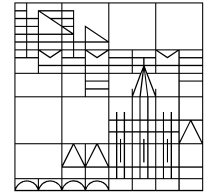




Universität
Konstanz



Master of Science Mathematics

Studying in Konstanz...



... rather like this!



Why study mathematics in Konstanz?

- You can choose your own field of specialization.
- An early choice of a full professor as your main scientific mentor allows:
 - a fast track toward current research questions
 - intense and highly individual supervision from the very beginning
- Small study groups allow to study on an individual basis.
- Multiple possibilities to study abroad (Erasmus, ...)
- Dual-degree program together with the Shanghai Jiao Tong University.
- Active student representation (“Fachschaft”)
- Department activities: Christmas party, summer barbecue, ...

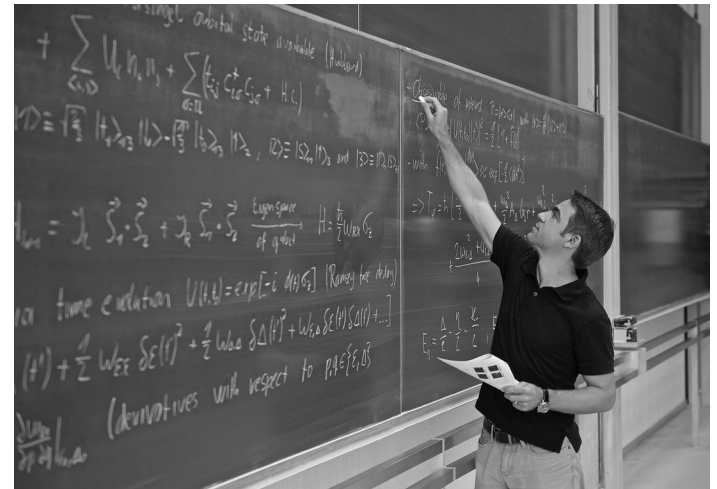
University of Konstanz

- about 11.700 students
- subdivided into 3 faculties:
 - **Faculty of Sciences**
 - Faculty of Humanities
 - Faculty of Politics, Law and Economics



Faculty of Sciences

- Biology
- Chemistry
- Computer and Information Sciences
- **Mathematics and Statistics**
- Physics
- Psychology



Department of Mathematics and Statistics

12 full professors in the following research areas

- Analysis, Numerics and Differential Geometry (6)
- Real Geometry and Algebra (4)
- Stochastic and Statistics (2)

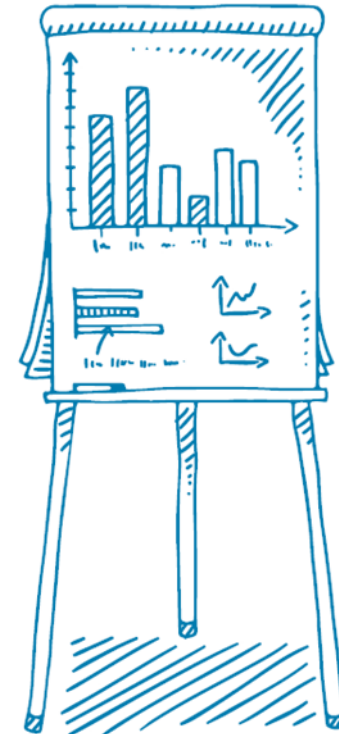
About 550 students in 6 study programs

- B.Sc. Mathematics (ca. 110)
- **M.Sc. Mathematics** (ca. 60)
- B.Ed. Mathematics (ca. 220)
- PhD Mathematics (ca. 25)
- B.Sc. Mathematical Finance (ca. 110)
- M.Sc. Mathematical Finance (ca. 40)



M.Sc. Mathematics at one glance

Degree	Master of Science
Program start	Winter and summer term
Study Period ("Regelstudienzeit")	4 terms
Application period	2.5. - 15.9. (winter term) 1.12. - 15.1. (summer term)
Admission restrictions	none
ECTS	120
Average number of first year M.Sc. students	20



Study Structure Mathematics M.Sc.

ECTS: 120 credits

Study period: 4 terms (“Regelstudienzeit”)

Study specializations:

- Analysis and Numerics
or Differential Geometry
- Real Geometry and Algebra
- Stochastic and Statistics

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s}$$

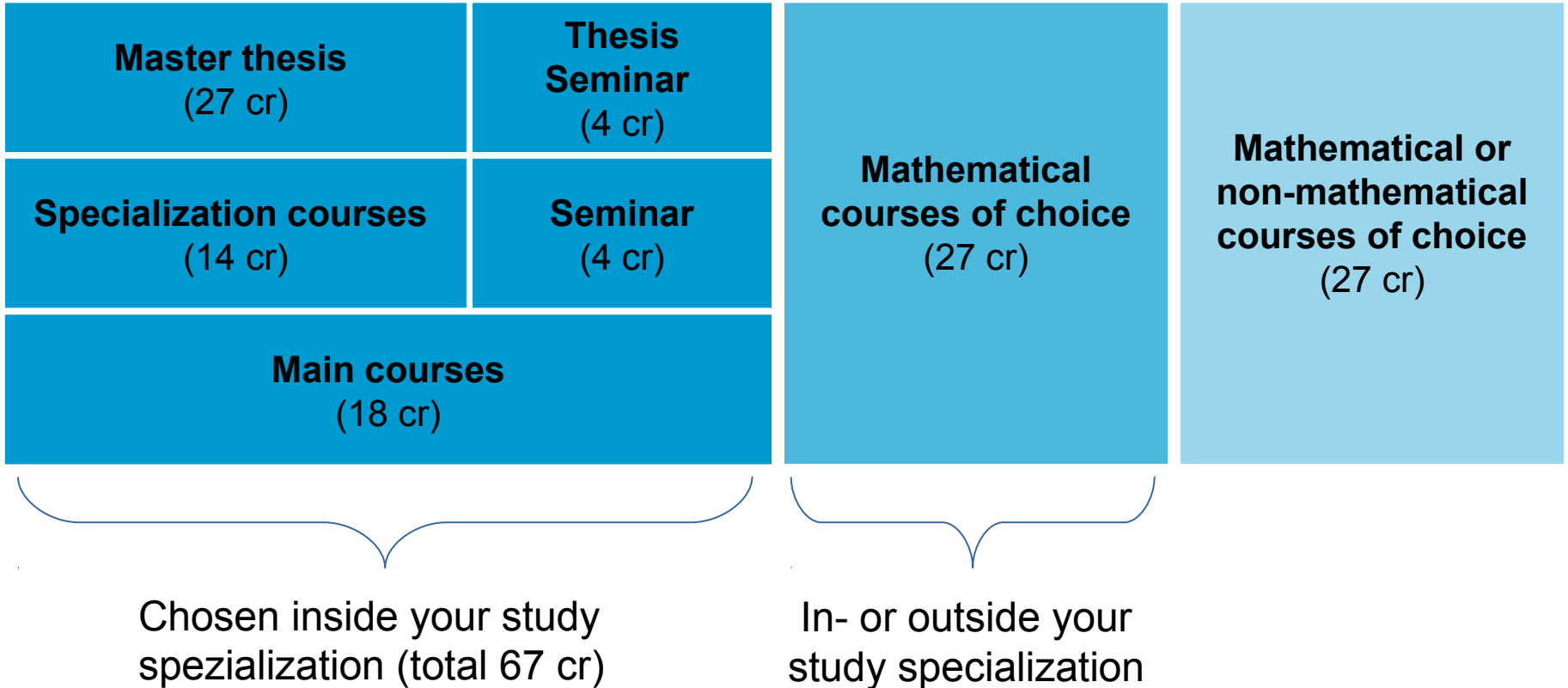
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Non-mathematical courses, chosen from

Biology, Chemistry, Computer Science, Life Science,
Philosophy, Physics, Psychology, Linguistics, Economy

Study Structure Mathematics M.Sc.

ECTS: 120 credits



Analysis, Numerics and Differential Geometry



Prof. Dr. Robert Denk
Analysis



Prof. Dr. Reinhard Racke
Analysis



Prof. Dr. Heinrich Freistühler
Analysis



Prof. Dr. Stefan Volkwein
Numerics



Prof. Dr. Michael Junk
Numerics



apl. Prof. Dr. Johannes Schropp
Numerics

Prof. Dr. Oliver Schnürer
Differential Geometry

Jun. Prof. Dr. Gabriele Ciaramella
Numerics

Analysis, Numerics and Differential Geometry

Current research topics in the area of Analysis

(Prof. Denk, Prof. Freistühler, Prof. Racke)

- Nonlinear parabolic and hyperbolic partial differential equations
- Systems of mixed order and coupled systems of mixed type
- Stochastic partial differential equations
- Large-time behaviour and large-time asymptotics of solutions of (nonlinear) evolution equations
- Free boundary value problems and initial-boundary value problems
- Applications in fluid dynamics, (thermo-) elasticity, one- and multiphase fluid dynamics, ...

Analysis, Numerics and Differential Geometry

Current research topics in the area of Numerics

(Prof. Junk, Prof. Volkwein)

- Numerics of transport equations (methods for differential equations and maximum-entropy-methods)
- Numerical procedures for optimization problems
- Development of a formal meta-language for modelling and numerics

Analysis, Numerics and Differential Geometry

Current research topics in the area of differential geometry

(Prof. Schnürer)

- curvature flows, e.g., mean curvature flow
- study of complete, noncompact solutions
- evolution of hypersurfaces by fully nonlinear partial differential equations

Analysis, Numerics and Differential Geometry

Regularly offered courses:

- **Partial Differential Equations II**

spectral theory of elliptic operators, operator semigroups, linear symmetric hyperbolic systems, energy methods for parabolic and hyperbolic equations, nonlinear systems of hyperbolic equations, Schauder theory for elliptic equations, Krylov-Savanov-estimates for parabolic equations, ...

- **Numerics for partial differential equations II**

finite element methods for elliptic and parabolic problems, finite volume and DG methods for hyperbolic conservation laws, error estimates and adaptivity, Krylov subspace methods for solving linear systems of equations, pre-conditioning and multi-grid methods

- **Differential geometry**

abstract and embedded manifolds, tensor, metrics, connections, curvature, geodesics, ...

Analysis, Numerics and Differential Geometry

Further Analysis lectures from the past years:

- Classical and relativistic fluid dynamics
- Stability of nonlinear waves
- Semigroups with applications to hyperbolic systems
- Nonlinear Evolution Equations
- Asymptotics of semigroups
- Linear and nonlinear waves
- Spectral theory
- Evolution equations in waveguides
- Parabolic boundary value problems
- Mathematical Aspects of magnetohydrodynamics
- Calculus of variations
- Interpolation spaces

Analysis, Numerik und Differentialgeometrie

Further numerics lectures from the past years

- Numerics of stochastic partial differential equations
- Numerical methods for constrained optimization
- Numerics of hyperbolic partial differential equations
- Stochastic control
- Optimal control of elliptic differential equations
- POD for linear quadratic optimal control
- Modern methods for solving large systems of linear equations

Further differential geometry lectures from the past years

- Differential geometry II
- Fully nonlinear geometric partial differential equations
- Graphical mean curvature flow

Real Geometry and Algebra



Prof. Dr. Salma Kuhlmann



Prof. Dr. Markus Schweighofer



Prof. Dr. Claus Scheiderer

Professur für Geometrie
(Vertretung: Dr. Cordian Riener)

Real Geometry and Algebra

Current research topics

- Valuation theory
- Model theory
- Real algebra
- Ordered algebraic structures
- Fields of power series
- Real closed exponential fields
- Models of arithmetic
- Real geometry and Galois cohomology
- Moment problems
- Positive polynomials
- Quadratic forms
- Sums of squares
- Quadrature formulas
- Polynomial optimization
- Semidefinite relaxation
- Linear matrix inequalities

Real Geometry and Algebra

Regularly offered courses:

- **Real algebraic geometry I**

Ordered fields and real closure, Tarski-Seidenberg-Elimination, real spectrum, semialgebraic sets, semialgebraic geometry

- **Real algebraic geometry II**

Positive polynomials und sums of squares, Archimidean property, selected applications

Real Geometry and Algebra

Further lectures from past years:

- Geometry of Linear Matrix Inequalities
- Quadratic forms
- Valuation theory
- Classical algebraic geometry
- Commutative algebra
- O-Minimal geometry
- Algorithmic number theory
- Topological Vector Spaces
- Convexity

Stochastic and Statistics



Prof. Dr. Jan Beran

Jun. Prof. Dr. Lyudmilla Grigoryeva



Prof. Dr. Michael Kupper

Jun. Prof. Dr. Luigi Bianchi

Stochastic and Statistics

Current research topics

- Statistics for stochastic processes
- Time series
- Fractal processes
- Non- and semiparametric modelling and asymptotics
- Stochastic Analysis
- Duality methods for robust optimization problems
- Stochastic backward differential equations
- Nonlinear semigroups

Stochastic and Statistics

Regularly offered courses:

- **Stochastic processes I & II**

Brownian Motion, semi martingales, Itô integral, stochastic differential equations, stochastic control, general market model, self-finance strategies, numeraire, arbitrage, complete markets, portfolio optimization, BSDE-Ansatz, superhedging

- **Mathematical statistics**

Decision problem, consistency, sufficiency, factorization theorem, exponential families, MVUE-estimators, Rao-Blackwell-Theorem, Completeness theorem, efficiency and asymptotic efficiency, Fisher information, Cramer-Rao bound, Maximum-Likelihood estimate, moment method, robustness, ancillarity, Bayes estimate, Minimax-principle, Reliability, superefficiency, Shrinkage-Estimators, Stein's Estimator Testing, Neyman-Pearson-Lemma, invariance, most powerful invariant tests, Likelihood Ratio tests

- **Zeitreihenanalyse**

Spectral representation of stationary processes and Hilbert space formulation, parametric and nonparametric statistical inference and prediction in time- and frequency domain, applications to data analysis

Stochastic and Statistics

Further lectures from past years:

- Multivariate statistics
- Insurance Mathematics
- Non-Life Insurance Mathematics
- Convex Analysis for Finance and Decision Making
- Generalized Linear Models

Application procedure

Via the **ZEuS – Portal** of the University of Konstanz:

<https://zeus.uni-konstanz.de/>

- 1) Online registration
- 2) Fill and print out online application.
- 3) Send all required documents to the university.

Track your application:
studium@uni-konstanz.de



Deadline:

Sommersemester:
01.12. (falls Visa nötig)
15.01.

Wintersemester:
15.05. (falls Visa nötig)
15.06.

Admission requirements

- Successfully completed B.Sc. in mathematics or a related field
- Successful academic assessment covering contents equivalent to those of the B.Sc. study program in mathematics at the University of Konstanz.
- In certain cases: admission examination
- German language skills at level DSH-1 or TestDaF 3.

It is very important to us that our beginning master students are able to successfully follow all of their courses.

For this reason we put great emphasize on checking in detail the mathematical background of all our applicants.



Fachbereichsreferent

rainer.janssen@uni-
konstanz.de

Further questions ?

Please contact us !

Rainer Janßen

Fachbereichsreferent

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E-Mail: rainer.janssen@uni-konstanz.de

Application period for next summer term

01.12. 2017 – 15.01.2018