



View of Würzburg (Foto: S. Korb)



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# Winter School 2018

## Modern Methods in Nonsmooth Optimization

Winter School 2018 in Würzburg  
February 26 – March 02, 2018

Modern Methods in Nonsmooth Optimization

### Information

#### • Expenses

The fee for the Winter School is **150,00 €** and includes some refreshments, a social dinner as well as a visit to the historical town of Rothenburg ob der Tauber.

#### • Financial support

A limited amount of financial support for travel and for accomodation is available.

#### • Deadlines

Application deadline for both the Winter School and financial support is November 15, 2017.

#### • Poster session

During the school, in addition to the lecture series, we will also have poster sessions in order to stimulate discussions between the lecturers and the participants, giving them the opportunity to present their own research on a large forum. We kindly ask to give us the title of your poster in the application form.

#### • Accomodation

We have made reservations for many participants at the „Schönstattzentrum Würzburg“, which is within walking distance of the Winter School.

#### • Requirements

The Winter School is for Master and PhD students. All presentations and discussions will be in English.



### Course Location

Würzburg is located in the state of Bavaria in the South of Germany. The city is rich in culture and lifestyle and provides a pleasant and entertaining atmosphere.

The roots of the Julius-Maximilians-University of Würzburg date back to the year 1402. The university belongs to the six oldest universities in the German-speaking world, looking back at a rich tradition. Currently, approximately 400 professors and 28.000 students are enrolled in ten departments. Many renowned scientists, among them 14 Nobel prize winners like Wilhelm Conrad Röntgen (discoverer of x-rays), conducted research at our university.

The Institute of Mathematics is located on the new Campus Hubland-Nord. It consists of eleven chairs:

- Algebra
- Dynamics and Control
- Geometry
- Complex Analysis
- Mathematics Education
- Applied Analysis
- Numerical Mathematics and Optimization
- Statistics
- Computational Science
- Mathematical Physics
- Mathematics in the Sciences



Old Main Bridge (Foto: S. Korb)

February 26 – March 02, 2018

Julius-Maximilians-Universität  
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Old Main Bridge with Fortress (Foto: S. Korb)



Vineyards around Würzburg (Foto: S. Korb)



## Scientific Organizers



Prof. Dr. Christian Kanzow  
University of Würzburg



Prof. Dr. Daniel Wachsmuth  
University of Würzburg

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### Modern Methods in Nonsmooth Optimization

#### Modern Methods in Nonsmooth Optimization

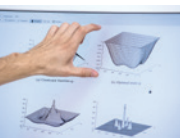
Nonsmooth optimization is a highly active field of research in the subject of applied and numerical mathematics. It requires sound knowledge of convex and nonsmooth analysis for the derivation and convergence analysis of modern methods to solve difficult and often nondifferentiable optimization problems. With Amir Beck (Israel), Christian Clason, Anton Schiela, Alexandra Schwartz (Germany) and Tuomo Valkonen (England) we were able to acquire five internationally renowned researchers as speakers. The lectures cover the range from theoretical foundations to the derivation and convergence analysis of optimization methods as well as their numerical realization and application. First, these topics will be explored for finite-dimensional optimization problems. Afterwards, the appropriate ideas and techniques will be transferred to infinite-dimensional problems.



Hubland-Campus  
by night  
(Foto: C. Zube)



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#### Speakers

Five excellent speakers will give lectures on particular topics related to nonsmooth optimization. These lectures provide an introduction to topics of active research within this field, both for finite- and infinite-dimensional optimization problems. All speakers will provide the necessary background material and then introduce the students to the current state-of-the-art of their own research.

- **Amir Beck** (Tel-Aviv University, Israel)  
First-Order Methods for Nonsmooth Optimization Problems  
Amir Beck is a world-leading expert for solution methods in nonsmooth optimization. He is well-known in particular for his contributions to the development of FISTA. He will give a lecture on first-order methods for nonsmooth optimization. The lecture will be algorithmically oriented by exploiting the special structure of several nonsmooth optimization problems and applications. Since this requires some knowledge from convex analysis, the necessary tools will also be presented.
- **Christian Clason** (University of Duisburg-Essen, Germany)  
Introduction to Nonsmooth Infinite-Dimensional Optimization Problems  
Christian Clason is an expert for the solution of infinite-dimensional optimization problems using nonsmooth techniques. His lecture will present tools from nonsmooth analysis that can be used to derive necessary optimality conditions for infinite-dimensional optimization problems arising in optimal control, mathematical imaging, and inverse problems. A particular focus will be on optimality conditions in a form that is amenable to numerical solution.

- **Anton Schiela** (University of Bayreuth, Germany)  
Optimization Methods in Function Space  
Anton Schiela is an expert for the solution of difficult infinite-dimensional optimization problems. The lecture will focus on algorithms for the solution of smooth and nonsmooth optimization problems in a Banach or Hilbert space setting. Special emphasis will be put on the realization of such algorithms using proper discretization techniques.
- **Alexandra Schwartz** (Technische Universität Darmstadt, Germany)  
Mathematical Programs with Complementarity Constraints and Related Problems  
Alexandra Schwartz is an expert for optimization problems with specially structured constraints. This includes mathematical programs with complementarity constraints or cardinality constraints. Her talks therefore focus on these topics. The necessary requirements from nonsmooth analysis will also be introduced within this lecture series.
- **Tuomo Valkonen** (University of Liverpool, England)  
Preconditioned Proximal Point Methods in Hilbert Spaces  
Tuomo Valkonen is an expert for nonsmooth optimization methods and their applications to image reconstruction problems. The lecture will focus on modern iterative methods based on decoupling of the proximal point method. The necessary background from the field of variational analysis will also be provided.

