

PhD Opportunities in Optimization and Operational Research at the School of Mathematics

Miguel Anjos (for Alper Yıldırım)



THE UNIVERSITY
of EDINBURGH

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About ERGO

- Active for more than 25 years
- Highly recognized in the UK and beyond
- 15 academic staff
 - Miguel Anjos
 - Burak Buke
 - Thomas Byrne
 - Chris Dent
 - Skarleth Carrales
 - Sergio García Quiles
 - Jacek Gondzio
 - Andreas Grothey
 - Akshay Gupte
 - Julian Hall
 - Jörg Kalcsics
 - Ken McKinnon
 - John Pearson
 - Lars Schewe
 - E. Alper Yıldırım
- OR Consultant
 - Alemseged Weldeyesus
- 3 postdoctoral research associates
 - Stefano Cipolla
 - Nicolò Mazzi
 - Zeynep Şuvak
- 22 PhD students, 11 of them former MSc students here!

International Recognition

- Best Paper Awards
 - Bomze, Gollwitzer, and **Yıldırım**, *J. of Global Optimization*, 2014
 - Huangfu & **Hall**, *Computational Optim. and Applications*, 2015
 - Huangfu & **Hall**, *Mathematical Programming Computation*, 2018
 - Burlacu, Egger, Gross, Martin, Pfetsch, **Schewe**, Sirvent, and Skutella, *Optimization and Engineering*, 2019
- Winners of MOPTA Competition 2020 (Team NP Die Hard: Fermín, Gjeroska, and Solà)
- Journal Editorships (Anjos, Dent, Gondzio, Grothey, Hall, Schewe, Yıldırım)
- EURO Excellence in Practice Award 2016 (Schewe et al.)
- Inria International Chair (Anjos)
- Two Senior Members of IEEE (Anjos, Dent)
- Senior Schöller Fellow (Anjos)
- Two EUROPT Fellows (Anjos, Gondzio)
- Fellow of the Canadian Academy of Engineering (Anjos)
- Fellow of OR Society, IESIS, and IET (Dent)

Areas of Research Activity

- Future Energy Networks
- Decision Making Under Uncertainty
- Integer and Combinatorial Optimization
- Continuous Optimization
- Computational Optimization and Software

Examples of possible PhD projects

Akshay Gupte

- Stochastic mixed-integer polynomial optimization with applications in resilient infrastructure and network design

Alper Yıldırım

- Theoretical comparison and implementation of alternative convex relaxations of structured nonconvex optimization problems
- Dynamic optimization of AI-based 5G networks

Andreas Grothey

- Scenario aggregation in stochastic programming (in particular with respect to Energy applications)
- Asynchronous decomposition for interior point (for a student with a programming interest)

Examples of possible PhD projects

Burak Buke

- Design and Control of Service Systems with Heterogeneity: Modelling the Human Aspect (background in probability required)
- Subscription Based Online Systems: Pricing and Traffic Control (background in probability required)

Chris Dent

- Stochastic optimization for energy scenario analysis (in collaboration with Scottish government)

Jacek Gondzio

- Cutting Plane Methods with Interior Point Solver
- Huge Scale Optimization with Inexact Newton Method

Joerg Kalcsics

- Stochastic supply chain design

Examples of possible PhD projects

John Pearson

- Optimization with PDE constraints: Modelling of such problems as well as numerical linear algebra for the resulting discretized systems.

Julian Hall

- High performance solution of large scale sparse LP problems with the simplex method

Lars Schewe

- Energy systems: Hierarchical MINLP modeling or “Finding the right optimization model automatically”
- Energy markets: How detailed should our model be?
- Algorithms for structured MINLP

Examples of possible PhD projects

Miguel Anjos

- New algorithms for solving bilevel optimization problems
- Optimal deployment of infrastructure for increased EV adoption
- Optimal storage sizing and placement for renewable integration

Recent Graduates and Their Current Positions

- Xavier Cabezas, *Heuristic Methods for Solving Two Discrete Optimization Problems*, 2018, Adv: Sergio Garcia Quiles.
Now: Lecturer in Ecuador
- Lukas Schäfer, *Design of Reliable Aerospace System Architecture (in collaboration with AIRBUS)*, 2018, Adv: Sergio Garcia Quiles.
Now: Mathematician and Software Developer at Math.Tec, Austria
- Thomas Byrne (MSc graduate), *Facility Location Problems and Games*, 2020, Adv: Joerg Kalcsics.
Now: University Teacher in our School
- Saranthorn Phusingha, *Multi-Period Sales Districting Problems*, 2020, Adv: Joerg Kalcsics.
- Minerva Martín del Campo Barraza, *Efficient Algorithms for Solving p -Median Problems with Radius Constraints and Its Application to Clustering with Feature Selection*, 2020, Adv: Sergio Garcia Quiles.