"Design of experiments and process modeling:

Some classical ideas and some recent novel developments”

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**Abstract**

The seminar starts with a short review of the advantages and limitations of the following two types of models: Knowledge-Driven and Data-Driven. It also reviews the classical data-driven approach of process understanding and modeling, the Design of Experiments (DoE) methodology. To ameliorate two limitations of this methodology, we have introduced two generalizations. The first one, called Design of Dynamic Experiments, enables the design of experiments with time varying inputs, such as the time dependence of the reaction temperature or the feeding profile of a co-reactant. The second one addresses the modeling of the process output when there are several time-resolved measurements. The last one is a generalization of the classical Response Surface Model and it is called Dynamic Response Surface Model (DRSM). We conclude with industrial example applications of these two innovations from collaborations with Pfizer, Dow Chemicals and ExxonMobil.

**Brief Biographical Note**

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 University’s 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.