Data-driven modeling:
Two methodological generalizations

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The ever-increasing availability of process data presents us with the challenge of seriously reexamining our modeling practices. Most models can be broadly categorized into two main categories: data-driven and knowledge-driven. The present seminar focuses on the development of data-driven models. It describes two generalizations of the classical design of experiments (DoE) methodology, the long-standing data-driven modeling methodology of choice. The first generalization enables the design of experiments with time-varying inputs, called Design of Dynamic Experiments (DoDE). The second generalization enables the development of a dynamic response surface model (DRSM) when time-resolved measurements are available. We will discuss how both advances are able to contribute significantly to the modeling, optimization, and understanding of processes for which a knowledge-driven model is not easily at hand. We also argue that such approaches can be widely used in developing reduced-size meta-models, for on-line use in existing processes. We conclude with a critical view of some missing elements in the development of knowledge-driven models.

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Dr. Christos Georgakis is Professor of Chemical and Biological Engineering at Tufts University where he has also been the Bernard M. Gordon Senior Faculty Fellow in Systems Engineering. He received his Chemical Engineering Diploma (1970) from National Technical University in Athens, Greece; his MS (1972) from the University of Illinois and his Ph.D. (1975) from the University of Minnesota. Starting in 1975, he served as du Pont Assistant Professor and Edgerton Associate Professor of Chemical Engineering at MIT, and as Professor of Measurement and Control at the University of Thessaloniki in Greece where he initiated the Chemical Process Engineering Research Institute. He joined Lehigh University in 1983 where he founded and directed the Chemical Process Modeling and Control Research Center. Lehigh honored him in 2001 with the Iacocca Professorship. After two years as the Othmer Distinguished Professor at the Polytechnic University, in New York City, he moved to Tufts in 2004. In 2017 he has been recognized with the Distinguished Senior Scholar Award.

His research activities have been recognized by a multitude of awards both nationally and internationally. He was awarded in 1978 a Dreyfus Foundation Teacher-Scholar Grant. In 2001, he was the recipient of the Computing Award of the CAST Division of the American Institute of Chemical Engineers. He is a fellow of the American Institute of Chemical Engineer, the American Association for the Advancement of Science, of the International Federation of Automatic Control. In 2002-03 he served as the President of the American Automatic Control Council. Six years ago, he initiated a new series of conferences called Future Innovation in Process Systems Engineering (FIPSE). The fourth one is taking place in June 2018 in Halkidiki, Greece.

Per informazioni rivolgersi al prof. Massimiliano Barolo