

**Overview Courses<sup>1</sup>**  
**Master Computational Mathematics**  
**Winter Term 2023/24**

**Module Group: “Algebra, Geometry and Cryptography”:**

**Computer Algebra** (Dr. Long)

**Cryptanalysis** (Prof. Dr. Zumbärgel)

**Real Algebra** (Prof. Dr. Kaiser)

**Seminar:**

- **NOCAS** (Prof. Dr. Kreuzer)
- **Logic and Geometry** (Prof. Dr. Kaiser, Prof. Dr. Müller)

**Module Group: “Mathematical Logic and Discrete Mathematics”:**

**Algorithmic Graph Theory and Perfect Graphs** (Prof. Dr. Rutter)

**Komplexitätstheorie** (Prof. Dr. Müller)

**Modelltheorie** (Prof. Dr. Müller)

**Parameterized Algorithms** (Prof. Dr. Rutter)

**Random Graphs** (Prof. Dr. Glock)

**Randomised Algorithms** (Prof. Dr. Sudholt)

**Seminar:**

- **Logic and Geometry** (Prof. Dr. Kaiser, Prof. Dr. Müller)

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<sup>1</sup>No guarantee on completeness and correctness.

## **Module Group: “Analysis, Numerics and Approximation Theory”:**

**Asymptotische Geometrische Analysis & Anwendungen** (Prof. Dr. Prochno)

**Introduction to Information-based Complexity and Compressed Sensing**  
(Dr. Sonnleitner)

### **Seminar:**

- Funktionalanalysis (Prof. Dr. Prochno)
- Phenomena in High Dimensions (Prof. Dr. Prochno)

## **Module Group: “Dynamical Systems and Optimization”:**

- **Distributed Algorithms** (Prof. Dr. Harks)
- **Dynamical Systems** (Prof. Dr. Wirth)
- **Dynamic Network Flows** (Prof. Dr. Harks)
- **Optimierung** (Prof. Dr. Harks)

### **Seminar:**

- **Advanced Seminar Dynamical Systems** (Prof. Dr. Wirth)
- **Algorithmische Optimierung** (Prof. Dr. Harks)
- **Data Science and Optimization** (Prof. Dr. Sauer)
- **Dynamical Systems and Matrix Theory** (Prof. Dr. Wirth)
- **Optimierung und Spieltheorie** (Prof. Dr. Harks)

## **Module Group: “Stochastics, Statistics”:**

**Classical Limit Theorems & Large Deviations Theory** (Prof. Dr. Prochno)

**Stochastic Processes** (Prof. Dr. Rudolf)

**Computational Statistics: Regression in  $\mathbf{R}$**  (PD Dr. Schnurbus)

**Computational Statistics: Statistical Learning in  $\mathbf{R}$**  (PD Dr. Schnurbus)

**Econometric Methods** (Prof. Dr. Haupt)

### **Seminar:**

- **Diskrete Stochastische Prozesse** (PD Dr. Gilch)
- **Mathematical Data Science** (Prof. Dr. Rudolf)
- **Monte Carlo Methods and Applications** (Prof. Dr. Rudolf)

## **Modulgruppe: “Data Analysis and Data Management and Programming”:**

**Data on the Web** (Prof. Dr. Scherzinger)

**Data Science Lab** (Prof. Dr. Granitzer)

**Graph and Network Algorithms Lab** (Prof. Dr. Rutter)

**Introduction to Deep Learning** (Prof. Dr. Lemmerich)

**Management of Scientific Data** (Prof. Dr. Algergawy)

**Modern Database Systems** (Prof. Dr. Scherzinger)

**Principles of AI Engineering** (Prof. Dr. Herbold)

**Randomised Algorithms** (Prof. Dr. Sudholt)

**Scaling Database Systems** (Prof. Dr. Scherzinger)

**Advanced Data Analytics** (Dr. Fritsch)

## **Modulgruppe: “Applications”:**

**Approximate Dynamic Programming (Reinforcement Learning)** (Prof. Dr. Otto)

**Foundations of Energy Systems** (Prof. Dr. de Meer)

**Financial Engineering und Strukturierte Finanzierung** (Prof. Dr. Entrop)

**Practical Course: Advanced Topics in Management Science** (Prof. Dr. Otto)

**Quantitative Methoden in Finance** (Prof. Dr. Entrop)