

## COURSE OBJECTIVE

**Smart systems** are assembly of one or many smart parts that change their electrical/mechanical properties under external stimuli. The smartness is obtained using **smart/Active materials**. These materials change properties significantly in a controlled fashion by external stimuli, such as stress, temperature, moisture, electric or magnetic fields. Study of smart materials needs special expertise. Application vary based on the properties and range from control, health monitoring, energy harvesting etc. The objective of the course is understand the physics behind such special behavior and how to use these properties in engineering applications

## LEARNING OBJECTIVE

- ⇒ Gain basic understanding of the smart materials mechanics and smart systems
- ⇒ Get hands on experience in testing, characterization and use of smart materials in technology
- ⇒ Use of smart materials for smart systems, energy harvesting and control.
- ⇒ Linear and nonlinear energy harvesting systems
- ⇒ Learn the computational techniques towards the coupled phenomena of smart systems & energy harvesting
- ⇒ Get an idea of the recent advances and the state of the art: like energy harvesting, structural health monitoring and vibration control

## ELIGIBILITY

The course is open to teachers of colleges approved by AICTE. No course fee is charged for participants sponsored by AICTE approved institutions. Due to a ceiling on the number of participants, applications received will be pre-screened. **Provisionally selected participants** will be duly notified, who will be then required to send a **caution deposit of Rs 500/-**. The caution deposit will be refunded upon a successful completion of the course. This caution deposit should be paid by a crossed demand draft drawn in favor of "IIT Madras", payable at any bank at **Chennai**.

## TRAVEL/ACCOMODATION

Outstation participants are eligible for *to and fro* **AC 3 - Tier train** fare by the shortest route. Boarding and lodging facilities (twin sharing basis) will be provided at Taramani Guest House, IIT Madras for participants from AICTE approved institutions.

## COURSE FACULTY

The teaching faculty constitutes experts from Department of Applied Mechanics and other departments of IIT Madras, and guest speakers from reputed Industries, and R&D establishments.

Short-Term Training Programme

On

## Introduction to Smart Materials with Energy Harvesting Applications

02 – 07 September 2018

Sponsored by  
**All India Council for Technical Education**

*Coordinators*

**Dr. Shaikh Faruque Ali**  
**Dr. A. Arockiarajan**



organized by

**Centre for Continuing Education**  
&  
**Department of Applied Mechanics**

**Indian Institute of Technology Madras**  
**Chennai – 600036**

## COURSE CONTENTS

- *Introduction to coupled electro-magneto-mechanics*
- *An overview about smart materials and applications*
- *Introduction to the material property or effect and its related applications: Shape memory alloys, electrostrictive, electro-rheological, magnetostrictive; magneto-rheological, Ferroelectrics and smart polymers.*
- *Basics of active composites and functionally graded materials*
- *Introduction to energy harvesting*
- *Linear and nonlinear energy harvesting, devices and concepts*
- *Design of materials for energy harvesting and coupled field problems*
- *Experimental exposure to energy harvesting*
- *Computational aspects towards smart systems*
- *Effect of uncertainty on energy harvesting systems*
- *Other applications of smart materials*

## VENUE

Classes will be held at the NEWTON HALL in the Department of Applied Mechanics, IIT-M.

## LECTURE NOTES

To fully realize the objectives of the course, lecture notes will be made available to the participants during registration at IIT-M.

## SPONSORSHIP CERTIFICATE

Certified that Dr./Shri/Smt ..... is being sponsored hereby for attending the Short-Term Training Programme on “Introduction to Smart Materials with Energy Harvesting Applications” to be conducted at IIT Madras from 02—07 September 2018.

Signature of Sponsoring Authority  
with date and seal

Send/Fax the registration form to:

**Dr. Shaikh Faruque Ali**  
Associate Professor  
Department of Applied Mechanics  
Indian Institute of Technology Madras  
Chennai- 600036, Tamil Nadu.

Tel. : 044-22574054  
Fax : 044-22574052  
Email: sfali@iitm.ac.in

Short-Term Training Programme  
On

## Introduction to Smart Materials with Energy Harvesting Applications

02 – 07 September 2018

Duly filled registration form should be sent to the coordinator so as to reach on or before 20 August 2018. (for additional copies, please photocopy this form)

## REGISTRATION FORM

Name: \_\_\_\_\_

Designation: \_\_\_\_\_

Organization: \_\_\_\_\_

Mailing Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Email: \_\_\_\_\_

Educational Qualification: \_\_\_\_\_

Experience: \_\_\_\_\_

Contact No: \_\_\_\_\_

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Date signature of applicant