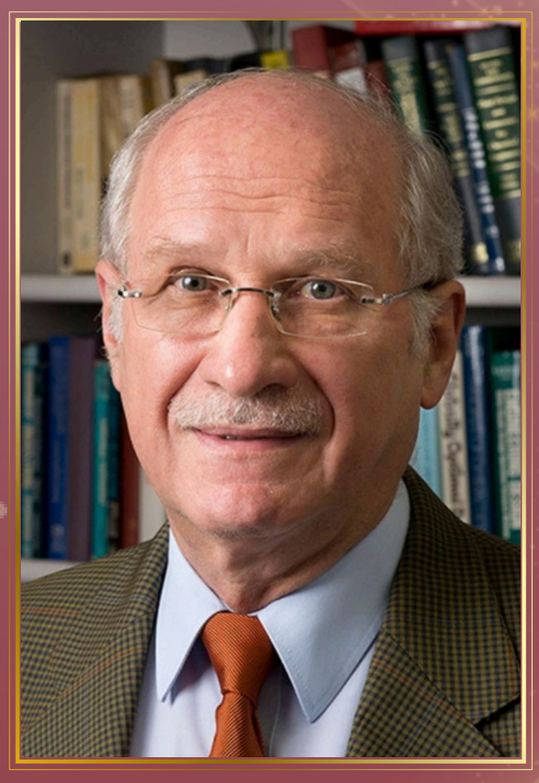
Co-organised by

Lingnan University
Institute for Advanced Study

LUIAS Distinguished Lecture

Workshop on Recent Theoretical and Computational Advances in the Optimisation of Systems under Uncertainty



Speaker

Professor Ignacio E. GROSSMANN

Rudolph R. and Florence Dean University Professor
Center for Advanced Process Decision-making
Department of Chemical Engineering, Carnegie Mellon University
Lingnan Fellow, Lingnan University Institute for Advanced Study

Date: 8 December 2026 Time: 10:00 AM - 4:15 PM

Venue: LYH201/1, 2/F, Lau Lee Yuen Haan Amenities Building
Lingnan University

Mode: Hybrid (Face-to-face or Zoom)

About the Workshop

Optimisation under uncertainty has been an active and challenging area of research for many years. However, its application in practical systems has faced a number of important barriers that have prevented its effective application. Barriers include availability of information on the uncertainty of the data (ad-hoc or historical), determination of the nature of the uncertainties (exogenous vs. endogenous), selection of an appropriate strategy for hedging against uncertainty (robust optimisation vs. stochastic programming), handling of nonlinearities (most work addresses linear problems), large computational expense (orders of magnitude larger than deterministic models), and difficulty in the interpretation of the results by non-expert users.

In this workshop, we describe recent advances that address some of these barriers. We first describe the basic concepts of robust optimisation, including the robust counterpart, showing its connections with semi-infinite programming. We also explore the relationship between flexibility analysis and robust optimisation for linear systems. A historical perspective is given, which shows that some of the fundamental concepts in robust optimisation have already been developed in the area of flexibility analysis in the 1980s. We next consider two-stage and multi-stage stochastic programming in the case of exogenous parameter, for which we describe acceleration techniques for Benders decomposition, hybrid sub-gradient/cutting plane methods for Lagrangean decomposition, and sampling techniques. We address both mixed-integer linear and nonlinear stochastic programs, including integer recourse. We then address the generalisation to the case of both exogenous and endogenous parameters, which gives rise to conditional scenario trees for which theoretical properties are described to reduce the problem size. To avoid ad-hoc approaches for setting up the data for these problems, we describe approaches for handling of historical data for generating scenario trees. Finally, we illustrate the application of each of these formulations in demand-side management optimisation, planning of process networks, chemical supply chains under disruptions, planning of oil and gas fields, and optimisation of networks, all of them under some type of uncertainty.

Biography

Prof Ignacio E. Grossmann is the Rudolph R. and Florence Dean University Professor in the Department of Chemical Engineering, and former department head at Carnegie Mellon University. He obtained his B.S. degree at the Universidad Iberoamericana, Mexico City, in 1974, and his M.S. and Ph.D. at Imperial College in 1975 and 1977, respectively. He is a member and former director of the Center for Advanced Process Decision-making, an industrial consortium that involves 20 petroleum, chemical, engineering, and software companies. He is a member of the National Academy of Engineering, and Fellow of AIChE and INFORMS. He has received the INFORMS Computing Society Prize and the following AIChE awards: Computing in Chemical Engineering, William H. Walker for Excellence in Publications, Warren Lewis for Excellence in Education, Research Excellence in Sustainable Engineering, Founders Award for Outstanding Contributions to the Field of Chemical Engineering. In 2015 he was the first recipient of the Sargent Medal by the IChemE. In 2025, Prof Grossmann was selected as Foreign Academic of the Chemical and Physical Sciences Section of the Royal Academy of Exact, Physical and Natural Sciences of Spain. He has honorary doctorates from Abo Akademi in Finland, University of Maribor in Slovenia, Technical University of Dortmund in Germany, University of Cantabria in Spain, Russian Kazan National Research Technological University, Universidad Nacional del Litoral, Argentina, Universidad de Alicante in Spain, and RWTH Aachen, Germany. He is a 2019 top cited scientist in Computer Science and Electronics: 53 Worldwide, 38 National. He has authored more than 700 papers, the recent textbook Advanced Optimisation for Process Systems Engineering, and the textbook Systematic Methods of Chemical Process Design, which he co-authored with Larry Biegler and Art Westerberg. He has also organised the virtual library on process systems engineering. Grossmann has graduated 68 Ph.D. and 37 M.S. students. His main research interests are in the areas of discrete/continuous optimisation, optimal synthesis and planning of chemical processes and energy systems, supply chain optimisation, and optimisation under uncertainty.

For More Details

Scan to Register

Enquiries

2616 8847

luias@ln.edu.hk

ALL ARE WELCOME

EDUCATION for SERVICE
作育英才・服務社會