

## Entry requirements

You are eligible for this degree programme if you have an undergraduate university degree in mathematics or a closely related degree with a mathematics component of at least 110 ECTS credits and a final grade of 2.7 under the German marking system or the relevant equivalent grade in a foreign marking system. Applicants who have not attained this minimum grade may still apply if they are among the best 70% of graduates of their cohort.

Unless English is the language of instruction for your prior university or secondary education, you should provide a language certificate at level B2 of the Common European Framework of Reference for Languages (CEFR). Similarly, unless German was the language of instruction of your prior university or secondary education, you should provide proof of German language skills at level A1 CEFR (beginner's level). If you do not have German language skills at the time of application or enrolment, you will complete a compulsory, free German language course during the first two semesters of the programme.

The deadline for applications for a place on the programme is 15 December for entry in April (summer semester), or 31 May for the October (winter semester) intake.

For further information on the application process and documents to submit, visit [www.uni-passau.de/en/apply](http://www.uni-passau.de/en/apply).

Programme	Computational Mathematics
Degree awarded	Master of Science (M.Sc.)
Duration and ECTS	4 semesters; 120 ECTS credits
Starts in	April and October each year

## Further information and contact details

### Programme page on the web

[www.uni-passau.de/en/msc-compmaths](http://www.uni-passau.de/en/msc-compmaths)

### Faculty of Computer Science and Mathematics International Coordinator

Primary contact for prospective international students seeking advice on study options, entry requirements and admissions-related matters  
[masters@fim.uni-passau.de](mailto:masters@fim.uni-passau.de)

### Academic Advice Service

General advice on studying at the University of Passau and for all degree programmes  
[www.uni-passau.de/en/academic-advice](http://www.uni-passau.de/en/academic-advice)  
[advice@uni-passau.de](mailto:advice@uni-passau.de)

### International Office

Offers information about the University for international students and assistance with the immigration formalities and getting settled in Passau  
[www.uni-passau.de/en/international/coming-to-passau](http://www.uni-passau.de/en/international/coming-to-passau)

### Student Registration Office

Contact for enquiries related to your application  
[www.uni-passau.de/en/student-registration-office](http://www.uni-passau.de/en/student-registration-office)  
How to apply for the degree programme  
[www.uni-passau.de/en/apply](http://www.uni-passau.de/en/apply)

### iStudi Coach for job market induction

Provides job market orientation and advice on internship and job search to international students  
[www.uni-passau.de/en/iStudi](http://www.uni-passau.de/en/iStudi)

### Language Centre

Offers a wide range of language courses  
[www.sprachenzentrum.uni-passau.de/en](http://www.sprachenzentrum.uni-passau.de/en)

### Centre for Careers and Competencies

Helps students seeking internships or career entry positions and offers transferable skills courses  
[www.uni-passau.de/en/zkk](http://www.uni-passau.de/en/zkk)

### German Courses Passau

German language courses for international students  
[www.uni-passau.de/en/learn-german](http://www.uni-passau.de/en/learn-german)

### Costs and funding

[www.uni-passau.de/en/costs-funding](http://www.uni-passau.de/en/costs-funding)



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[Colourbox.de](http://Colourbox.de)/Carlos Castilla

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# Master of Science in Computational Mathematics



English-taught degree programme



## Why study Computational Mathematics at the University of Passau?

In addition to being a science in its own right, mathematics also plays a fundamental role in the quantitative areas of practically all other academic disciplines, particularly in the natural sciences, engineering, business administration, economics, medicine and psychology.

Mathematical results permeate nearly all facets of life and are a necessary prerequisite for the vast majority of modern technologies—and as our IT systems become increasingly powerful, we are able to mathematically handle enormous amounts of data and solve ever more complex problems.

Special emphasis is placed on developing students' ability to formalise given problems in a way that facilitates algorithmic processing as well as enabling them to choose or develop, and subsequently apply, suitable algorithms to solve problems in an appropriate manner. The degree programme is theoretical in its orientation, with strongly application-oriented components.

Studying this programme, you can gain advanced knowledge in the mathematical areas of Cryptography, Computer Algebra, Algorithmic Algebra and Geometry, Image and Signals Processing, Statistics and Stochastic Simulation, Dynamical Systems and Control Theory as well as expert knowledge in Computer Science fields such as Data Management, Machine Learning and Data Mining.

Furthermore, you will have the chance to learn how to apply your knowledge to tackle problems in areas as diverse as Marketing, Predictive Analytics, Computational Finance, Digital Humanities, IT Security and Robotics.



## Features

- Fully English-taught degree programme
- A broad spectrum of subjects with a focus on algorithms
- Excellent relations with businesses and industry
- Numerous partnerships with universities abroad

## Career prospects

Mathematicians continue to have outstanding career prospects, as they are highly sought after wherever high-level analytical thinking skills are a requirement. Their potential occupational fields are therefore less limited than is the case with medical doctors or engineers, who specialise in a specific sub-field of their discipline.

Outside of academic and research organisations, mathematicians find employment in nearly all private- and public-sector organisations. Nowadays, mathematicians' work typically makes heavy use of computing technology.

Traditionally, mathematicians are employed in the pharmaceutical industry, in the financial industry, insurance companies, consulting and business intelligence, market research, logistics, information technology and in the research and development departments of high-tech companies.

## Programme syllabus

The **core modules** consist of two mathematics seminars and the presentation of your master's thesis.

The **compulsory elective modules** are divided into eight module groups:

- 1) Algebra, Geometry and Cryptography
- 2) Mathematical Logic and Discrete Mathematics
- 3) Analysis, Numerics and Approximation Theory
- 4) Dynamical Systems and Optimisation
- 5) Stochastics, Statistics
- 6) Data Analysis and Data Management and Programming
- 7) Applications
- 8) Key Competencies and Language Training

1) This module group imparts advanced results in the areas of algebra and geometry, which constitute the fundament for algorithmic calculations, particularly in cryptography but also in many other mathematical areas.

2) The theoretical possibilities and limitations of algorithm-based solutions are treated in this module group.

3) Methods from the fields of mathematical analysis, applied harmonic analysis and approximation theory for modelling and approximating continuous and discrete data and systems as well as efficient numerical implementation and evaluation of these methods are the scope of this module group.

4) Dynamical systems theory deals with the description of change over time. This module group is concerned with methods used for the modelling, analysis, optimisation and design of dynamical systems, as well as the numerical implementation of such techniques.

5) This module group deals with methods for modelling and analysing complex random phenomena as well as the construction, analysis and optimisation of stochastic algorithms and techniques used in statistical data analysis.

6) This module group examines the core methods used in computer science for the analysis of data of heterogeneous modalities (e.g. multimedia data, social networks and sensor data) and for the realisation of data analysis systems.

7) In this module group, you will practise applying the mathematical methods learned in module groups 1 to 6 to real-world applications such as Marketing, Predictive Analytics and Computational Finance.

8) In this module group, you will choose seminars that develop your non-subject-specific skills, such as public speaking and academic writing and other soft skills; you may also undertake internships. This serves to complement your technical expertise gained during your degree studies and helps to prepare you for your professional life after university.

