

# ADA

ANALYTICS DATEN ANWENDUNGEN

CENTER FOR TRAINING AND EDUCATION  
IN DIGITALIZATION AND TRANSFORMATION

The ADA-Center is a partner for companies who would like to optimize their business processes. Powered by the combined longstanding experience of Fraunhofer IIS, FAU Erlangen-Nürnberg and LMU München in the execution of large-scale industry projects, it develops cutting-edge analytical solutions to the challenges facing them. Together with its sector-specific competency groups, it provides companies with mathematical models for real-world problems, the design of fast solution algorithms as well as their implementation in practice.

## SPEAKERS



**Professor Paul Williams,**  
London School of Economics

Paul Williams is a Cambridge graduate in mathematics with a PhD in mathematical logic. He has gained extensive experience in linear and integer optimization during his research and consulting work at IBM, where he established optimization modelling as a subject of study. Afterwards, he has held a variety of academic positions during which he made important contributions to the algorithmic advancement of the field.



**Dr. Andreas Bärmann**  
Friedrich-Alexander-Universität  
Erlangen-Nürnberg

Andreas Bärmann is a postdoc in integer optimization at FAU with a research focus on optimization in logistics, especially on the interplay of machine learning and optimization methods in this field. The lectures in this course will be supported by further optimization experts from FAU as well as Dr. Kostja Siefen from Gurobi.

## ACADEMIC PROGRAMME DIRECTORS



**Prof. Dr. Alexander Martin**  
FAU Erlangen-Nürnberg  
Head of ADA-Center



**Nadine Chrobok-Pensky**  
Fraunhofer IIS  
Manager ADA-Center

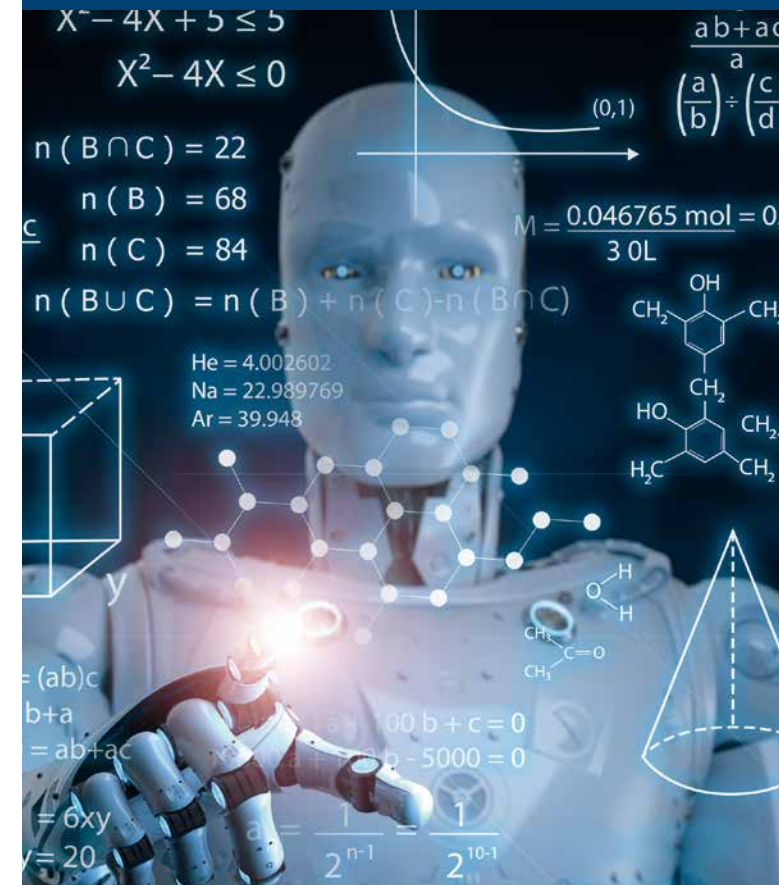
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This programme is part of the center for training and education in digitalization and transformation, a joint initiative of:



## INDUSTRIAL TRAINING COURSE Mathematical Optimization



**ORGANIZER:**

Friedrich-Alexander-Universität Erlangen-Nürnberg

**FOR WHOM?**

Planning professionals at an operational or management level in logistics, production, energy or telecommunication; data scientists and consultants working with quantitative methods; interested people with a background in mathematical, natural, technical or economic sciences.

**PREREQUISITES:**

- » Basic knowledge in linear algebra
- » Elementary programming skills are helpful
- » Participants should bring their own laptop with administrator rights to install the software used in this course if possible.

**DATES:**

**Monday, 22 July to Saturday, 27 July 2019**

Each day from 09:30 until 17:30

**DURATION:**

3 or 6 days

**PARTICIPATION FEE:**

Day 1 to 3: 1.500 € + VAT

Day 1 to 6: 2.400 € + VAT

(incl. lunch on all days and a joint dinner on Wednesday, excl. accomodation and excl. travelling)

**LOCATION:**

Friedrich-Alexander-Universität Erlangen-Nürnberg  
Lehrstuhl für Wirtschaftsmathematik, PC-Pool 1 (ground floor)  
Cauerstraße 11, 91058 Erlangen

**For registration please complete the online form:**

<https://lze.academy>

**For further information please contact:**

Kristin Pöhlau, [weiterbildung@lze-projekt.de](mailto:weiterbildung@lze-projekt.de)

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**1****DAY****Introduction to linear programming**

Elementary models and applications, the challenges of integer programming

**Analysing linear programmes**

Geometric properties and the simplex algorithm

**3****DAY****Introduction to integer programming****Solving integer programmes**

Branch-and-bound, cutting planes, good and bad model formulations

**5****DAY****The travelling salesman problem**

Applications in logistics and further areas, polyhedral properties

**Fixed-charge and general network design problems****DAY****2****DAY****4****DAY****6****KEY TAKE-AWAYS**

- » An extensive hands-on training programme in optimization methods, given by leading experts in the field, oriented at the productive use, both within large and small companies.
- » Mathematical modelling and algorithmic solution of optimization problems with a special emphasis on the use of state-of-the-art optimization software tools.
- » Rich networking opportunities with FAU and Fraunhofer experts in the optimization of processes in logistics, production, energy systems and telecommunication as well as practitioners in the field.

**COURSE DETAILS**

The course teaches the foundations of mathematical optimization with a special focus on the solution of planning problems from an industrial environment. It gives planners all the necessary tools to formulate and solve optimization tasks as mathematical models, covering both linear and integer problems. At the hand of many practical and detailed examples, the participants learn to build optimization models for problems occurring in logistics and transport, production, energy systems, telecommunication and many further contexts. They obtain a basic understanding of the most important algorithms in linear and integer optimization: the simplex method and the branch-and-bound scheme.

In extensive hands-on training sessions, the participants acquire the ability to use state-of-the-art optimization software to solve large-scale optimization tasks and to interpret the computed solutions in terms of the application context at hand. As an add-on, university experts give advice for the beneficial implementation of optimization approaches in small and major companies, drawing from their vast experience in industrial cooperations over the last 20 years.



**GUROBI**  
OPTIMIZATION

The course includes a free 30-day trial license for the optimization software Gurobi which is used in the practical exercises. You also get a course book and the lecture slides.