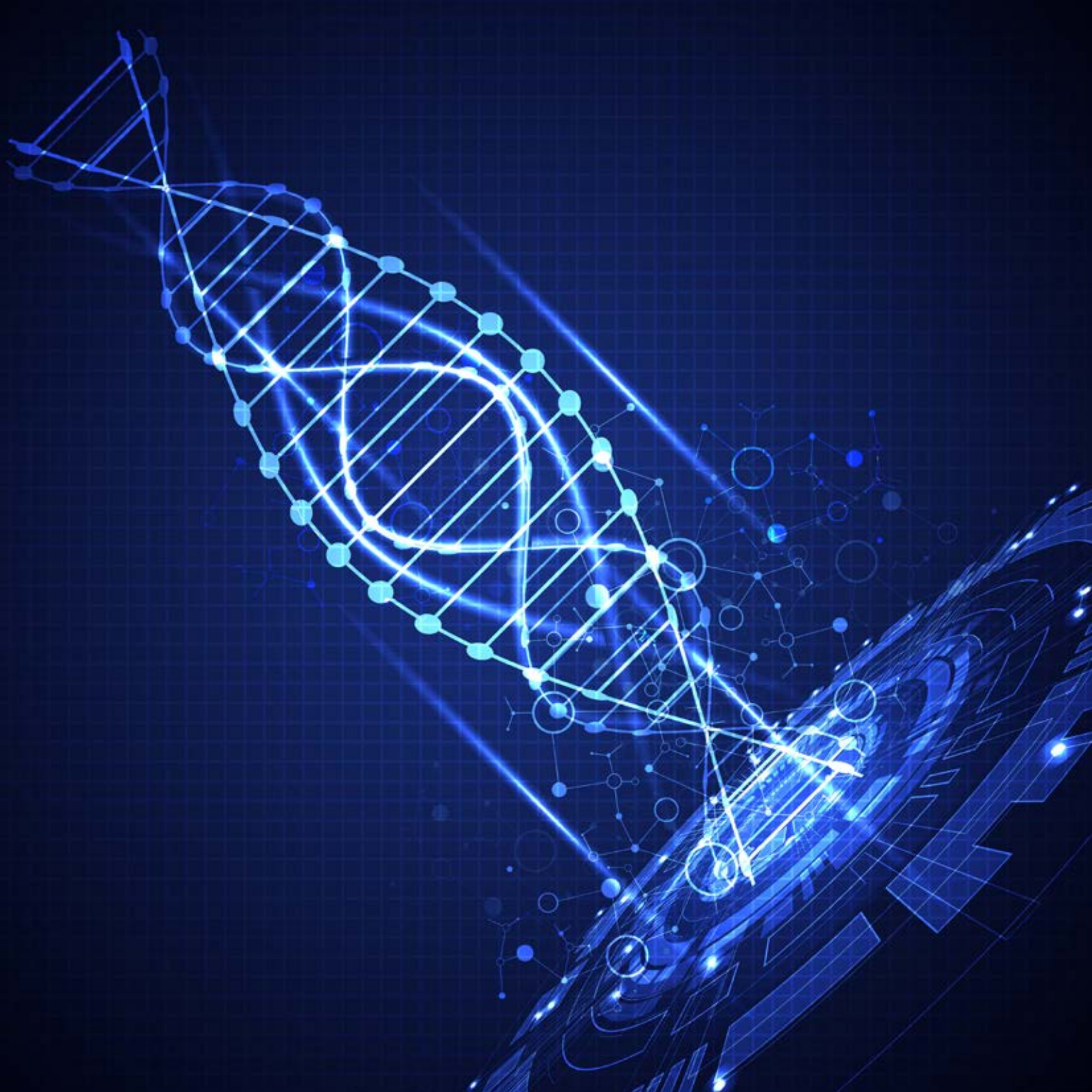
Admission requirements

To access the Master's degree programme in Mathematics applicants must have graduated with a Bachelor's degree or any recognized international equivalent degree, which includes a focus on basic mathematical skills and knowledge in linear algebra and mathematical analysis.

Applicants must have:

- a Bachelor's degree in Mathematics (L-35 Mathematical sciences) awarded by a recognized Italian university or a Bachelor's degree in Mathematics or in any Mathematics-related field awarded by any internationally recognized university, along with a corresponding study plan which includes at least 60 MATH/* ECTS-credits (or a recognized equivalent thereof);
- a minimum intermediate level of English (Level B1), according to the Common European Framework of Reference for Languages (CEFR), other certifications (i.e. IELTS, TOEFL) are accepted.





Master of Science in Quantitative and Computational Biology (QCB)

The Master of Science degree in **Quantitative and Computational Biology (QCB)** is a **multidisciplinary degree that formally integrates quantitative sciences and applied biology**, through to the involvement of the following organizations at the University of Trento:

- CIBIO, Centre for integrative biology
- Department of Physics
- Department of Mathematics
- Department of Information Engineering and Computer Science

The course focuses on a strategic area where technology and methodology enable students to face essential questions at the interface between fundamental research and clinical and pre-clinical areas, through analytical and quantitative approaches.

The course - entirely taught in English - is designed to capture the increasing need for researchers and experts able to transform the enormous amount of biological information ("big data") into knowledge and to gain quantitative insight into the behaviour of biological systems by means of bio-mathematical and bio-physical models.

Key target areas include pharmacogenomics, biotechnology, food science, and precision medicine, which represent applied research fields where the growing availability of multidimensional data demands high interdisciplinarity.

The QCB course is designed to train **experts in biotechnology, computational biology, bioinformatics and biological data and systems biology analysis**, who will have the opportunity to learn in a multidisciplinary context, interacting with students with different experiences. Strong emphasis will be given to quantitative and computational aspects, with a focus on tools to analyse, model and understand biological systems and phenomena.

The course consists of two tracks "Biotechnological Track" and "Computational Track".

Admitted students will follow one of the two tracks based on their educational background acquired in previous studies. The two different tracks offer the opportunity for students to integrate their background based on their first-level degree and individual preparation. In the first, second and third semesters, students will take different courses with a focus on biotechnological or computational topics. The fourth semester is entirely dedicated to the preparation of the thesis.

Students will have the chance to carry out research projects within the University of Trento organisations involved in the Master's Degree, at other Italian or European Universities, or in companies operating in the biotechnology, bioinformatics and computational areas.

Programme overview

Degree Awarded	Master of Science in Quantitative and Computational Biology
Intake	September
Duration	2 years
Teaching Language	English
Maximum number of admitted students	30
Location	Centre for Integrative Biology (CIBIO)
Application deadlines	non-EU citizens living abroad: January/February each year EU citizens and non-EU citizens living in Italy: June each year
Admission requirements	Bachelor's degree in biotechnologies, computer science, mathematics, physics or related fields; B1 English language knowledge
Tuition fees and funding	Students may benefit from partial or total exemption from university tuition fees and grants to cover part of the living expenses
Further information	international.unitn.it/mqcb
Contacts	masterbio@unitn.it

Career opportunities

Students of the QCB Master will be trained for the following professional profiles:

- Biotechnologist
- Computational Biologist
- Bioinformatics technicians
- Biologists data and systems biology analyst

The profiles are characterized by a set of shared competences and by specific expertise in the field of biotechnology, information technology and / or mathematics and physics.

Graduates, trained for the above mentioned professions, will be able to use biological data publicly available and to work closely with biologists, clinicians, pharmacologists, engineers, epidemiologists in experimental research and pre-clinical context, in analysis/hospital laboratories, by using a common language.

Admission requirements

To be admitted to the QCB Master, students must have a first-level university degree, or another degree recognized as valid, in the fields of Biotechnology, Information Engineering, Life Sciences, Science and agro-food Technology, Sciences and Chemical Technologies, Pharmacy, Physics, Computer Science, Mathematics and have obtained at least 6 ECTS in the following area: Biology or Chemistry, Mathematics, Physics and Computer Science or Information Engineering. More details are available on the website: international.unitn.it/mqcb

An English language certificate of B1 level or equivalent is required if the Bachelor-degree courses were not taught in English. Each student must submit a complete online application package, which provides the University with fundamental information and allows the Admissions Committee to evaluate candidates on the basis of their proficiency, as well as on their potential to further develop their skills.

Courses

Biotechnological Track

Mandatory courses

1st year: Biostatistics; Scientific Programming; Genomics; Biotechnology Engineering 1st year
English B2 level (3 credits)

Three elective courses among:

1st year: Modern Physics; Bioinformatics; Biological Networks
2nd year: Computational Biophysics; Data Mining; Mathematical Modeling; Biotechnology Management and Regulations

Computational Track

Mandatory courses:

1st year: Molecular Biology of the Cell; Chemistry and Biochemistry; Biological Networks
2nd year: Mathematical Modeling
English B2 level (3 credits)

Three elective courses among:

1st year: Modern Physics; Bioinformatics
2nd year: Computational Biophysics; Data Mining; Biotechnology Management and Regulations

Additional credits for both tracks:

One free choice course
Traineeship
Thesis

Complete Programme 120 CFU or ECTS.

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