

Advances in Mixed-Integer Nonlinear Optimization

Overview

Many design, planning and decision problems arising in engineering, sciences, finance, and statistics can be mathematically modeled as Mixed-Integer Nonlinear Optimization (MINLO) problems. The last two decades have seen a phenomenal growth in the development of theory, algorithms and computational tools for MINLO. Riding on this growth, MINLO has found many applications, and is being used to solve practical problems in various domains.

The 10-day course will start with a gentle introduction to MINLO models and motivating practical applications. The next part of the course covers the branch-and-cut paradigm which is central to solving these problems followed by methods for convex MINLOs and nonconvex MINLOs. Heuristic search, cutting plane techniques, reformulation and presolving methods will be covered. The course concludes with discussions on the future trends of MINLO. Tutorials for practice problems and exercises will be conducted each day. Hands-on computational exercises on modeling and using state-of-the-art software will help participants understand practical ways of solving MINLOs.

Dates	January 15-20 and January 22-25, 2024. Number of participants for the course will be limited to fifty.
You Should Attend If...	<ul style="list-style-type: none">▪ you are an executive, engineer, or a researcher from a manufacturing, service or government organization including R&D laboratories and interested in optimization▪ you are a student or faculty from an academic institution interested in learning MINLO techniques and applications
Fees	The participation fees for taking the course is as follows: Participants from abroad : US \$500 Industry/ Research Organizations: Rs 30000 Academic Institutions: Rs 10000 The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. The participants will be provided with accommodation on payment basis.

The Faculty



Sven Leyffer is a Senior Computational Mathematician and Deputy Division Director at the Argonne National Laboratory. He is also the current SIAM President. His research interests include large-scale nonlinear optimization, mixed-integer nonlinear optimization and optimization with complementarity constraints.



Pietro Belotti is an Assistant Professor in the Operations Research group of the Department of Electronics, Information and Bioengineering of the Politecnico di Milano. His research interests include discrete nonlinear (global) optimization; exact methods for discrete multiobjective optimization; robust optimization; and open-source software for optimization. He is the author and maintainer of Couenne, a software package for solving global optimization problems.



Ashutosh Mahajan is an Associate Professor at Indian Institute of Technology Bombay. His research interests include theory, algorithms, and software for optimization problems involving discrete choices or integer variables. He co-develops and maintains the open-source solver Minotaur for convex and nonconvex MINLO.

Course Co-ordinator

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