భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Energy Science And Technology

SHAPING THE FUTURE OF ENERGY

About the School

Greenko Group and IIT Hyderabad are collaborating to establish the Greenko School of Sustainability at the Indian Institute of Technology Hyderabad. The School of Sustainability is designed to shape a world that harmonizes with nature and empowers future generations toward a more sustainable tomorrow. The objectives of the school are to conduct research and development, education programs. The Greenko School of Sustainability will be structured as a cross-disciplinary center that manages seamless participation and knowledge flow from all existing departments and centers of IIT Hyderabad.

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About Us

MTech in Energy Science and Technology (EST) is being offered from the academic year 2020 at IITH. The Department of Chemistry is initially coordinating this course. Currently, M.Tech. in EST comes under the Greenko School of Sustainability Faculty members from different departments (CHY, EE, MSE, PH) across the Institute with expertise in Energy, Materials, and Technology serve as instructors for the diverse curriculum

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.

Program Duration: 2 yrs.

ELIGIBILITY CRITERIA

- *B Tech/ BE in BT/ Chemical/ Civil/ EE/ ME/MSME/ MSc with CY/PH with a valid GATE Score.*
- *GATE Subjects: AE/BT/CH/CE/CY/ EC /EE/ IN/ ME/MN/MT/PE/PH/PI/XE-C/XE-E/XE-F/XE-H/XLP/ES*
- *Ministry of Education Supported students: These students will either be admitted based on GATE score or if they have a BTech from an IIT, they should have 8.0 or more CGPA.*
- *Govt Lab/Industry Sponsored students: These candidates should have first class BTech with a minimum experience of 2 years in any Public industry or any Government research lab. GATE qualification is exempted for them. They will be selected based on a written test and/or an interview. They will not receive any scholarship.*
- *Self-Sponsored students: These students should have first class BTech and will be selected based on a written test and/or an interview. They will pay a tuition fee of Rs. 20,000 per credit for 48 credit in 24 months. The admission fee of Rs. 1 lakh will be absorbed in the tuition fee. They will not receive*

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Indian Institute of Technology Hyderabad

Message from the GSS Chair

Prof. Sireesh Saride
Dept. Civil Engineering
IIT Hyderabad
Email:chair@gss.iith.ac.in
Phone: +91 40 2359-6302

The Master of Technology (M.Tech.) program in Energy Science and Technology (EST) is an interdisciplinary program being launched from the academic year 2020 at IIT Hyderabad. The Department of Chemistry is initially coordinating this program. Currently, 12 faculty members from various Departments (i.e., Chemistry, Chemical Engineering, Electrical Engineering, Physics and Materials Science and Metallurgical Engineering) across the Institute with numerous expertise in Energy, Materials, and Technology are serving as instructors to this diverse curriculum. The goal of the program is to impart and foster knowledge in energy research and development and also encompasses 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 M.Tech. course curriculum does not only help the students to develop the theoretical knowledge of energy but also provides practical knowledge on various aspects like renewable energy systems, energy storage systems, electric vehicles, and energy-battery management systems.

The two year course has been incorporated with one-year project work, which will make the students develop advanced practical knowledge of their choice and most importantly, enable the students with a very good amount of research flavor. I believe the program will continue to grow and will open up a new realm of possibility for funding, facilities, new energy systems development, and would contribute significantly to the growth of the Institute

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Message from Faculty-in-Charge, EST

Energy has evolved to be the central theme of the global economy. Availability of continuous and inexpensive power is the need of the hour for the entire world including India. The Government of India, under the National Electric Mobility Mission Plan (NEMMP) 2020 has set an ambitious target of 40 crore hybrid and electric vehicle customers by 2030. In addition, GoI has set a target of 500 GW installed renewable energy capacity by 2030. In order to meet these targets, the most important considerations are large scale energy conversion and storage. As our contribution to the societal needs of energy, IIT Hyderabad started an inter-disciplinary M. Tech program "Energy Science and Technology (EST)" in 2020. The overall goal of the program to impart knowledge related to various aspects of energy covering both science and technology. EST curriculum is designed to equip students from a variety of backgrounds with state-of-the-art energy principles, their integration and device development to transform them to energy engineers.

The course curriculum offers a plethora of subjects that span from the basics of electrochemistry to materials challenges to systems engineering to energy audit. Energetic faculty of the program offer high quality courses and research that will get the students ready for both academia as well as industry. The students of the program are nurtured with ample opportunities and freedom to shape their future as per their wishes. As a coordinator of the program, I wish to ensure students have a happy and productive outcome, here at EST. Finally, I warmly welcome all potential applicants to the EST program and I hope this course can fulfill your future dreams.

Prof. Atul Suresh Deshpande
Department of Materials Science & Metallurgical Engineering
IIT Hyderabad
Email: fic.mtech.est@iith.ac.in

Courses Offered

Total of 14 credits of courses needs to be done in first semester

Total of 14 credits of courses needs to be done in second semester

Third and Fourth Semester includes MTech Thesis of 12 credits in each semester

Students can choose either Industry related or Lab related work for their MTech Thesis

Core Courses

- *Fundamentals of Electrochemistry*
- *Non-conventional Energy Sources and Environment*
- *Energy management*
- *Material Synthesis and Characterization*
- *Electrochemical energy storage systems*
- *Power converters for renewable energy sources*
- *Control of Power converters for Solar Photovoltaic*
- *Energy Audit*
- *Bioenergy*
- *Photovoltaic(PV) Technology*
- *Lab: Energy Conversion and Storage Devices**
- *English Communication*
- *Industry lecture Series*

*Compulsary Course

Electives

- *Hydrogen Economy*
- *Electric Vehicles*
- *Computational fluid dynamics*
- *Bio-Refinery*
- *Energy System analysis*
- *Fuel cell technology*
- *Computational Methods for Chemical Engineers*
- *Petroleum refinery*
- *Combustion engineering*
- *Data analysis tools for experimental research*
- *Statistical design and analysis*
- *Optimization techniques*
- *Introduction to smart grids*
- *Advanced transport phenomenon*
- *Molecular Thermodynamics*
- *Nuclear energy*
- *Lab: Laboratory Methods in Electrochemistry and*
- *Related Analysis*
- *Data Science and Analysis*
- *Machine Learning and it's Application.*

Our Faculty Members

Prof. Ch. Subrahmanyam

PhD-2003, IIT Madras
Research Interests:
Heterogeneous Catalysis, Nanomaterial Synthesis with Energy and Environmental Applications.

Prof. Surendra K. Martha

PhD-2006, IISc Bangalore
Research Interests:
Materials Electrochemistry with special emphasis on Li-ion, Na-ion, Lead acid Batteries, Ultracapacitors and Recycling Batteries.

Pof. Siva Kumar K

PhD-2010, IISc Bangalore
Research Interests:
Multilevel Inverters, Open-end Winding Induction, Motor Drives, Switched Mode Power Conversion, Microgrids, Power Quality and Control.

Dr. Ashish Kulkarni

PhD- 2018 Toin University of Yokohama, Japan
Research Interests
Perovskite Photovoltaics and Optoelectronics
Silicon-Perovskite Tandem Solar Cells
Roll-to-roll fabrication of Solar Modules

Department of Chemistry

Dr. Pradeep Kumar Yemula

PhD: IIT Bombay
Research Interests:
Smart Grids, Power System Control Centers, Information Technology Architectures, Ontologies for Power System Events, Common Information Model (CIM), Interoperability and Standards.

Dr. Narendra Kurra

Ph.D: JNCASR, Bangalore
Research Interests:
Materials (electro)chemistry, Two-dimensional materials, Energy Storage.

Dr. Arup Mahta

PhD-2017, IIT Indore
Research Interests:
Perovskites Optoelectronics, Surface Catalysis, Energy Storage, Spintronics, First Principle Calculations, Catalysis, Nanoscience & Technology

Dr. Rupesh Ganpatrao Wandhare

PhD-2014, IIT Bombay
Research Interests
Power Electronics, Renewable Energy Sources, Distributed Energy Generation Standalone and Hybrid Energy Generation.

Department of Chemistry

Department of Electrical Engineering

Department of Chemical Engineering

Prof. Debaprasad Shee

PhD-2008, IIT Kanpur

Research Interests:

Catalysis over supported metals and metal oxides, Nanostructured catalysts, Structure property correlations, Fuels and chemicals from renewable sources and reaction engineering.

Department of Physics

Prof. Sai Santosh Kumar Raavi

Ph.D. 2009: University of Hyderabad

Research Interests:

Optics and Spectroscopy of Energy Conversion

Material

Department of Material Science and Metallurgical Engineering

Prof. Suhash Ranjan Dey

Ph.D-2006 University PaulVerlaine Metz, France

Research Interests:

Advanced Multi-Functional Nanostructured Materials/High Entropy Alloys, Combinatorial Alloy Design of Emerging Materials.

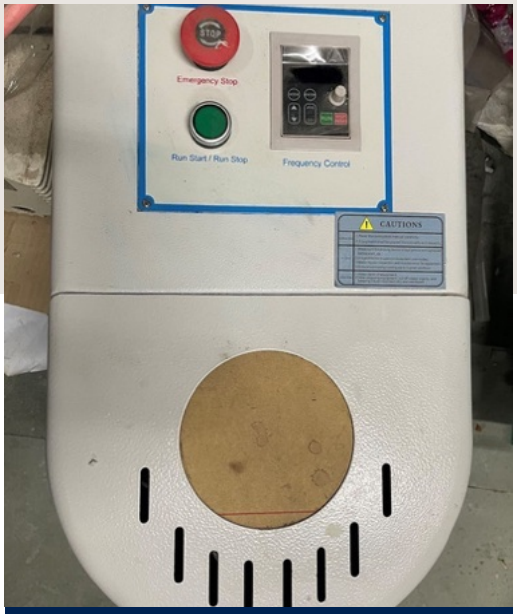
Prof. Atul Suresh Deshpande

PhD-2004, Max Planck Institute of Colloids and Interfaces

Research Interests:

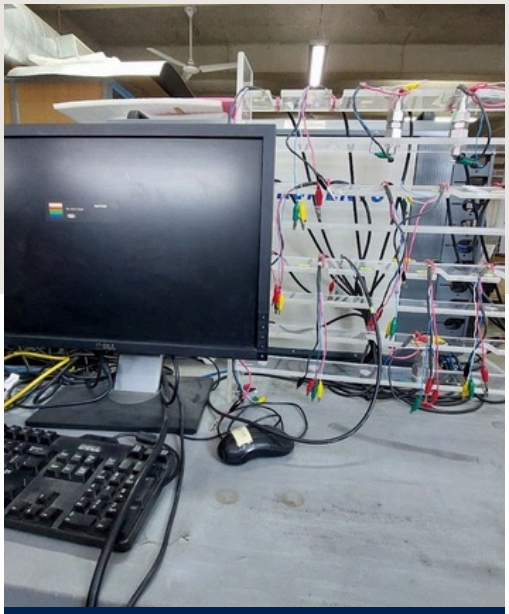
Nanostructured Materials for Energy Conversion and Storage, Catalytic and Biomedical Applications.

EST Facilities



Ball Milling Setup

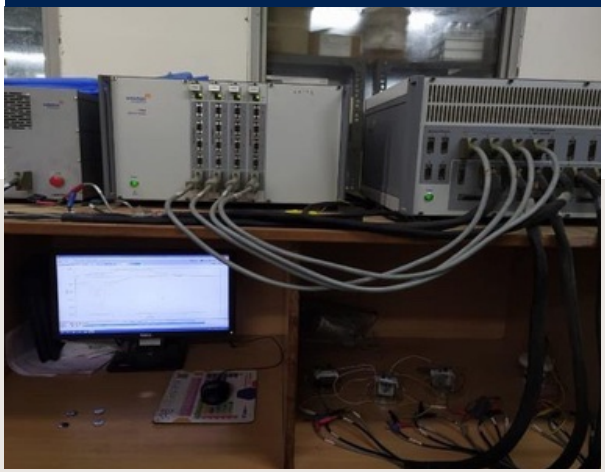
Glove Box Assembly



Battery tester setup

Synthesis Apparatus

Cell Characterization



Ultracapacitor

EST Facilities

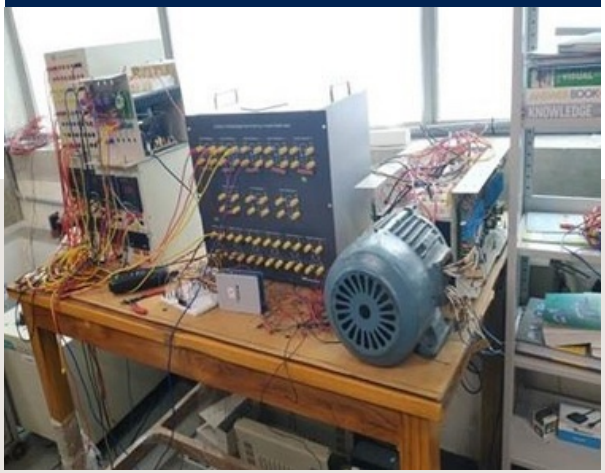
Chemi-sorption Apparatus

Electrical machines Lab

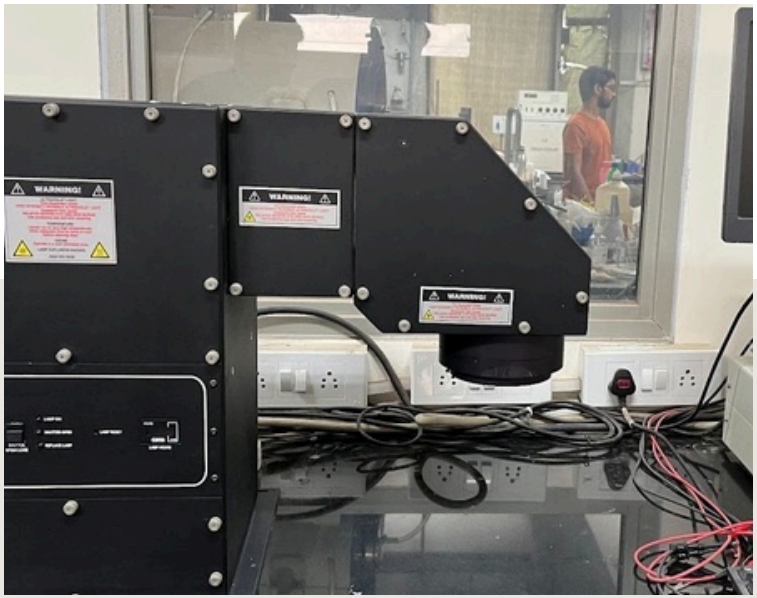
Power aPhysi-sorption (BET) adsorption apparatusElectronics

Solar Cell Testing

Power Electronics Lab



Solar Simulator



INDUSTRY LECTURE SERIES

Company Name: Green Avni Solutions LLP, Hyderabad
Speaker: Mr. Prakash Rapolu, Managing Partner and Founder
Title of talk: Environment and Energy: Insights from Green Avni Team

Company Name: Log 9 Materials, HQ and R&D Centre, Bengaluru, India
Speaker: Mr. Hemant Charya, VP, R&D
Title of talk: Alternative energy storage solutions for Electric Vehicles and stationary applications

Company Name: ARCI, IITResearch Park, Chennai
Speaker: Dr. Tata Narasinga Rao, Director-in-Charge
Title of talk: Nanomaterials-Based Technologies-From Laboratory to Market

Company Name: Tata Steel Ltd
Speaker: Dr. Supriya Sarkar, Head Environmental Research R&D,
Title of talk: Recovery of Energy: Iron and Steel Industry

Company Name: Roshan Energy Technologies Pvt. Ltd. Hyderabad
Speaker: Mr. S. A. Gaffoor, Director and CEO
Title of talk: Battery Energy Storage Systems and Challenges.

Company Name: Godi India Pvt Ltd, Hyderabad
Speaker: Dr.Veerababu Medabalmi, Manager of Energy Technology
Title of talk: An Overview and Godi Approach to various Advanced Energy Storage Technologies

Company Name: High Energy Batteries (India) Ltd, TN
Speaker: Mr. V Ravichandran, Head of R & D
Title of talk: Batteries for strategic Defense Needs

Company Name: Rechargion Energy Pvt Ltd, Pune India
Speaker: Dr. Vilas Shelke, CEO
Title of talk: Energy, Entertainment, and Entrepreneurship

Company Name: ABB Global Industries & Services Pvt. Ltd
Speaker: Dr. Mayukha Pal
Title of talk: Energy Resilient Smart Distribution System

Company Name: IBM Industry Academy, IBM Consulting, Frankfurt, Germany.
Speaker: Mr. Biren Gandhi, Global Industry CoE Leader - Energy, Environment & Utilities,Executive Partner & Member,
Title of talk: Digitalization of the Energy Transition

And many More

INDUSTRY COLLABORATIONS

ROSHAN ENERGY TECHNOLOGIES (P) LTD.

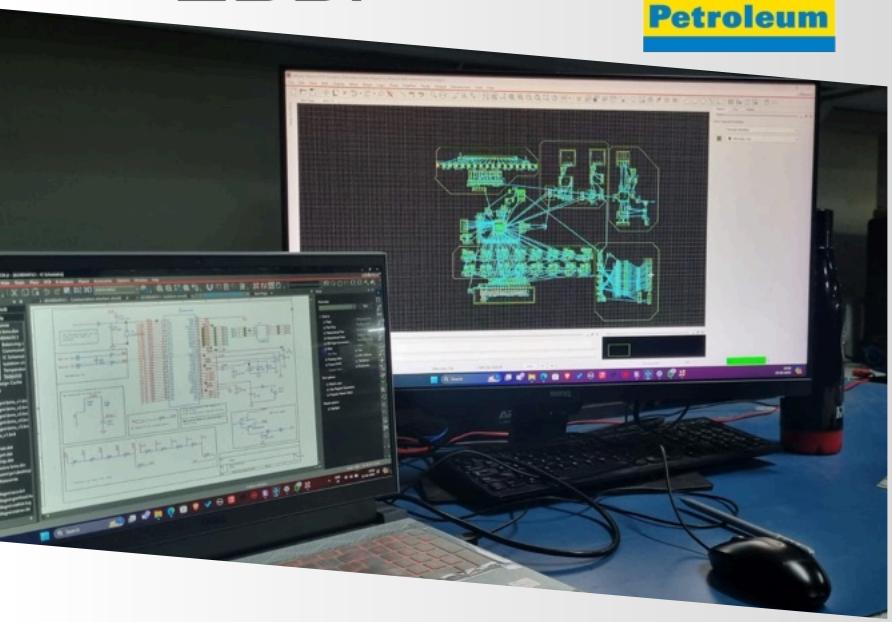
NED ENERGY LIMITED

PURE

HBL® HBL Power Systems Limited.

GODI

Bharat Petroleum



EST Students

Syed Zain Ahmed

BResearch Area - NZEB, Digital Twins, Smart Grids, Energy Mgmt. Analytics
Interest Areas - AI/ML in Energy, Sustainable Infrastructure, Digital Twins, Battery Systems & EVs, Energy Tech-Mgmt Integration, Project & Product Management, Supply Chain.

Aakash Saha

Research Area - BMS Optimization using ML.
Interest Areas - Applications of Machine Learning in BMS. Analyzing Battery Health, SoC, performance using ML Algorithms

Chouhan Jairam

BResearch Area - Supercapacitor materials integration
Interest Areas - Supercapacitor materials, Renewable energy integration, BMS, Energy storage

EST Students

Research Area -Hydrogen Storage Systems
Interest Areas - Hydrogen Storage System Techno-economic Analysis, Green Hydrogen Logistics & Storage Infrastructure, Metal ion Batteries

Shreyash Rudrawar

Research Area - ML applications in renewable energy optimization
Interest Areas - Li-ion Batteries, AI/ML applications in Energy sector, Energy Auditing, Data Science.

Sagar G V

Research Area - Reverse supply chain modelling for energy sector
Interest Areas - Machine Learning, Logistics & Supply Chain in Energy Optimization Modelling, Renewable energy system integration, Electrochemical energy storage

Gaurang Kaushik

EST Students

Sirisha Ponnaganti

Research Area - Design & Implementation of a High-Efficiency UPS with Battery Management system.
Interest Areas - Power Conversion Systems , Power Electronics , Battery Management systems , Photovoltaics

Sushant

Research Area - Metal Ion (Next-gen) Batteries
Interest Areas - Li and Na ion Battery Technology, Electric Vehicles, BIPV Technology, Hydrogen Storage, BMS and Thermal Management

Sudeep S Bukkineni

Research Area - Battery Technology
Interest Areas - Battery Technology, Applied Machine Learning, Artificial Intelligence, Electric Vehicles

PAST YEAR RECRUITERS

DP WORLD

Hind Rectifiers Limited

SUZUKI

BluPine Energy

Movement that inspires

PAST YEAR RECRUITERS

SUZUKI MOTORS

Baker Hughes

Reliance New Energy

Rastriya Chemicals & Fertilizers Ltd.

ZF India Pvt Ltd

SIEMENS

Deloitte.

L & W Constructions Pvt Ltd

BLEND 360

Infosys

LETS CONNECT ...

Prof. Atul Suresh Deshpande
Department of Materials Science & Metallurgical Engineering
Faculty-in-charge
Email: fic.mtech.est@iith.ac.in
Phone: (040) 2359 - 6556

Dr. Pradeep Kumar Yemula
Department of EE
Placement Coordinator, GSS
+91 8374993999
ypradeep@ee.iith.ac.in

An Interdisciplinary Approach...

We are a group of people with diverse backgrounds in engineering and technology With an interdisciplinary approach towards the program, faculty members from different disciplines impart knowledge and latest research in different aspects related to energy and sustainability The students, then deep dive into different areas in energy research and development to shape the future of energy!

ENERGY SCIENCE AND TECHNOLOGY

Shaping the future of energy

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Indian Institute of Technology Hyderabad

IIT HYDERABAD

Kandi, Sangareddy,Telangana, India-502284

(040)2359 6101, 2359 6028

https://iith.ac.in/