Case Studies Discrete / Nonlinear Optimization (MA4512 / MA4513)
Joint Information Event

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February 6, 2019
Welcome!
Who are we?

Nonlinear Optimization:

Discrete Optimization:
What is this about?

Case Studies Nonlinear Optimization
Case Studies Discrete Optimization

Contents:
- exemplary case studies
- individual mathematical lectures
- team management & project organization
- poster design & presentation skills
What is this about?

Case Studies Nonlinear Optimization
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Case Studies Nonlinear Optimization

Possible projects:

• Portfolio Optimization\(^1\) (AllianzGI / Risklab)
• Nonlinear Model Predictive Control (Siemens)
• Global Optimization With Non-smooth Objective (IAV)
• Price Optimization\(^1\) (Garten-und-Freizeit.de)
• Preliminary: Topology Optimization\(^1\) (BMW)

\(^1\) Declaration of confidentiality required.
Computer Course Nonlinear Optimization

Contents

• modeling, numerical optimization problems
• introduction to AMPL
• testing optimization methods from lectures
• using optimization software packages

Organisation

• block course: March 13 - 15, 2019
• registration via ferienkurse.ma.tum.de
• http://www-m1.ma.tum.de/bin/view/Lehrstuhl/HaubnerSoftwarekursWS1819
What is this about?

Case Studies Discrete Optimization
What is this about?

Case Studies Discrete Optimization

Possible projects:

- Tow train usage for assembly lines (Audi)
- Shift planning for bus drivers (FlixMobility)
- Online optimization of AGV routes (Logivations)
- Camera placement in warehouses (Logivations)
- Layout of PV power plants (Siemens)
- Optimizing school meals (World Food Programme)
Computer Course Discrete Optimization

Contents
- integer linear programming
- introduction to Fico Xpress / Mosel
- applying theory from lectures
- learning to control optimization packages

Organisation
- block course: April 08-10, 2019 (preliminary)
- registration via ferienkurse.ma.tum.de
- additional information soon available at http://www-m9.ma.tum.de/
Overview of projects

- Portfolio Optimization\(^1\) (AllianzGI / Risklab)
- Nonlinear Model Predictive Control (Siemens)
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Methodology

- independent work in project teams
- intensive coaching
- presentations
- lectures on mathematical subjects
- lectures on soft skills
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Mathematics
Management
Marketing
Marketing?

Presentation of discussion and results . . .

- . . . in the team / in a small group
- . . . to the scientific community (scientific conference)
- . . . to a general audience (poster and booth)

Additional coaching provided by ProLehre
Schedule

Combination: individual work, project, mathematical lectures, soft skills
Schedule

Combination: individual work, project, mathematical lectures, soft skills

... preliminary meeting
Schedule

Combination: individual work, project, mathematical lectures, soft skills

- preliminary meeting
- mathematics, soft skills
- project phase
Schedule

Combination: individual work, project, mathematical lectures, soft skills

- preliminary meeting
- project phase
- mathematics, soft skills
- final meeting
What do we expect?

- dedicated
- open minded & creative
- willing to contribute in a team
- motivated by real world challenges
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- dedicated
- open minded & creative
- willing to contribute in a team
- motivated by real world challenges

Requirements for Nonlinear Optimization:
- Grundlagen der Nichtlinearen Optimierung
- Nonlinear Optimization Advanced
- useful: programming skills (computer course!)
What do we expect?

• dedicated
• open minded & creative
• willing to contribute in a team
• motivated by real world challenges

Requirements for Discrete Optimization:
• Fundamentals of Convex Optimization
• Combinatorial Optimization or Discrete Optimization
• useful: programming skills (computer course!)
What can you expect?

• interesting, applied mathematics
• innovative teaching methods
• support
• creative freedom
• 7 ECTS
Why should you do it?

Mathematics  Management  Marketing
Why should you do it?

- combination of theory and practical applications
Why should you do it?

Mathematics  Management  Marketing

- combination of theory and practical applications
- key competencies
Why should you do it?

Mathematics  Management  Marketing

• combination of theory and practical applications
• key competencies
• communication and presentation skills
What to do next?

- limit of 20 students for each course
- binding, mandatory registration until March 1st, 2019
- by email:
  - ulf.friedrich@tum.de
  - pfefferer@ma.tum.de

Details about application: see websites!

- acknowledgement of receipt (lost in spam otherwise)
- reply until March 20th, 2019
Important Dates

Lectures (starting April 24th, 2019):
- Mondays 10:15 - 11:45 (preliminary)
- Wednesdays 14:00 - 15:30 (preliminary)

Kickoff meeting:
- Tuesday, April 23rd, 2019, starting 16:00 (open end)

Poster Workshop:
- May 2019 (two complete days)

TUMMS Poster Presentation:
- June 2019

Final meeting:
- July 2019, ca. 8:30 - 19:00
What further questions do you have?

www-m17.ma.tum.de/Lehrstuhl/LehreSoSe19CaseStudies

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