## SPONSORSHIP CERTIFICATE:

This is certified that Mr./Ms./Dr./ Prof/.....
.....Is an employee/PhD student/research scholar of our organization/institute.....
.....and is hereby sponsored for the 2nd winter school on Optimization and Optimal Control at College of Engineering, Pune during the period Dec. 04, 2017 ~ Dec. 08, 2017

Place: Name and Signature
Date: (Director/Principle/HR/CEO)

(Seal of the institution/Organization)

## IMPORTANT INFORMATION

Early registration is encouraged as the seats are limited. For selection, preference will be given to ongoing PhD students and research scholars. Registration charges are non refundable for selected participants. Accommodation will be provided on request and will charge extra.

Last date of receiving application: Nov. 27, 2017
Intimation of selection on or before: Dec. 01, 2017
Boucher and registration form can also be downloaded from our institute website: www.coep.org.in

## ACCOMMODATION AND TRAVEL

Participants have to make their own arrangement for accommodation. We will assist participants in getting accommodation nearby to College of Engineering Pune or for PhD students at COEP hostel as per availability.
Participants have to make their own arrangement for travel and no TA/DA will be paid to participants.

## ABOUT COEP

College of Engineering, Pune (COEP) was established in the year 1854 and is one of the oldest and premier engineering institutions in the country. It is the Lead Centre under the Technical Education Quality Improvement Program (TEQIP) assisted by the World Bank. The college was also a participant of the Canada India Industry Institute Linkage Program. COEP is considered amongst the top engineering colleges in the country in the various independent surveys on technical education. The institute offers B. Tech, M. Tech & PhD programs and need based Short Term Training Courses. The number of enrolled student for regular degree courses is around 3500.

## ABOUT TEQIP-III

The Technical Education Quality Improvement Program (TEQIP) aims to upscale and support ongoing efforts of Govt. of India to improve the quality of technical education and enhance the existing capacities of the well performing institutions to become dynamic, demand driven, quality conscious, efficient and forward looking, responsive to rapid economical and technological developments occurring both at national and international levels.
Third phase of Technical Education Quality Improvement Program (referred to as TEQIP-III) is fully integrated with the Twelfth Five-Year plan objectives for the Technical Education as a key component for improving the quality of Engineering Education in the existing institutions with the special considerations for Low Income Sates and Special Category States and support to strengthen few affiliated technical universities/colleges to improve their policies, academic and management practices.

Estd. 1854

**Department of Instrumentation and Control**

**College of Engineering, Pune**

**In collaboration with**

**Technical Education Quality Improvement Program of**

**COEP (TEQIP-III)**

**is pleased to announce**

# 2nd Winter School on
# Optimization and Optimal Control

**(Dec. 04, 2017 ~ Dec. 08, 2017)**

**Coordinator**
**Dr. D. N. Sonawane**

**Organized by**

*United We Control*

**Department of Instrumentation and Control**
**College of Engineering, Pune**
**Shivajinagar, Pune-411 005**
**Maharashtra, India**

## PREAMBLE:

Optimal control is a field in mathematics that develops tools for formalizing and methods for solving problems of choosing the best strategy to control a dynamic process. The dynamic process may be characterized by means of differential, integral, functional, or differential-algebraic equations which depend on functions of parameters called controls; these parameters are to be determined. Problems in the mathematical theory of optimal control had come from the practical needs, primarily from mechanics, robotics, economics, nuclear physics, electrical engineering, communication engineering, biophysics, etc. Major contribution in this field is given by Lev Pontryagin and his collaborators in the Soviet Union and Richard Bellman in the United States.

The winter school on the optimization and optimal control system will have tutorial flavor and practical hands-on experience will be delivered to the participants who are not necessarily control experts. It will also provide a timely update on the most recent developments in this area. There will be a mutual exchange of knowledge between the participant and resource persons who are highly specialized in this area. It will help the participant to update their knowledge and widen their horizon in the field of optimization and optimal control.

## COURSE OBJECTIVES:

The winter school focuses on upgrading the teaching, learning, analysis and research skills about the advances in optimization theory and the field of optimal control. This program enriches the links between academia and industry and will enhance the collaboration among them. It will also explore the optimization problem formulation and its applicability to Model Predictive Control.

## COURSE CONTENTS AND PROGRAM

**Prerequisites:** Control systems, convex sets, convex functions, linear algebra, matrix computations, MATLAB

Optimization, Convex optimization, Dynamic programming, LQR, Calculus of Variations, Pontryagin's maximum principle, concept of Lagrange multipliers. Least square, unconstrained optimization, Quasi Newton method, steepest descent method, conjugate gradient method and exterior point method. Constrained optimization, KKT conditions, linear programming using Simplex method, quadratic programming using interior point methods and active set methods. Sequential quadratic programming. Introduction to Model predictive control, formulations of MPC, MPC and QP methods, explicit MPC, observer design, off-set free MPC. Case studies and applications of optimal control and MPC.

MATLAB Toolbox: Dynopt, linprog, Quadprog, CVX, IPOPT, CPLEX, MPT, ACADO, MATLAB MPC, YALMIP.

| | Monday Dec. 04, 2017 | Tuesday Dec. 05, 2017 | Wednesday Dec. 04, 2017 | Thursday Dec. 04, 2017 | Friday Dec. 04, 2017 |
|---|---|---|---|---|---|
| 8.30 - 9.00 | Breakfast | Breakfast | Breakfast | Breakfast | Breakfast |
| 9.00 - 10.30 | Lecture | Lecture | Lecture | Lecture | Lecture |
| 10.30 - 11.00 | Tea Break | Tea Break | Tea Break | Tea Break | Tea Break |
| 11.00 - 1.00 | Lecture | Lecture | Lecture | Lecture | Lecture |
| 1.00 - 2.00 | Lunch | Lunch | Lunch | Lunch | Lunch |
| 2.00 - 6.00 | Lab (Hands-on) | Lab (Hands-on) | Lab (Hands-on) | Lab (Hands-on) | Lab (Hands-on) |

## RESOURCE PERSONS

1. **Dr. Kishalay Mitra,** Associate Professor
   Department of Chemical Engineering
   Indian Institute of Technology, Hyderabad (IITH)
2. **Dr. D. N. Sonawane,** Associate Professor
   Department of Instrumentation and Control
   College of Engineering, Pune (COEP)
3. **Dr. V. N. Pande,** Associate Professor
   Department of Electrical Engineering
   College of Engineering, Pune (COEP)

## WHO SHOULD ATTEND

Faculty members/ PhD Students/Research Scholars/ Engineers from Industries/ Public Sector undertaking and utilities are eligible to attend this program

## REGISTRATION FEES

Faculty of Academic Institute: Rs. 5000/-
PhD Students/Research Scholars: Rs. 3000/-
Persons from industry/ R&D organization/Utilities: Rs. 7000/-
The registration fees include registration kit, high tea and working lunch.
DD should be drawn in favor of Director, College of Engineering, Pune (2nd Winter School on Optimization and Optimal Control)

## HOW TO APPLY

Duly filled application in the prescribed format sponsored by the competent authority of institute/organization may be sent to the coordinator/s so as to reach on or before Nov. 27, 2017. The applicant may also send scan copy of registration form and DD through email to:

dns.instru@coep.ac.in or……..

## For further details contact to:

**Dr. D. N. Sonawane**
Department of Instrumentation and Control
College of Engineering Pune
Cell: 9822888944
Email: sonawanedn@gmail.com

## REGISTRATION FORM

**2nd Winter School on Optimization and Optimal Control**

1. Name:……..……
2. Date of birth: .....Sex: M/F……
3. Designation: ……..
4. Institute:……....
5. Address for correspondence:

……

……

……Pin:……

6. Phone (STD Code): …… Mobile:…….....
7. Email:……
8. Highest qualification:……
9. Specialization:……
10. Years of Experience:……
11. Area of work:……
12. Whether accommodation needed:……YES/NO
13. Payment Details: DD No:……Bank:……..Date:……..

The information furnish is true and correct to the best of my knowledge. I agree to abide by the rules and regulations governing the program. I shall attend the program for entire duration with fail.

Signature of the Applicant

Official seal and signature of competent authority

Date:……..

Place:……..

Photo-copies of registration forms may be used for multiple entries send scan copies of DD and dully filled registration form to dns.instru@coep.ac.in