

# Model Predictive Control: Theory and Applications

## Overview

Model Predictive Control (MPC) has become a dominant advanced control technique for all application areas, especially in process industries. Unlike the traditional control techniques, MPC is an optimization-based technique, which used model predictions in future to determine the control actions. This course will provide an overview of the theory and application of model predictive control technology, including hands-on introduction to solving advanced control problems using MPC. The theory part will cover dynamic system models, state estimation, system identification, and constrained optimal control. Applications will include both those in the process industries as well as embedded hardware applications in mechatronics and automotive industries.

<b>Dates of the Course</b>	<b>29-Jan to 02-Feb, 2018</b>
<b>Host Institute</b>	<b>IIT Madras</b>
<b>No. of Credits</b>	<b>1</b>
<b>Max. Participants</b>	<b>30</b>
<b>You should attend if...</b>	<ul style="list-style-type: none"><li>• You are a student at all levels (MTech/MS/ PhD, or senior BTech student) interested in advanced model-based control</li><li>• Faculty from reputed academic and technical institutions or universities</li><li>• Engineer and/or R&amp;D professional from industries (both national and multinationals)</li><li>• Engineer and/or researcher from government R&amp;D labs</li></ul>
<b>Course Registration Fees</b>	<p>The participation fees for taking the course is as follows: <u>Student</u> Participants: Rs. 1,000 <u>Faculty</u> Participants: Rs. 5,000 <u>Government Research</u> Organization: Rs. 5,000 <u>Industry</u> Participants: Rs.10,000</p> <p><b>Modes of Payment:</b> <u>Online transfer:</u> Account Name: CCE IIT Madras Acc. No.: 36401111110 (SBI, IIT Madras Branch, Chennai) IFSC Code: SBIN0001055</p> <p><b>OR</b> <u>Demand draft:</u> In favour of "<b>Registrar, IIT Madras</b>" payable at Chennai. The demand draft is to be sent to the Course Coordinator at the address given below.</p> <p>The above fee is towards participation in the course, the course material, computer use for tutorials and assignments, and laboratory equipment usage charges.</p>
<b>Accommodation</b>	<p>The participants may be provided with hostel accommodation, depending on availability, on payment basis. Request for hostel accommodation may be submitted through the link: <a href="http://hosteldine.iitm.ac.in/iitmhostel/">http://hosteldine.iitm.ac.in/iitmhostel/</a></p>

## Course Faculty



**Prof. Jay H. Lee** obtained his B.S. degree in Chemical Engineering from the University of Washington, Seattle, in 1986, and his Ph.D. degree in Chemical Engineering from California Institute of Technology, Pasadena, in 1991. From 1991 to 1998, he was with the Department of Chemical Engineering at Auburn University, AL, as an Assistant Professor and an Associate Professor. From 1998-2000, he was with School of Chemical Engineering at Purdue University, West Lafayette and then with the School of Chemical Engineering at Georgia Institute of Technology, Atlanta. Starting 2010, he is with the Chemical and Biomolecular Engineering Department at KAIST, Korea, where he was the department head for five years. He is now an Associate Vice President of International Office and also the founding director of Saudi Aramco-KAIST CO<sub>2</sub> Management Center there. He has held visiting appointments at E. I. Du Pont de Numours, Wilmington, in 1994 and at Seoul National University, Seoul, Korea, in 1997. He was a recipient of the National Science Foundation's Young Investigator Award in 1993 and also the AIChE CAST Computing in Chemical Engineering Award in 2013. He was elected as an IEEE Fellow in 2011, an IFAC Fellow in 2011, and an AIChE Fellow in 2013. He published over 170 manuscripts in SCI journals with more than 12,000 Google Scholar citations. His research interests are in the areas of state estimation, robust control, model predictive control, planning/scheduling, and approximate dynamic programming.

## Course Coordinator



**Dr. Niket Kaisare** is an Associate Professor in the Department of Chemical Engineering at IIT-Madras. He obtained his PhD in chemical engineering at Georgia Institute of Technology, working in model-based advanced process control. After a post-doc in the department of chemical engineering at University of Delaware, he joined IIT-Madras as Assistant Professor in 2007. He spent three years, from mid-2011 to 2014, in Industrial R&D, working on numerous problems related to modeling of vehicle catalytic converters, cryogenic hydrogen storage, monitoring and control of oil and gas wells, and automation engineering. He has taught several courses in process modeling and analysis, computational techniques, process simulation laboratory, and advanced control theory. His current research program is focused on "multi-scale modeling, analysis and control of catalytic micro-reactors for energy and fuel processing applications."

## Course Coordinator

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