

AICTE Training and Learning (ATAL) Academy Sponsored Online One-Week Faculty Development Program

on

Advances in Smart Materials for Sustainable Engineering, Healthcare, Energy, and Structural Applications



6-11 October 2025

Organized by



Coordinators

Dr. Jagadeesha T

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ATAL Academy

AICTE Training and Learning (ATAL) Academy is established with the vision “To empower faculty to achieve goals of Higher Education such as access, equity and quality.” AICTE is committed to the development of quality technical education in the country by initiating various schemes launched by the Government of India, Ministry of Human Resource Development. The Council understands the growing need to equip the younger generation with practical skills and to train faculty and technicians in their respective domains. Such training enhances the teaching-learning process, bridges the gap between academia and industry, and ensures alignment with emerging technologies. Through continuous professional development programs, the ATAL Academy aims to foster innovation, improve curriculum delivery, and promote interdisciplinary research. These initiatives ultimately aim to make students more employable, globally competent, and industry ready.

About NIT Calicut

National Institute of Technology Calicut was founded as Regional Engineering College, Calicut in 1961. Set in a picturesque location at the foothills of the Western Ghats, it is located about 22 kilometers north-east of Calicut city. It is a prestigious institute with a reputation for excellence at both undergraduate, postgraduate and research levels, fostering the spirit of national integration among the students and close interaction with industry

About the Course

This 6-day Faculty Development Programme aims to provide comprehensive insights into the fundamentals, advancements, and applications of smart materials. Topics include MR, ER, and shape memory alloys, piezoelectric and pyroelectric materials, bio-based and thermoelectric materials, and polymers for energy applications. The programme will cover characterization, manufacturing, and integration of smart materials in sectors such as healthcare, agriculture, automotive, aerospace, and energy. Emphasis will be placed on energy harvesting, waste-to-wealth strategies, cancer treatment, and structural health monitoring.

Objectives of this FDP

- Provide core knowledge of MR/ER fluids, shape memory alloys, and piezo-, pyro-, and thermoelectric materials.
- Explore fabrication and characterization methods for smart materials across key applications.
- Demonstrate applications in medical devices, cancer treatment, automotive, aerospace, and structural monitoring.
- Introduce bio-based and nanotech smart materials for agriculture and energy efficiency.
- Examine smart materials in energy harvesting and waste heat utilization.
- Promote innovation in waste-to-wealth conversion and multifunctional smart material uses.

Topics to be covered

- MR and ER fluids, Shape Memory Alloys – fundamentals and adaptive applications.
- Piezoelectric, Pyroelectric materials – sensing, actuation, and energy conversion uses.
- Characterizing smart materials – evaluate structure, functionality, and performance.
- Manufacturing smart materials – additive manufacturing and composite fabrication methods.
- Smart materials in medicine – diagnostics, implants, and drug delivery.
- Advanced smart materials – use in aerospace, civil, mechanical, and robotics.
- Bio-based smart materials – sustainable and eco-friendly material systems.
- Energy harvesting – capture mechanical, thermal, and light energy.
- Waste to wealth – self-healing, recyclable, resource-efficient innovations.
- Automotive, aerospace, space – intelligent structural and functional integration.
- Agricultural nanomaterials – precision farming with smart and nano-enabled systems.
- Polymers for energy – batteries, fuel cells, and thermal systems.
- Structural health monitoring – embedded sensing for infrastructure maintenance.

Course Outcomes

Upon completion of this Faculty Development Programme, participants will gain a comprehensive understanding of various smart materials, including MR/ER fluids, shape memory alloys, piezoelectric, pyroelectric, thermoelectric, and bio-based materials. They will acquire skills in material characterization, manufacturing techniques, and applications in healthcare, automotive, aerospace, agriculture, and energy sectors. Participants will be equipped to explore energy harvesting, structural health monitoring, and waste-to wealth innovations using smart materials. The programme will enhance their research capabilities, promote interdisciplinary knowledge exchange, and prepare them to integrate smart material technologies into teaching, research, and product development initiatives aligned with sustainable and advanced engineering practices

How to Apply?

Participants can sign up and register for the program in AICTE ATAL website links. There is **NO Registration fee** for this course

Registration Details

<https://www.aicte-india.org/atal>

OR

<https://atalacademy.aicte-india.org/signup>

IMPORTANT DATES

Last date for receipt of applications: **25.09.2025**

Intimation to selected candidates: **30.09.2025**

Target Participants

Faculty members from AICTE approved institutions, Research Scholars, Industry personnel & PG students Participants from the Government and Industry

Max. No. of Participants: 200 Nos.

Mode of Delivery

Live web sessions through Online Platform

Resource Persons

From IITs/NITs/Central & State Universities

Requirements to get E-Certificate

1. Smart phone with good internet facility
2. Minimum **80% attendance** is required for the whole course
3. **Minimum 60% marks** should be obtained in the Final test to be conducted online at the end of FDP

Chief Patron

Prof. Prasad Krishna
Director, NIT Calicut

Patrons

Prof. V. Madhusudanan Pillai
Head of Mechanical Engineering Dept.
NIT Calicut

Prof. Sudhish N. George
Chairperson, CCESD, NIT Calicut

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