

## INTRODUCTION

Recent advances in Control and Signal Processing techniques have led to unprecedented increase in the number of engineering applications such as in Vehicle Control, Electric Drives, Power System Analysis, Communication, Robotics, Industrial Automation, Chemical Processes and Mechatronic system and many more. The aim of this short-term course includes convergence of a number of advanced Control and Signal Processing techniques including the recent developed ones and their applications to some real-world Engineering Problems.

The course focuses on a series of class room as well as laboratory sessions covering both the fundamentals and recent advances in control and signal processing techniques. One of the interesting features of the course is to provide hands-on sessions on how to successfully simulate different control and signal processing algorithms using the available MATLAB toolboxes in Control and Signal Processing. Thus, these will supplement the theory sessions covered in the class room sessions. The course will also provide laboratory demonstrations on control and real-time implementation in DSP platforms.

## COURSE COVERAGE

- State Space Approach to Controller & observer Design
- Digital Control Synthesis
- Intelligent Control
- Optimal Control
- Adaptive & Nonlinear Control
- Embedded Control
- Design Strategies for Electric Drives/Power System/Process Control/Robotics

- Signal Detection in continuous and discrete time, Signals with random parameters & stochastic signals
- Signal Estimation-Bayesian parameter estimation, MMSE, ML, MAP estimates
- Adaptive Signal Processing Techniques-Transversal Filter, LMS, RLS algorithm
- Application of Adaptive filters
- Parametric System Identification & Closed-Loop Identification
- Identification of Multivariable and Nonlinear System
- Soft Computing Approaches to Adaptive Control, System Identification
- Deterministic Self-Tuning Regulators
- Stochastic and Predictive Self Tuning Regulators
- Model Reference Adaptive Systems
- Implementation of Control and signal processing techniques in MATLAB & SIMULINK Environment
- Real - time signal processing and Control using DSP /Microcontroller/ dSPACE
- Case Studies
  - Control in the steel, chemical and paper industries.
  - Fault Detection & Diagnosis
  - Power system Harmonics & Frequency
  - Control of Robot Manipulators
  - Machine & Drives

## VENUE

The course will be organized at the National Institute of Technology (NIT), Rourkela. It is one of the premier national level institutions for technical education in the country and is funded by the Government of India. It is situated at the eastern end of Rourkela steel

city, beyond Sector-1 over an area of 262 hectares of land. NIT Rourkela has fourteen

academic departments which offer B.Tech, M.Tech and PhD programs in various areas of engineering and technology. The Institute is a participant of the Technical Education Quality Improvement programme of Government of India.

## DEPT. OF ELECTRICAL ENGINEERING

Department of Electrical Engineering, NIT Rourkela was established in 1961. Since its inception, the Department is under dynamic progress and is reputed for imparting quality education both at B.Tech, M.Tech levels. The Department currently runs two M.Tech programmes with the specializations in (i) Power Control and Drives, (ii) Electronic Systems and Communication. Besides the undergraduate and postgraduate teaching, a good number of research scholars are working on different areas of Electrical Engineering towards the award of PhD degrees. The Department has well equipped modern laboratories such as Signal Processing & Communication, Image Processing & Computer Vision, Power Electronics & Drives, Control & Robotics, Embedded Systems & Real-Time and Soft Computing Labs for pursuing research in the emerging areas of Electrical Engineering.

## FACULTY

NIT Rourkela has a good number of Professors specialized in the area of Control and Signal Processing in both Electrical and Electronics & Communication Engg. Departments who have designed the course and will deliver lectures. In addition to this experts from Jadavpur University and IIT Kharagpur will deliver a number of lectures.

## CORRESPONDENCE

### Dr. Bidyadhar Subudhi

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## WHO SHOULD ATTEND?

Faculty from AICTE approved Institutions with Bachelor's degree in Electrical/Electronics/ Instrumentation & Control/Communication/ Computer Science/InformationTechnology/Chemical/Bio-Tech./Mechanical Engineering are eligible to attend.

## TA FOR PARTICIPANTS

The participants are entitled to avail III AC Train Fare. The reimbursement of TA will be made as per AICTE guide lines such as production of necessary travel documents.

## ACCOMODATION

Accommodation for participants shall be arranged in the Institutes Guest House.

## REGISTRATION

There is no registration fee for the faculty members of AICTE (All India Council for Technical Education) approved institutions as the course is fully sponsored by the (AICTE), New Delhi. However, as a matter of confirmation for participation in the course, a caution money of Rs.300/- in the form of demand draft drawn in favour of "Continuing Education, Rourkela" payable at SBI, NIT Branch, Rourkela (code- 2109) to be sent to the coordinator on or before 05<sup>th</sup> October, 2008.

The number of seats is limited to 60. Therefore, interested faculty members should apply well within the scheduled time frame i.e.5<sup>th</sup> October 2008.

## REGISTRATION FORM

AICTE–MHRD Staff Development  
Programme on

### **ADVANCED CONTROL & SIGNAL PROCESSING TECHNIQUES WITH APPLICATIONS**

**29 Oct – 11 Nov 2008**

1. Name: \_\_\_\_\_

(Capital Letters)

2. Designation: \_\_\_\_\_

3. Specialization: \_\_\_\_\_

4. Department: \_\_\_\_\_

5. Organization: \_\_\_\_\_

6. Teaching Experience: \_\_\_\_\_

7. Mailing Address: \_\_\_\_\_

Phone \_\_\_\_\_

FAX \_\_\_\_\_

E-mail \_\_\_\_\_

8. Accommodation required: YES / NO

9. Refundable Caution Money sent:

DD no. \_\_\_\_\_ Dated \_\_\_\_\_

for Rupees\_\_\_\_\_ On Bank \_\_\_\_\_

Date \_\_\_\_\_ SIGNATURE \_\_\_\_\_

### **Sponsorship Certificate**

On the event of selection, Mr/Ms.

\_\_\_\_\_ will be relieved for  
participation of the above programme.

SIGNATURE OF THE HEAD OF THE  
INSTITUTE / SPONSORING AUTHORITY  
(WITH DATE AND SEAL)

**AICTE-MHRD**  
Staff Development Programme

On

## **ADVANCED CONTROL & SIGNAL PROCESSING TECHNIQUES WITH APPLICATIONS**

**29 Oct – 11 Nov 2008**

*Co-ordinators*

**Dr. Bidyadhar Subudhi**  
**Dr. Susmita Das**  
**Dr. Dipti Patra**



*Organized by*

*Centre for Industrial Electronics & Robotics*

**DEPT. OF ELECTRICAL ENGINEERING**  
**NATIONAL INSTITUTE OF TECHNOLOGY**  
**ROURKELA – 769008, ORISSA**