

INDIAN INSTITUTE OF TECHNOLOGY INDORE

Discipline of Metallurgy Engineering and Materials Science

Organizes

6-Days Online Short-Term Course on Advanced Technology in Materials Engineering

January 19-24, 2021

Under Quality Improvement Program (QIP), AICTE, MED



NEED AND NOVELTY OF COURSE:

This is a first of its kind course and its novelty lies in the following in view of the multi-scale nature of real-world problems, spanning from sub-nano to millimeters in spatial dimensions, and from femto- to milliseconds in the time domain. Ideally, engineer/scientist would like to predict the behavior of new material systems in an attempt to reduce laboratory expenses and to obtain quick predictions with a prime goal of being accelerate the trial-and-error experimental findings. The dramatic increase in computational power in the last two decades for modeling and simulations increased the possibility of modern methods that can play a major role in the analysis of solids on micro- and nano-scale levels. This fact motivated the course that will comprehend the modeling of advanced engineering materials such as composites, 1D, 2D and 3D structures etc. with varied dimensions from mm to nm and model/study their multifunctional behavior. Keeping the interest of faculty participants from various backgrounds in mind, the contents of the course were developed which will be covered by the experts with interdisciplinary expertise and multi-institutional experience as well as from industry.

COURSE SYLLABUS

The first part of the course shall include: Introduction to Semiconductors, Physics of Semiconductors, Electronics; Materials Physics and Materials Science, Soft materials, Energy Materials, Li-ion Battery Technology, H₂-storage Technology, Corrosion Engineering, Computer Simulations at Different Time Scales, Multiscale Aspects of Materials, Creating New Materials, Thermodynamics of Materials Engineering, Principles of Engineering Practice, Introduction to Porous Semiconductor materials, Fundamentals of Materials Science and Engineering, Solar Cell, Transistors, Introduction to Phase-Field Method and Its Formalisms, some examples related to microstructure evolution. Fundamentals of equations of elasticity; Basics of solid continuum: kinematics of deformation, kinetics of solid continuum and material symmetry; Fundamentals of weak formulations; Fundamentals of micro-macro concepts: Average strain and stress theorems, the Hill-Reuss-Voigt bounds, classical micro-macro mechanical approximations and micro-geometrical manufacturing idealizations; Aim of micromechanics; Homogenization.

COURSE FACULTY

- Dr. Bhaskar Mondal, IIT Mandi
- Prof. A. K. Das, IACS, Kolkata
- Prof. G. P. Das, IIT Kharagpur
- Dr. Shailesh I. Kundalwal, IIT Indore
- Dr. Mrigendra Dubey, IIT Indore (Co-Coordinator)
- Dr. Sumanta Samal, IIT Indore (Co-Coordinator)
- Dr. Srimanta Pakhira, IIT Indore (*Lead Expert & Coordinator*)

COURSE OBJECTIVES

- To provide the participants with a working knowledge of semiconductors, electronics, materials science, Li-ion battery, energy storage technology, microstructure-property relations and atomistic modeling of nanostructures.
- To provide the participants with the mathematical tools needed for quantitative characterization of microstructure and calculation of effective properties.
- To provide the participants with a working knowledge of the various tools and techniques needed to characterize and design heterogeneous materials using both micromechanics and nano-mechanics techniques.
- To introduce the participants into practical problems of micromechanics and nano-mechanics, and their solutions, through case studies and live projects.

CERTIFICATE

Participants who successfully complete the course will be awarded with a certificate.

ELIGIBILITY

- All teachers of degree level technical/engineering Colleges/Institutions/ Universities are eligible to attend this course.
- **For other participants from any Inst/Organization:** UG in Science/Engineering Degree with basic training on computer systems.

REGISTRATION PROCESS

Online Mode: Registration link
“[QIP_Advanced_Technology_Mat_Eng](https://forms.eduqfix.com/indoreiit/add?formType=9263526567614218)”

Via E-mail: The below particulars can be sent to spakhira@iiti.ac.in along with a scanned copy of your institute/organization identity card.

Name:
Designation:
Institution/Organization:
Address of Institution/Organization:
Academic qualification:
Are you a faculty member from AICTE approved College/Institute? (**Yes or No**):
E-mail id:
Phone/Mobile No.:
(Payment details for participants from other Govt./Private organizations. Only “faculty” participants from AICTE approved institutes are exempted from the registration fees)
Bank name:
Payment reference No.
Amount transferred:
Date of transaction:
Any other relevant information:

REGISTRATION FEE

- **No fee for faculty participants from AICTE approved Colleges/Institutes/Universities.**
- The fee is ₹ 2500 for teachers and non-teachers from other government organizations.
- The fee is ₹ 5000 for participants from private organizations.

Note: The fees includes service tax.

Online Registration Link:
‘[QIP_Advanced_Technology_Mat_Eng](https://docs.google.com/forms/d/1aO-rF0GJNxuz8ZlaZKpcjJfK9sDLfOrXS8V2ucMlM/edit)’ OR
<https://docs.google.com/forms/d/1aO-rF0GJNxuz8ZlaZKpcjJfK9sDLfOrXS8V2ucMlM/edit>

Registration Deadline: January 16, 2021

Notification of Acceptance: By January 18, 2021

Duration of Course: January 19-24, 2021

MODE OF CONDUCT OF COURSE: ONLINE

Mode of payment

Online Payment: Please click or copy & paste below link.

<https://forms.eduqfix.com/indoreiit/add?formType=9263526567614218>

Bank Transfer: Registration fee can be paid through NEFT/IMPS to the below A/c number:

Name of the Beneficiary: Registrar, IIT Indore

Name of Bank: Canara Bank

Branch: Simrol, Indore

Account No. 1476101027440

IFSC Code: CNRB0006223

COURSE COORDINATORS:

Dr. Srimanta Pakhira, Dr. M. Dubey and Dr. S. Samal

Email: spakhira@iiti.ac.in or mdubey@iiti.ac.in or sumanta@iiti.ac.in

Web site: <https://spakhirafsu.wixsite.com/acmslab>