

# MTech Admission Brochure



भारतीय प्रौद्योगिकी संस्थान हैदराबाद  
Indian Institute of Technology Hyderabad

**Department of Chemical Engineering**  
Indian Institute of Technology Hyderabad  
Kandi, Sangareddy-502285, Telangana, India

Academic year 2020-2021

# About Department

We offer BTech, MTech and PhD programs in Chemical Engineering. Our outstanding student-to-faculty ratio of 10.5:1 facilitates personalized teaching and research activities. We strive to maintain an environment that enables students to identify and pursue their personal, professional goals within an innovative educational and research program that is rigorous as well as flexible. We affirm



our commitment to creation, development, and organization of fundamental knowledge along with technical service to the



community. Currently, the department has eighteen young and dynamic faculties from versatile areas. Despite being a young department, 75% of the class students are actively participating in internship programs. In addition, 50% of our

students seek jobs, 30% seek a graduate program and rest of them pursue other opportunities including start-ups.

# Academics

The BTech program encompasses a wide variety of courses which prepares a student for both industry as well as research. B.Tech

degree is awarded on completion of 125 credits of which 33 credits are allocated for core/free electives. Core electives are divided into four areas:

Biological Processes, Energy and Environment, Materials

and Chemical Processes. In addition, students are given



opportunities for a minor degree, dual degree and an integrated MTech program.



**Two-year regular MTech** program features a curriculum that is both comprehensive and

flexible. Students are encouraged to actively formulate and solve innovative research problems. MTech degree is awarded on completion of 50 credits of which 24 credits are allocated for thesis speeded across three semesters. The program culminates in an M Tech thesis describing the student's original research. The MTech

students are allocated a project advisor a based on their preferences which gives them the flexibility to work with the faculty and research area of their choice. PhD students are allocated an advisor based on their preferences which gives them the flexibility to work with the faculty and research area of their choice.

Department of Chemical Engineering also offers **self-sponsored MTech** program. The GATE qualification is mandatory for admission to self-sponsored MTech program. The minimum eligibility criteria for admission into the program is B.E/B.Tech in appropriate branch of engineering from a recognized university/institution with minimum first class. The program is non-subsidized, wherein students need to pay tuition fees per credit basis.

## Research areas

Research spans a wide variety of exciting areas including fluids, mineral processing, catalysis, materials for energy and biological applications, nanotechnology, bioengineering, process control, optimization, microfluidics, and DFT studies. The department now hosts about 50 PhD students. Our strong commitment to research is evidenced by INR30 crores extramural funding that our faculties have obtained. Faculties are actively involved in hosting conferences and outreach workshops benefitting the students and faculty across several institutes in India. The Department also houses state of the art research and teaching equipment. Faculty productivity is indicated by their publication record in leading journals.



## Energy

The energy research in the Department of Chemical Engineering spans across bio-fuels to fuel processing to fuel cells and batteries. The faculty members are actively involved in Solid Oxide Fuel Cell (SOFC) research and onboard fuel processing for SOFC-auxiliary power unit applications along with design and materials aspect of rechargeable batteries.

## Catalysis

Our research is also focused on the design and development of catalyst materials – ranging from zeolite, and supported metal/metal oxide – with improved reactivity, stability, and selectivity. The catalysts are tested for various industrial processes (e.g. steam reforming, water-gas shift reaction, and fine chemicals) and biomass based fuels and chemicals. These study aims to produce hydrogen, bio-fuels, and value-added chemicals and utilizes renewable feed stocks, low-value by-products, and waste materials. The design and optimization of chemical processes using Aspen Plus are also integral part of this research.

## Fluid Mechanics

We pursue research on a variety of problems of fundamental and applied interest in fluid mechanics, and heat and mass transfer using a combination of tools ranging from basic modeling, computational fluid dynamics (CFD), and linear stability analysis. Fluid mechanics research conducted in the

department spans a wide range of topics such as multiphase flows, spatially developing flows in complex geometries, micro-fluidics, and biological flows. A major focus of our research is on understanding the transition to turbulence, with high emphasis on the laminar-turbulent transition.

## Mineral Processing

In mineral processing research, we are involved in flow sheet development and optimization for various mineral beneficiation plants. We study dense medium cyclones (DMC), hydro-cyclones (HC), feed slurry distributors, grinding mills and flotation devices for understanding the process by using computational modeling techniques (multi-phase CFD/discrete element methods/coupling CFD-DEM models). New innovative/novel improved mineral processing equipment designs through integrated CFD/DEM studies and physical modeling is our major focus. Mathematical models based on industrial data and inputs from CFD/DEM are also being developed using non-linear model building techniques for various mineral processing units.

## Molecular and Cellular Bioengineering

The key to understanding the role of chemical engineers in biological engineering research is to recognize that biological systems are inherently chemical in nature. Chemical Engineering provides a unique

integrated systems perspective across a wide range of length scales (molecular to macroscopic) that makes it well suited to attack problems of great interest in modern biology. Specifically, the thrust of our research is on developing a mechanistic understanding of intercellular interactions involved in pathophysiological processes such as infection, inflammation, thrombosis, and cancer metastasis. In addition, our efforts are focused on developing multi-scale computational models for vascular processes such as leukocyte rolling over the endothelium, and bulk phase intercellular interactions in blood flow.

## Haemodynamics and Haemostasis

Pathologies of the cardiovascular system due to coagulation abnormalities are greatly influenced in their progression by the mechanics of vascular tissue, by the flow behavior of blood in blood vessels, and by the biochemistry of the reactions in the coagulation cascade and fibrinolysis. The thrust of our research is to better understand these pathologies by characterizing the rheological and biochemical variables in flow situations that present in the human vasculature, and by identifying conditions that precipitate potentially life-threatening events (like thrombo-embolisms and strokes). Towards this end, we use various tools like computational modeling of blood flow in the presence of clot formation and lysis, experimental characterization of blood and clot rheology, and constitutive modeling of blood, clot, and vessel walls.

## Drug Delivery

Many newly developed specialized polymers are increasingly being applied for delivering drugs in more controlled and sustainable way. In this important area of application, an effort is going on at IITH to develop new methods and mechanisms to achieve 'controlled, targeted and sustainable release of drugs' with the help of specialized polymers. We're also interested in investigating the fundamental forces between the polymer and drug molecules at various conditions.

## Nanoscience and nanotechnology

Nanoscience and nanotechnology is a rapidly emerging interdisciplinary field at the interface between physics, chemistry, materials science, electronics, and biology. Broad activities in this fast changing arena of research include synthesis of a wide range of nanomaterials, their characterization and applications in energy and environment. Presently, we focus on synthesis, fabrication of carbon based nanostructures and their applications in energy storage devices such as Li ion rechargeable batteries etc. We also deal with nanopatterning of soft matters for various applications such as superhydrophobic surfaces.

## Process Control and Stochastic Control

Process Control deals with the use of automatic control strategies to improve efficiency of a chemical process. Apart

from the applications of standard control techniques, we develop novel sensor technologies (known as "soft sensors") based solely on data obtained from a running plant. For example, the data could be in the form of images, sound or just input output data of a process stored in a chemical plant. We also study the application of non-linear and stochastic control techniques.

## Polymers

Conventional polymers are currently facing a lot of issues related to the

environment as well as their petroleum origin. Our research program aims to address these aspects by coming up with new grades of environment friendly polymers and/or building knowhow of making biodegradable polymers with customized features for specific applications. The main focus is on building polymerization technology through modeling, optimization, and lab. Scale implementation and then optimally linking with rheology and processing with desired end use properties.

# Two-year Regular MTech

Two-year regular MTech degree with teaching assistantship is offered in the Department of Chemical Engineering.

- Admission is based on GATE score.
- Graduates of IITs with CGPA 8.0 or above are eligible for direct admission without GATE score. The department will conduct a written test or interview for the selection of the direct admission candidates.
- All selected students under the regular MTech program are eligible for stipend as per the guidelines of MHRD.

# Self-sponsored MTech

- The Department of Chemical Engineering also offers self-sponsored MTech degree without teaching assistantship. Applicant should have 1st class B.Tech./B.E. or equivalent

degree in appropriate discipline with minimum CGPA of 7.0. This is a non-subsidized program, wherein a student pays tuition fee per credit basis. The GATE qualification is not mandatory for admission to this program. The candidates with industrial experience are also encouraged to apply under this program.

- Those candidates who are yet to appear in the final exam may also apply provided that their results are likely to be declared by July 15, 2020.

## **Selection procedure**

- Two-year regular MTech program with valid GATE score: The admission is based on GATE score.
- Self-sponsored MTech program: The candidates will be selected based on the performance in the written test and or personal interview.
- Direct admission: Graduates of IITs with CGPA 8.0 or above without GATE score will be selected based on the performance in the written test or interview.

## **Financial assistance**

- Financial assistance in the form of Half-Time Teaching Assistantship (HTTA) at the rate as per MHRD guidelines (tenable for a maximum period of 24 months) will be awarded to Indian nationals doing the regular MTech Program with valid GATE score, subject to Institute rules.
- HTTA students are required to assist the department for 8 hours of teaching assistance (TA) work per week. The TA

works are related to academic activities of the department such as laboratory demonstration, tutorials, evaluation of assignments, quizzes, seminars, research projects etc.

- For self-sponsored MTech program, the GATE qualification is not mandatory. The candidates registered in this program are thus NOT eligible for any financial assistance/fellowship.

## Who can apply?

- The candidates need to have a Bachelor's degree in Engineering/Technology from Govt. approved educational institutions.
- Those candidates who are yet to appear in the final exam may also apply, provided that their results are likely to be declared by July 15, 2020.
- Candidates with 2019 GATE score can apply with the projected GATE score for 2020.
- Two-year regular MTech program with valid GATE score: The GATE qualified candidates with BE/BTech degree in Chemical Engineering, Chemical Technology (petroleum, petrochemical, polymer, rubber, oil, pharmaceutical etc.), Biotechnology, and related disciplines can apply for MTech program. However, the preference is given to BE/BTech in Chemical Engineering with valid CH GATE score.
- Self-sponsored MTech program: The candidates with BE/BTech from a government recognized university/institution with minimum first class in Chemical Engineering, Chemical Technology (Petroleum, petrochemical, polymer/rubber, oil, pharmaceutical etc), Biotechnology, and related disciplines can apply for this program. **The GATE qualification is not mandatory for admission to this program.**

- Direct admission: IIT graduates with BE/BTech degree in relevant disciplines and CGPA of 8.0 (7.5 for SC/ST) and above can apply without a GATE score.

## Reservation

15% seats are reserved for SC candidates, 7.5% for ST and 27% for OBC for regular MTech program.

## How to apply?

### **Application fee**

The details of application fees and payment mode for SC, ST, and PD candidates are given in admission web portal.

### **Admission**

Please follow the link <[www.iith.ac.in/mtechadmissions/forms.jsp](http://www.iith.ac.in/mtechadmissions/forms.jsp)> to apply online. The candidate will have to upload e-receipt of application fees and e-copy of valid GATE score card (if applicable) while filling the online application. Only jpeg and pdf file formats will be accepted. Without these the application will not be considered.

### **Applying to more than one department**

You can apply to more than one departments. However, separate application fees must be paid for each application.

# Contact

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