

Integrated Computational Materials Engineering



M.Tech. Program @ IIT Hyderabad

A Unique Opportunity for Working Professionals

Program Highlights

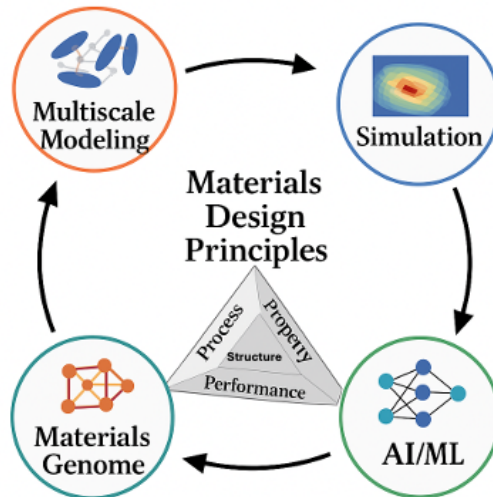
- 48-credit interdisciplinary **online** M.Tech. program
- Learn **Multiscale Modeling, AI/ML, and Accelerated Materials Design**
- Designed for **flexibility**: complete in up to 4 years
- **Capstone Project** in collaboration with industry

Aim and Scope

Whether you're working in semiconductors, aerospace, defense, healthcare, or energy — materials are at the heart of innovation. To build next-generation products, we need to discover new materials and optimize existing ones for efficiency, sustainability, and performance. This requires an emphasis on **accelerated materials innovation**, development of **digital twins**, and deployment of **ICME tools in Industry 4.0 ecosystems**.

Inspired by NASA's Vision 2040, this program prepares professionals to thrive in the age of **Smart Manufacturing** and **Digital Materials Design**. You'll learn:

- Multiscale modeling across multiple *length and time scales* — from atoms to applications
- Integration of **AI/ML** and **Materials Informatics** for accelerated development and discovery
- High-performance computing for cutting-edge materials simulations
- Solving complex, real-world, industry-relevant problems — virtually



ICME Workflow

“Voices Driving Materials Innovation

Global Vision

“To create jobs and grow our economy, we need to invest in what will fuel the economy of tomorrow — and that’s science, technology, engineering, and math. That’s why we’re launching the Materials Genome Initiative to help businesses discover, develop, and deploy new materials twice as fast.”

— **President Barack Obama**, June 24, 2011

India’s Scientific Spirit

“Excellence happens not by accident. It is a process.”

— **Dr. A.P.J. Abdul Kalam**

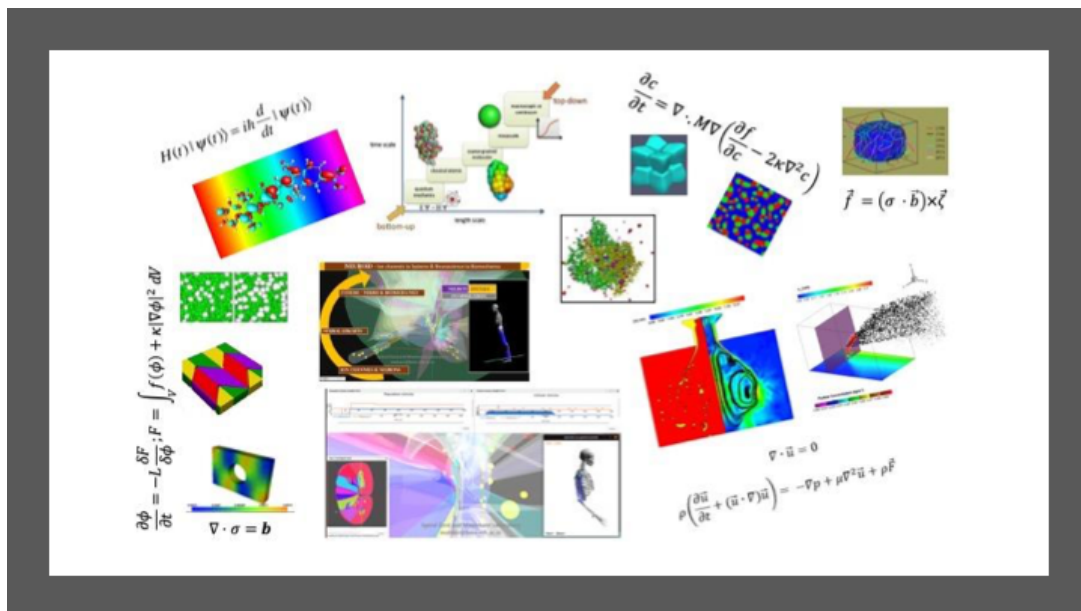
India’s Tech-forward Leadership

“India’s strength lies in its technology, talent, and temperament to innovate.”

— **Prime Minister Narendra Modi**

Core and Elective Courses

- Introduction to Materials Science and Engineering
- Computational Methods in Materials Science
- ICME Tools and Techniques
- Modeling of Metallurgical Processes
- Thermodynamics and Kinetics
- Finite Element Method
- Computational Thermodynamics
- Electronic Structure and Atomistic Modeling
- Mesoscale Modeling - Phase Field Models
- Computational Micromechanics
- Process Modeling - CFD
- Introduction to Parallel Programming
- ICME Tools Integration (Industry-led)



From Equations to Applications: The ICME Design Strategy

Course Mode

- ICME students attend live online classes at IIT Hyderabad, ensuring a full classroom experience
- Virtual doubt-clearing/ discussion sessions on weekends
- Full access to recorded lectures and tutorials
- Hands-on training with state-of-the-art software:
Thermo-Calc, DICTRA, Ansys, MATLAB, TensorFlow, PyTorch, PRISMS, MOOSE, MicroSim, LAMMPS, Quantum ESPRESSO, PyCALPHAD, Abaqus
- Centered on **multiscale simulations, machine learning-guided optimization, and materials design through ICME principles**

Eligibility Criteria

- Minimum **2 years** of work experience
- BTech/BE in relevant Engineering disciplines or MSc in Physics/Chemistry/Materials Science
- No GATE score required
- Experience/No Objection Certificate at time of interview

Selection Process

- Apply online at iith.ac.in/mtechadmissions
- Shortlisting based on criteria set by experts + online interview

Credits and Thesis

- **Total 48 credits:**
 - 24 credits coursework (to be completed within 3 years)
 - 24 credits Capstone Project (Thesis I & II) (to be completed within 1 year)
- Project can be conducted at the parent organization with joint mentorship - adviser from IITH is a must

Fee Structure

For latest fee details, visit: <https://www.iith.ac.in/academics/fee-structure/>

Apply Now

 Ready to Join?

For detailed brochure, eligibility, and application form, visit:
<https://iith.ac.in/mtechadmissions/>