POST GRADUATE PROGRAM

2023-2024

Weblink: http://iitk.ac.in/see/pg-programme.php

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For societal development and for maintaining the quality of life of citizens of India as well as the rest of the world, energy sustainability is a vital concern. The energy needs of the society need to be met in such a manner that the energy production has a minimal environmental impact and a low carbon footprint. The indigenous development of novel alternative and renewable energy technologies necessitates the development of R&D infrastructure as well as highly qualified human resources through focused academic programs. The Department of Sustainable Energy Engineering or SEE (www.iitk.ac.in/see) addresses these challenges by imparting high-quality education and training to its students in various aspects of energy sustainability via vibrant postgraduate programs.

The research portfolio of the Department is envisioned into four broad verticals: (i) Energy Generation, (ii) Energy Storage, Distribution and Usage, (iii) Alternative Fuels, and (iv) Energy, Environment, & Policy which align well with the national and global domains in energy sustainability. The research areas in these verticals can be seen in the illustration shown below.

The Department will place special emphasis on (i) solar energy conversion and storage via photovoltaics and thermal methods for energy generation, (ii) contemporary and novel battery, fuel-cell and supercapacitor materials, devices and architectures, prototypes and system development for electric vehicles, (iii) smart grid and power distribution, (iv) hydrogen as a clean fuel with emphasis on production and storage, (v) carbon capture and (vi) clean water. The faculty of the department have core strengths in science and engineering whose research domains are in various aspects of sustainable energy engineering. The aim of the academic programmes will be on developing engineers who will be able to connect the fundamental nuances of science and engineering of energy sustainability with energy systems development. The department also aims to embark on making meaningful international collaborations to benefit its students. In this direction, it already has strong linkages with Rice University in the form of Rice-IITK Collaborative Center (www.iitk.ac.in/rice-iitk/) at IITK. Such initiatives are expected to provide the students opportunities for international exposure and collaborations.
POST-GRADUATE PROGRAMMES OFFERED

M.Tech.  M.S. (by Research)  Ph.D.

The detailed admission procedure along with the eligibility criteria can be found at:

(I)  www.iitk.ac.in/doaa/admission-procedure
(ii) https://iitk.ac.in/doaa/data/pgmanual-02Sep2015.pdf

LABS/FACILITIES

TEACHING LABORATORY:

Sustainable Energy Technologies lab consisting of experiments related to student training on solar photovoltaics, solar thermal, storage, hydrogen and fuel cells, smart grid, wind energy, basic electronics, temperature and flow measurements, Materials synthesis and characterization

KEY RESEARCH LABORATORIES:

- Solar photovoltaics fabrication laboratory
- Battery materials and cell development and characterization laboratory
- Hydrogen generation and storage laboratories
- Smart grid facilities
- Solar thermal storage

INSTITUTE FACILITIES

Advanced Center for Materials Science  Advanced Imaging Center  Nanoscience Center
**Faculty List and Expertise**

**Prof. Aakash Chand Rai**  
Expertise: Energy-efficient Buildings, Impact of Climate Change on Heating and Cooling of Buildings, Indoor Air Quality, Airborne Infection Transmission, and Air Pollution

**Prof. Abheejeet Mohapatra**  
Expertise: Power system security, Uncertainty modelling

**Prof. Abhishek**  
Expertise: Wind Energy, Rotary Wing Aeromechanics

**Prof. Amarendra Edpuganti**  
Expertise: Power electronics applications in renewable energy, electric vehicles, and fuel cell vehicles

**Prof. Anand Singh**  
Expertise: Energy materials development

**Prof. Ankush Sharma**  
Expertise: Power Systems, Smart Grid Technology

**Prof. Anoop Singh**  
Expertise: Energy economics

**Prof. Ashish Garg**  
Expertise: Perovskite and organic solar cell materials and device development, Battery Materials

**Prof. Ashoke De**  
Expertise: Energy Harvesting, Wind & Hydro Energy, Modelling

**Prof. Debopam Das**  
Expertise: Wind energy

**Prof. Deepika Swami**  
Expertise: Energy Policy and Climate Change

**Gururaj Mirle Vishwanath**  
Renewable penetration challenges to the grid, Machine learning applications to power systems, Power Converters for EV and its interfacing challenges

**Prof. Goutam Deo**  
Expertise: Catalysis, Carbon capture

**Prof. Himanshu Sharma**  
Expertise: Carbon capture, alternative fuels

**Prof. Jayant K. Singh**  
Expertise: Materials design, Computational Materials

**Prof. Jishnu Bhattacharya**  
Expertise: Storage materials development, modelling
Prof. Kanwar Singh Nalwa
Expertise: Solar cells (Device physics, Materials, Characterization), Energy storage materials and devices (Na-ion and Liquid metal batteries)

Prof. Lalit M. Pant
Expertise: Electrochemical energy conversion and storage, numerical modelling, porous media transport

Prof. Laltu Chandra

Prof. Malay K. Das
Expertise: CH4 Recovery from gas hydrate, CO2 sequestration, Electrochemical Energy Conversion and Storage

Prof. Nishith Verma
Expertise: Adsorption, Synthesis of nanomaterials including adsorbents and catalysts, Environmental Pollution Control (air/water purifications), Carbon-based Electrodes

Prof. Parthasarathi Sensarma
Expertise: Power Electronics for Renewable Generation

Prof. Prabodh Bajpai
Expertise: Power Electronics for Renewable Generation

Prof. Pradip Swarnakar
Expertise: Environmental Sociology, Climate Change Policy

Prof. Raja Angamuthu
Expertise: Storage materials development

Prof. Rajeev Jindal
Expertise: Energy Technology and Policy, Carbon Neutrality, c-Si Solar Cells and Metal-ion Batteries

Prof. Raju Kumar Gupta
Expertise: Storage materials and devices, Solar energy materials and devices, Water Remediation, Hydrogen production, Carbon Capture and Conversion

Prof. Sachhida Nand Tripathi
Expertise: Climate Issues, Climate Modelling, Environment, Air Pollution

Prof. Saikat Chakrabarti
Expertise: Smart grid, Microgrid, Power system dynamics and stability

Prof. Sameer Khandekar
Expertise: Phase-change heat transfer, Heat pipes, Electronics thermal management, energy systems

Prof. Shobhit Omar
Expertise: Storage and fuel-cells materials and devices development
**Prof. Sudarshan Narayanan**  
Solid state batteries (solid electrolytes, anode materials), thin films for energy conversion (transparent conductors, low-emissivity coatings)

**Prof. Suvendu Samanta**  
Expertise: Power Electronics, Electric Vehicles, Wireless Power Transfer, Resonant Converters with WBG Devices

**Prof. Swathi Battula**  

**Prof. Vaibhav Arghode**  
Expertise: Solar Thermal Energy

**Prof. Vishal Agarwal**  
Expertise: Computational Catalysis, Biofuels and CO2 conversion
BROAD RESEARCH AREAS OF THE DEPARTMENT

- Solar Photovoltaics
- Solar Thermal
- Wind Energy
- Batteries and Supercapacitors
- Fuel Cells
- Electric Vehicles
- Hydrogen and alternative fuels
- Carbon Capture and Utilization
- Water
- Smart Grid and Renewables Integration
- Energy Economics, Policy and Regulation
- Building design
- Energy Efficiency
- NetZero and Carbon Neutrality
DEPARTMENT OF
SUSTAINABLE ENERGY ENGINEERING
Indian Institute of Technology, Kanpur

CONTACT

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