भारतीय सांकेतिक विज्ञान संस्थ हैदराबाद
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Integrated Computational Materials Engineering

M.Tech. Program @ IIT Hyderabad

Program Highlights

- ICME M.Tech. program offered both *offline* and *online* mode
- 50–credit *offline* program is offered by the MSME department
- 48–credit *online* program is offered by the Center for Interdisciplinary Programs (CIP)
- Learn Multiscale Modeling, AI/ML, and Accelerated Materials Design
- 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

Aim and Scope

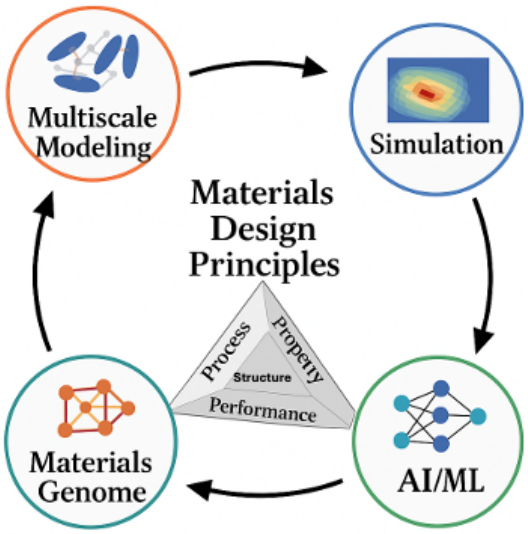
Whether you're working in semiconductors, aerospace, defense, healthcare, or energy—materials are at the heart of innovation. To build next-generation products, we need to discover new materials and optimize existing ones for efficiency, sustainability, and performance. This requires an emphasis on accelerated materials innovation, development of digital twins, and deployment of ICME tools in Industry 4.0 ecosystems. In the spirit of India's National Education Policy (NEP 2020), this program prepares professionals to thrive in the age of Smart Manufacturing and Digital Materials Design.

Ready to Join?

Apply Now: `https://iith.ac.in/mtechadmissions/`

Key Learning Outcomes:

- 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

Credits and Thesis

Regular M. Tech. (MoE/Self-sponsored)

Total 50 credits:

- Candidates shall earn total of **50** credits within **two** years from the date of admission into the program
- 26 credits coursework (to be completed within the first year).
- 24 credits Project (Thesis Stages I & II) (to be completed in the second year).
- Project work can be done in collaboration with industries using the infrastructure at IIT Hyderabad

Online

Total 48 credits:

- 24 credits coursework (to be completed within 3 years).
- 24 credits Capstone Project (Thesis Stages I & II) (to be completed within 1 year).
- Project work should be conducted at the parent organization with a joint mentorship adviser from IITH.

Curriculum

Core Courses

- Introduction to Materials Science and Engineering
- Computational Methods in Materials Science
- Fundamentals of Scientific Computing
- Information and Tools Integration in ICME (Industry-led)
- Industrial Lectures (for regular M. Tech. only)
- Communication skills (for regular M. Tech. only)

Elective Courses

- Physical Metallurgy
- Imperfections in Crystaline Solids
- Functional Properties of Materials
- Materials Thermodynamics and Kinetics
- Science and Technology of Light Metals and Alloys
- Fundamentals of Semiconductor Materials
- Kinetics of Metallurgical Processes
- Computational Thermodynamics and Kinetics
- Electronic and Atomistic Modeling
- Mesoscale Modeling - Phase Field Models
- Machine Learning and Data Analytics in Materials Science
- Clean Steel Making: Theory, Practice and Modeling
- Optimization and Machine Learning in Materials Science
- Computational Micromechanics
- Finite Element Modeling in Solid Mechanics

Important Details:

- Students pursuing a regular MTech at a Centrally Funded Technical Institution (CFTI) are also welcome to simultaneously enroll in the ICME (online) MTech program at IIT Hyderabad as per the UGC guideline

- Online ICME program is designed for flexibility and can be completed in up to 4 years. Students attend live online classes (offered in hybrid mode) at IIT Hyderabad, ensuring a full classroom experience. There will be full access to recorded lectures, tutorials, and Virtual doubt-clearing/discussion sessions on weekends.

Eligibility Criteria & Selection Process

Regular MoE - Offline

- BTech/BE in relevant Engineering disciplines (Metallurgy/Materials Engineering/Chemical/Mechanical/Industrial/Production/Electrical/AI or related disciplines) or MSc in Physics/Chemistry/Materials Science.
- Valid GATE score required in MT/ME/CH/EE/PI/PH/CY/XE/DA

Self-Sponsored - Offline

- BTech/BE in relevant Engineering disciplines (Metallurgy/Materials Engineering/Chemical/Mechanical/Industrial/Production/Electrical/AI or related disciplines) or MSc in Physics/Chemistry/Materials Science.
- GATE score is not mandatory
- Written test and/or interview

Online - Working Professionals

- Working professionals in public- and private-sector industries, R&D labs, and academic institutions with more than two years of work experience
- A first-class bachelor's degree (BE/BTech/BDes/MSc/MCA/4-year BS or equivalent) in Metallurgy/Materials Engineering/Chemical/Mechanical/Industrial/Production/Electrical/AI or related disciplines are eligible to apply
- GATE score is not mandatory
- Applicants are required to submit experience and no-objection certificates (NOC) at the time of the written test and/or interview

Online - Regular Students

- A first-class bachelor's degree (BE/BTech/BDes/MSc/MCA/4-year BS or equivalent) in Metallurgy/Materials Engineering/Chemical/Mechanical/Industrial/Production/Electrical/AI or related disciplines are eligible to apply
- GATE-score/CEED Qualification required
- Written test and/or interview
- NOC is not required

₹ Fee Structure:

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

Contacts:

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