

Applied Mathematics

MSc Programme



Applied mathematicians devise models and algorithms that influence our daily lives. For example, everybody uses search engines to find information on the internet. Thanks to advanced mathematical algorithms, these search engines give us this information in a fraction of a second. Another example is how mathematicians help to save lives by using optimization models and algorithms to determine the optimum coverage of emergency helicopters.

Degree	Master of Science
Starts	September
Type	full-time
Credits	120 ECTS, 24 months
Language	English
Application deadline	1 April (International BSc degree) 23 July (Bridging programme*) 1 September (Dutch BSc degree)
Tuition fee	€ 18.750 (non-EU applicants) € 2.168 (EU applicants)
Scholarships	scholarships.tudelft.nl

The objective of the MSc programme in Applied Mathematics is to deepen your knowledge of applicable mathematics and to develop your expertise in applying the methods and tools of mathematics to problems in science and engineering.

Computational and mathematical tools are used to predict the behaviour of technical, physical and even social systems, ranging from tomorrow's weather to the viability of social insurance systems and the global climate one hundred years from now.

Programme

When you join the MSc Programme in Applied Mathematics at TU Delft you will gain a thorough knowledge of applicable mathematics, in addition to developing expertise in applying the methods and tools of mathematics to problems in science and engineering.

This programme focuses on the acquisition of broad experience in simulation and the mathematical modelling of problems in science and engineering, in the mathematical analysis of these models and in the implementation of

First Year		Second Year	
1 st semester	2 nd semester	1 st semester	2 nd semester
Scientific writing for AM Ethics for AM	Specialisation courses and free electives	Specialisation courses and free electives	Graduation Project (42 EC)
Choose 1 to 3 out of 7 orientation courses		Start Graduation project	
Specialisation course(s) or free elective(s)			

For more information on all courses, please visit: www.studyguide.tudelft.nl

the results. You will gain sufficient insight into the underlying mathematical theories, allowing you to develop new mathematical methods and techniques.

Specialisations

You can specialise in the following subjects:

Computational Science and

Engineering (CSE) focuses on mathematical modelling and the simulation of problems that arise in science and engineering, the mathematical analysis of such models and the development of new mathematical methods and techniques for analysing such problems.

Discrete Mathematics and Optimization

provides the mathematical tools required for the analysis and solution of problems that are of a combinatorial nature. Such problems often have origins in (pure) mathematics, adjacent areas like computer science and quantum physics, or practical applications such as logistics.

Financial Engineering is a flourishing field of applied mathematics in the intersection of stochastic processes, statistics and numerical analysis, with the aim of solving challenging problems arising in economics and finance. This specialization covers a broad range of topics: from the basics of mathematical finance and financial markets to risk management, computational methods for finance, and all the way to statistical and deep learning methods for finance.

Mathematics of Data Science focuses on the mathematical aspects of data science, which includes probability theory, statistics, machine learning, deep learning and optimization. Not only can you choose courses on fundamental aspects of data science but there are more applied courses as well. There are courses that study data science from a stochastic, optimization or numerical perspective.

Mathematics of Quantum Technology and

Computation equips the student with a broad range of state-of-the-art mathematical tools that are currently used in quantum technology and quantum computing, and are expected to underly future progress in the field. The various branches of mathematics that are represented in this specialisation (quantum algorithms, functional analysis, optimization) allow the student to choose an individual profile that fits his or her personal interests.

Partial Differential Equations provides the mathematical tools required for the analysis of mathematical models. Such models are typically formulated as a system of coupled partial differential equations. Apart from very special cases, a closed-form solution cannot be given. Therefore, this specialisation focuses on the development of mathematical tools to study the properties of solutions, and methods to get approximate solutions and insight in the number and stability of these solutions. If you choose this specialisation you will learn techniques that come from the Approximation Theory, Dynamical System Theory, Fourier Analysis, Functional Analysis and Stochastic Analysis, to help you achieve these goals.

Stochastics focuses on the modelling and mathematical analysis of scientific and engineering problems that are characterised by uncertainty. Randomness is an essential ingredient for many successful mathematical models. In this MSc programme students will become familiar with a wide range of techniques and theories underlying efforts to deal with randomness. The specialisation includes the following themes: Applied Probability, Statistics and Risk Analysis.

Master's thesis

The master's thesis is the final challenge. You'll have to demonstrate your capacity to successfully carry out a research project. The projects can be completed at one of the research groups or at a company. After three quarters, you can complete the entire project by successfully presenting the results during a public presentation.

Examples of Master's Theses

- The Riesz transform on a complete Riemannian manifold with Ricci curvature bounded from below (Analysis, internal)
- Investigation of Different Solvers for Radiotherapy Treatment Planning Problems (CSE, with Erasmus Medical Center)
- Numerical Pricing of Bermudan Options with Shannon Wavelet Expansions (Financial Engineering, with CRM Barcelona)
- Optimal ambulance locations in the Netherlands (Optimisation, with RIVM)
- The evidential value of gunshot residue composition comparisons. (Stochastics, with NFI)

Career perspective



Companies

Deltares, KNMI, NFI, ABN Amro, Philips, KPN, TNO, Rijkswaterstaat



Positions

Consultant, Scientific Software Developer, Project Manager, Researcher, Academic career