

# Semester-wise credit requirements

## Course curriculum

Semester	Theory		Lab	Total
	Core	Elective		
I	8	4	Lab-1 Material Synthesis and Characterization (1.0)	13
II	6	6	Lab-2 Energy conversion and storage devices (2.0)	14
III	12 (Thesis-Stage 1)			12
IV	12 (Thesis-Stage 2)			12
Total (I-IV)				51

### Core courses

1. Fundamentals of Electrochemistry
2. Non Conventional Energy Sources and Environment,
3. Energy Management
4. Material Synthesis and Characterization,
5. Electrochemical Energy Storage systems.
6. Power Systems Engineering and Converters for Renewable Applications,
7. Energy Audit,
8. Bioenergy,
9. Photovoltaic (PV) Technology,
10. Lab: Energy Conversion and Storage Devices ,
11. Industrial lecture series,
12. English communication.

### Elective courses

1. Hydrogen economy,
2. Electric Vehicles,
3. Bio Refinery,
4. Energy system analysis,
5. Fuel cell Technology,
6. Petroleum refinery,
7. Bio Refinery,
8. Combustion Engineering,
9. Data analysis tools for experimental research,
10. Statistical design and analysis,
11. Optimization Techniques,
12. Advanced Transport Phenomena,
13. Molecular Thermodynamics,
14. Nuclear Energy,
15. Lab: Laboratory Methods in Electrochemistry and Related Analysis.



### Admission procedure

#### Eligibility criteria

1. B. Tech/ BE in BT/ Chemical/ Civil/ EE/ ME/ MSME/ M.Sc. with CY/PH with a valid GATE Score
2. GATE Subjects: AE/BT/CH/CE/CY/ EC /EE/ IN/ ME/MN/MT/PE/PH/PI/XE-C/XE-E/XE-F/XE-H/XL-P
3. GATE qualification is exempted for industry sponsored candidates with a minimum of two years' experience OR for IIT undergraduates with minimum CGPA of 8.0.

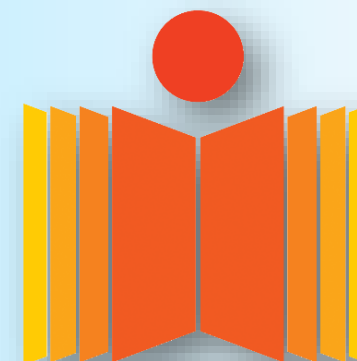
#### How to apply and selection criteria?

Eligible Candidates may register and apply through COAP portal. Department may conduct a written exam and/or an interview. Reservations as per the MHRD, GoI norms will be applicable. MHRD scholarship will be available for GATE qualified selected candidates. Total intake under GATE is 5, and Sponsored is 5.



## 2 Year M.Tech. Program In “Energy Science and Technology” (Interdisciplinary)

### Information Brochure



Indian Institute of Technology  
Hyderabad  
Kandi, Sangareddy-502285, TS  
India

## About the program

M. Tech. in Energy Science and Technology (EST) is an interdisciplinary program being offered from the academic year 2020. The goal of the program is to impart and foster knowledge in energy research and development and state-of-the-art approaches to shape the future of energy. Broad areas include, but are not limited to: Fossil Fuels, Power Engineering, General Energy, Renewable Energy, Energy Storage, Nuclear Energy and so forth. The intake per year under this 2-year M.Tech. program is 10 seats (MHRD) + 5 (Sponsored).

## About the department

This is a interdisciplinary course started from the academic year 2020-2021 at IITH. The Department of Chemistry is initially coordinating this course. Faculty members from different departments across the Institute with expertise in Energy, Materials and Technology serve as instructors for the diverse curriculum.

## About the Institute

IIT Hyderabad is one among the 2nd generation of IITs started by the Govt. of India in 2008. As of date, IITH offers B. Tech., M. Tech, M. Sc., M. Phil, M. Des and Ph.D. programs in Engineering, Science, Liberal Arts and Design. The very foundation of IIT Hyderabad is based on research and innovation. The vibrant research culture is evident from the number of patents and publications that IITH is generating. The institute has about 237 faculty and around 3000 students. IITH has a unique holistic educational ecosystem that offers interactive learning with a highly, flexible academic structure and encourages cutting-edge research, strong industry collaboration, and entrepreneurship.

## Industry participants

- PURE EV, Hyderabad
- NED Energy Ltd., Hyderabad
- HBL Power Systems Limited, Hyderabad,
- Roshan Energy Pvt. Ltd.

## EST facilities

- Materials synthesis apparatus
- Autoclave reactor, fixed bed reactor
- Battery assembly and electrochemical characterization
- Solar cell fabrication and characterization
- Scanning Electrochemical Microscopy (SECM)
- XRD & SAXS
- SEM-EDAX, TEM, XPS
- FTIR, UV-vis NIR, Atomic Force and Raman Microscopy
- Chemisorption, GC, GC-MS, LCMS
- Thermal Studies (TGA, DSC)
- DC-DC converters, DC-AC converters
- Three-phase voltage source converters
- Bidirectional converters
- Multipole multiphase induction machine

## EST faculty members

- ❖ **Dr. Debaprasad Shee (PhD-2008, IIT Kanpur)**  
Research area: Catalysis over supported metals and metal oxides, Nanostructured catalysts, Structure property correlations, Fuels and chemicals from renewable sources and reaction engineering
- ❖ **Dr. Praveen Meduri (PhD-2015, The University of Louisville)**  
Research areas: Multiscale materials, Energy Storage and Conversion, Renewables
- ❖ **Professor M. Deepa (PhD-2004, CSIR-NPL, New-Delhi)**  
Research areas: Materials Electrochemistry, Quantum Dot Solar Cells, Beyond Li-ion Batteries & Electrochromic Devices
- ❖ **Professor Ch. Subrahmanyam (PhD-2003, IIT Madras)**  
Research areas: Heterogeneous Catalysis, Nanomaterial Synthesis with Energy and Environmental Applications
- ❖ **Dr. Surendra K. Martha (PhD-2006, IISc Bangalore)**  
Research areas: Materials Electrochemistry with special emphasis on Li-ion, Na-ion, Lead-acid Batteries, Ultracapacitors and Recycling Batteries
- ❖ **Dr. Rupesh Ganpatrao Wandhare (PhD-2014, IIT Bombay)**  
Research areas: Power Electronics, Renewable Energy Sources, Distributed Energy Generation Standalone and Hybrid Energy Generation
- ❖ **Dr. Siva Kumar K (PhD-2010, IISc Bangalore)**  
Research areas: Multilevel Inverters, Open-end Winding Induction, Motor Drives, Switched Mode Power Conversion, Microgrids, Power Quality and Control.
- ❖ **Dr. Pradeep Kumar Yemula (PhD: IIT Bombay)**  
Research areas: Smart Grids, Power System Control Centers, Information Technology Architectures, Ontologies for Power System Events, Common Information Model (CIM), Interoperability and Standards
- ❖ **Professor Suhash Ranjan Dey (Ph.D. University Paul-Verlaine Metz, France (2006))**  
Advanced Multi-Functional Nanostructured Materials/High Entropy Alloys, Combinatorial Alloy Design of Emerging Materials
- ❖ **Dr. Atul Deshpande (PhD-2004, Max Planck Institute of Colloids and Interfaces)**  
Research areas: Nanostructured Materials for Energy Conversion and Storage, Catalytic and Biomedical Applications
- ❖ **Dr. Sai Santosh Kumar Raavi (Ph.D. 2009: University of Hyderabad)**  
Research areas: Optics and Spectroscopy of Energy Conversion Materials



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