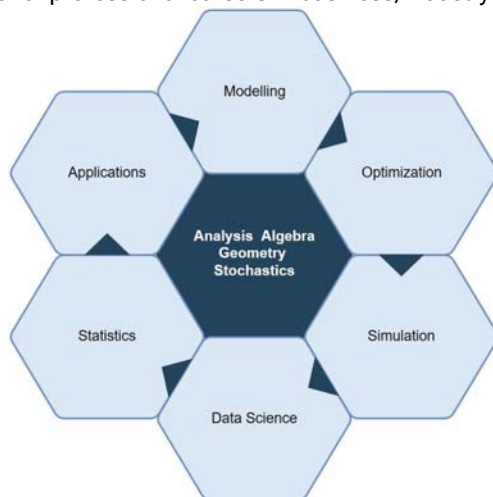




## Advanced and Computational Mathematics

Mathematics is indispensable for an efficient treatment of complex real-world problems coming from engineering, computer science, economics, finance etc. To list a few but rather influential and striking examples, we refer to household automatic control systems, Google ranking, portfolio optimization, weather forecasting or big data analysis. In these and many other areas, state-of-the-art mathematical concepts are used to model, analyze and solve the given problem.

The aim of this four-semester Master's program is to train highly qualified graduates in mathematics who are capable of successfully dealing with challenges encountered in academic and practical working fields. Based on a Bachelor degree in mathematics, the program deepens knowledge and skills in both theoretical and applied mathematics and prepares students for professional careers in business, industry or research.



Master's program			
Basic courses (Advanced Theoretical Mathematics, Computational Mathematics, Data Science)			
sem. 1 and 2	<b>Optimization Methods</b> Nonlinear Optimization Algorithms for Convex Optimization	<b>Algebraic and Geometric Methods</b> Algebraic Geometry Topology and Complex Geometry	18 ECTS
	<b>Stochastic Models</b> Stochastic Analysis Stochastic Processes	<b>Data Science</b> Machine Learning, Big Data Analytics Matrix Methods, Statistics	18 ECTS
Minor subject Computer Science, Economics and Business Administration, etc.		24 ECTS	
Applications and Specialization			
sem. 3 and 4	Optimization with PDEs, Optimization under Uncertainty, Randomized Algorithms and Online Optimization, Combinatorial Optimization, Infinite-Dimensional Optimization, Optimization on Manifolds		18 ECTS
	Inverse Problems, Regularization Theory and Practice, Fast solvers for PDEs, Model Reduction, Fourier Analysis, Introduction to Wavelets, Variational methods, Distributions and Differential Operators		
Time Series Analysis, Quantitative Finance, Asymptotic and Extreme Value Statistics, Mathematical Methods of Uncertainty Quantification, Methods of Algebraic Statistics, Quantitative Finance		12 ECTS	
Graph Theory, Singularity Theory, Game Theory, Mathematics of Big Data, Algebraic Geometry, Convex and Toric Geometry			
3 Research Seminars and/or Summer schools		30 ECTS	
Master Thesis		30 ECTS	
Ph.D. program			
sem 6 to 10	Research for Ph. D. Thesis		
	Seminars, additional lectures		

### Master's program (Phase 1)

Applicants are required to possess or be in the process of obtaining a Bachelor's degree in mathematics. Credits obtained for Bachelor's degree will be reviewed to determine admissibility.

Regular period of study: 4 semesters  
Degree: Master  
Start of study: in winter or summer term

### Ph.D. programm (Phase 2)

Students with excellent results in their Master's degree (externally or in Phase 1) qualify for the Ph.D. program.

Regular period of study: 6 semesters  
Degree: Ph.D.  
Start of study: in winter or summer term



TECHNISCHE UNIVERSITÄT  
CHEMNITZ

# Advanced and Computational Mathematics

Faculty of Mathematics

## International Master's- and Ph.D. Program

### All information about this program

[www.tu-chemnitz.de/mathematik/mscphd](http://www.tu-chemnitz.de/mathematik/mscphd)

### Application

Please apply using the form available at

[www.tu-chemnitz.de/mathematik/mscphd/form.pdf](http://www.tu-chemnitz.de/mathematik/mscphd/form.pdf)

Together with the form, please hand in the following documents:

- curriculum vitae
- transcript of records
- two recommendation letters by academic teachers
- Certified copy/translation into English or German of Bachelor's or Master's degree certificate, respectively

Please send your application with the complete documents to:

Technische Universität Chemnitz  
Fakultät für Mathematik  
Dekanat, Zimmer 604  
Reichenhainer Str. 39  
09126 Chemnitz  
Germany

Please also send a copy of all of the documents mentioned above as a single pdf-file to [int-mast-math@mathematik.tu-chemnitz.de](mailto:int-mast-math@mathematik.tu-chemnitz.de)

### Academic advisor

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The integrated Master's- and Ph.D. program at Chemnitz University of Technology leads after four semesters to a Master's degree in mathematics. Students with excellent results qualify for a Ph.D. program which can usually be completed in six semesters.