

German-Israeli Minerva School on

Modern Optimization and its Applications in Engineering II

Location: Wissenschaftszentrum Schloß
Thurnau, Bayreuth,
Germany

Date: September 22 to 26, 2003

Organizers: [Prof. A. Ben-Tal](#)
[Prof. A. Nemirovski](#)
[Prof. K. Schittkowski](#)

Faculty of Industrial Engineering and
Management, [Technion](#), Haifa
- as above -
Department of Mathematics,
[University of Bayreuth](#)

see also: [Topology Optimization Days](#), Thurnau,
September 18 to 19, 2003



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Aims and Scopes:

The field of Optimization is presently in a turning point due to recent methodological developments (e.g., conic, in particular, semidefinite programming, robust optimization, ...), algorithmic developments (polynomial time interior point methods) and progress in software implementations. As a result, significant links between optimization and computer science, particularly, in combinatorics, were created and are rapidly becoming major fields of research and applications. Likewise, new exciting links between continuous optimization and control were unfolded, mainly through the subject of semidefinite programming. These links offer new ways to treat challenging engineering-related applications.

This new body of knowledge, however, is not yet covered adequately by the current curriculum of programs in Mathematics/Applied Mathematics or Engineering. The only book which addresses the above topic as a whole is the recent (2001) book of Ben-Tal and Nemirovski *Lectures of Modern Convex Optimization*, SIAM. The Summer School offers a unique opportunity to young scientists to acquaint themselves with cutting edge methodology and potential applications of modern optimization, a knowledge that may prove to be essential in their future development.

The general theme of the Summer School is Continuous Optimization, i.e., theory, modelling, algorithms and applications. The topics to be addressed during the school are

- nonlinear continuous optimization
- semidefinite and second order cone optimization
- combinatorial and information-based complexity of mathematical programming problems
- polynomial time methods and methods for extremely large-scale problems
- optimization under uncertainty, robust optimization

- engineering, control and medical applications of optimization

The German-Israeli collaboration in the area of optimization has a long and highly successful history, as far as organizers of the Minerva School are concerned, and includes the organization of a previous Minerva Summer School *Modern Optimization and its Applications in Engineering* at the Technion, Haifa, 2000.

Intended Audience:

Ph.D. and post-doctoral students, as well as young faculty members, in the areas of Applied Mathematics, Computer Science and mathematically-oriented Engineering (Electrical, Mechanical, Aerospace, Chemical, etc.). Some basic knowledge about nonlinear programming or optimization in general is desirable.

Lecturers:

<u>Prof. H. Baier</u>	Faculty of Mechanical Engineering, Technical University of Munich
<u>Prof. A. Ben-Tal</u>	Minerva Optimization Center, Faculty of Industrial Engineering, Technion, Haifa
<u>Prof. U. Kirsch</u>	Minerva Optimization Center, Faculty of Civil Engineering, Technion, Haifa
<u>Dr.-Ing. H.-P. Mlejnek</u>	Institute for Statics and Dynamics of Aerospace Structures, University of Stuttgart
<u>Prof. A. Nemirovski</u>	Minerva Optimization Center, Faculty of Industrial Engineering, Technion, Haifa
<u>Prof. H.J. Pesch</u>	Department of Mathematics, University of Bayreuth
<u>Prof. E. Sachs</u>	Department of Mathematics, University of Trier
<u>Prof. K. Schittkowski</u>	Department of Mathematics, University of Bayreuth
<u>Prof. M. Teboulle</u>	School of Mathematical Sciences, Tel-Aviv University

Preliminary Program:

Monday, September 22		
9:30-9:35	Ben-Tal, Schittkowski	Welcome Address
9:35-10:30	Nemirovski	Conic Quadratic and Semidefinite Programming I
10:30-11:00	coffee break	
11:00-12:30	Nemirovski	Conic Quadratic and Semidefinite Programming II
12:30-14:00	lunch break	
14:00-15:30	Teboulle	Theory and Algorithm for Optimization and Variational Inequalities
15:30-16:00	coffee break	
16:00-17:30	Students	Short Presentations and Home Work
18:00-20:00	dinner	
20:00-...	welcome party	

Tuesday, September 23		
8:30-10:00	Ben-Tal	Robust Optimization I
10:00-10:30	coffee break	

10:30-12:00	Ben-Tal	Robust Optimization II
12:00-13:30	lunch break	
13:30-15:00	Schittkowski	Implementation of Optimization Software and Industrial Applications
15:00-15:30	coffee break	
15:30-17:00	Students	Short Presentations and Home Work
18:00-20:00	dinner	

Wednesday, September 24		
8:30-10:00	Sachs	Optimization in Infinite Dimensional Spaces *
10:00-10:30	coffee break	
10:30-12:00	Sachs	Large Scale Optimization *
12:00-13:30	lunch break	
13:30-...	excursion to Bayreuth	

Thursday, September 25		
8:30-10:00	Kirsch	Introduction to Structural Optimization
10:00-10:30	coffee break	
10:30-12:00	Kirsch	Computational Structural Optimization
12:00-13:30	lunch break	
13:30-15:00	Pesch	Optimal Control Applications
15:00-15:30	coffee break	
15:30-17:00	Schittkowski	Software Presentation
18:00-20:00	dinner	
20:00-...	farewell party	

Friday, September 26		
8:30-10:00	Mlejnek	Aspects of Optimal Material Distribution as an Optimization Task
10:00-10:30	coffee break	
10:30-12:00	Baier	Optimization in Multidisciplinary Engineering Problems
12:00-13:30	lunch break	
13:30-15:00	Students	Short Presentations and Home Work
15:00		

* Title not yet confirmed.

Accommodation:

The Minerva School will take place at the [Wissenschaftszentrum Schloß Thurnau](#). [Thurnau](#) is a small, historical city about 30 km in the west of Bayreuth, close to the Autobahn (A70) between [Bayreuth](#) and [Bamberg](#). Participants will stay overnight either in the castle or in nearby hotels. All lectures, meals, and social events will take place in the castle.

Travel Information:

Here is a brief description how to move from the Frankfurt Airport to Thurnau:

1. The actual train schedule and connections from Frankfurt Airport to Bayreuth can be retrieved from [internet](#).
2. Go to the railway station ('Fernbahnhof', 'Fernbf.'), buy a ticket to Bayreuth, and take the next Intercity Train (IC, EC, ICE) to Nürnberg (appr. every full hour). The fare is about EUR 60 for one direction.
3. Change the train in Nürnberg. If you are lucky, you can reach another Intercity Train (ICE) starting at platform no. 15. Otherwise, take a local train (Regionalbahn) starting from platform no. 17 (appr. 15 min to full hour). Please check platform number to be sure. Enter the first part of the train. In some cases, the train is separated at an intermediate station.
4. Total travelling time is less than 4 h.
5. As soon as you know your arrival time in Bayreuth, call 0170 7502867 or 0921 32887 to arrange local transportation from Bayreuth to Thurnau. If not possible, take a taxi to Thurnau.

Registration:

To register, send an e-mail to the local organizer, [Prof. K. Schittkowski](#), containing the following information:

1. Full name and address (private and institutional) with phone/fax number
2. Name and affiliation of supervisor of diploma thesis or dissertation
3. Brief outline of interest in the summer school (professional skills in optimization, research projects, ...)
4. List of publications (if available)
5. Presentation of a seminar (optional), preliminary title
6. Arrival data, i.e. transportation (car, train, ...) and approximate arrival time.

Important Notes:

- i. The number of participants is limited, early registration is recommended.
- ii. Financial support covering local expenses (accommodation, meals, ...) is available.
- iii. Participants from Israel will get full refund of travel expenses (on basis of cheapest tourist fares).
- iv. German participants can apply for a refund of travel expenses, refund after the event depending on budget.
- v. Participants from other countries are welcome, but financial support cannot be provided.

Acknowledgement:

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