

ICB seminar series 2024/25

chairman: Prof. Dr. Kjell Jorner

# OPTIMAL SYNTHESIS AND PLANNING OF SUSTAINABLE CHEMICAL PROCESS AND ENERGY SYSTEMS

**Prof. Dr. Ignacio E. Grossmann**

Center for Advanced Process Decision-making  
Department of Chemical Engineering  
Carnegie Mellon University



**Wednesday, 02/10/2024, 5:30 pm**

ETH Hönggerberg, HCI J 7

**Abstract:** In this seminar we cover applications of techniques for discrete and continuous optimization (mixed-integer linear/nonlinear programming (MILP/MINLP), Generalized Disjunctive Programming (GDP) and global optimization), for synthesis and planning of sustainable process and energy systems. Applications of MILP include design of hydrogen supply chains, expansion planning of reliable and resilient electric power systems with renewables, retrofit of crude oil refineries for processing biomass to produce sustainable aviation fuels. Applications of MINLP and GDP include synthesis of lignocellulosic ethanol, optimization of shale gas infrastructures, synthesis of intensified distillation columns. Finally, applications of global optimization include optimal process water networks that involve reuse and recycle, optimal maritime transportation planning under carbon intensity constraints, optimal design of centralized and distributed manufacturing facilities for biomass production

**Bio:** Ignacio E. Grossmann is the Rudolph R. and Florence Dean University Professor of Chemical Engineering at Carnegie Mellon University. He has been Department Head, and director of the "*Center for Advanced Process Decision-making*" at Carnegie Mellon. A member of the National Academy of Engineering, he has received the INFORMS Computing Society Prize as well as several AIChE awards. In 2015 he was the first recipient of the Sargent Medal by the IChemE and in 2017 he was awarded the ETH Chemical Engineering Medal. He has honorary doctorates from Universities in Germany, Spain, Aragentina among others. His main research interests are in the areas of discrete/continuous optimization, optimal synthesis and planning of chemical processes and energy systems, supply chain optimization, and optimization under uncertainty. He has over 700 publications and has graduated almost 70 Ph.D. students. He has also organized the virtual library on process systems engineering.