Department of Sustainable Energy Engineering

IIT Kanpur

Welcome to the Department of Sustainable Energy Engineering at the Indian Institute of Technology Kanpur, where we are dedicated to driving the future of renewable and clean energy. Our world-class faculty, cutting-edge research, and state-of-the-art facilities provide students with an unparalleled opportunity to become leaders in this vital field. Explore our comprehensive program and discover how you can be part of the movement towards a sustainable energy future.

Placement Brochure 2024 - 25

About the Department

The Department of Sustainable Energy Engineering at IIT Kanpur is a dynamic and innovative hub committed to addressing the global energy challenge. Our expert faculty, drawn from diverse backgrounds, bring a wealth of experience and expertise to the table. We pride ourselves on our interdisciplinary approach, seamlessly integrating engineering, technology, and policy to deliver comprehensive solutions.

At the heart of our department lies a strong focus on research and development. Our researchers are at the forefront of groundbreaking discoveries, exploring cutting-edge technologies in renewable energy, energy storage, and energy efficiency. From solar power to wind energy, biofuels to smart grids, batteries to hydrogen power, our work is shaping the future of sustainable energy.

Message From HOD

On behalf of the Department of Sustainable Energy Engineering at IIT Kanpur (IITK), I welcome you to this year's placement session at our institute. I am confident that you will be recruiting the very best talent available in our country.

Since its inception, IITK has been a leader in educational and R&D initiatives nationwide. IITK combines rigorous, science-based engineering education with human values and progressiveness. Known for its academic and research excellence, the institute also offers a vibrant atmosphere and opportunities for all-round personality development.

The third postgraduate batch of Sustainable Energy Engineering is vibrant and well-prepared for industry challenges. Through rigorous coursework, research, and unique lab courses, our students have developed excellent theoretical, analytical, and hands-on skills. They are dedicated and ready to tackle national and global sustainability issues, especially in the energy sector.

The Student Placement Office (SPO) at IITK fosters productive interactions between students and employers. We provide an open atmosphere to align everyone's goals and aspirations. We are confident that our students will excel as your future employees, enhancing your organization and supporting our mission of excellence in human resource development.

Welcome to IIT Kanpur, and we wish you a pleasant experience!

Best wishes,
ASHISH GARG
Professor and Head
Sustainable Energy Engineering
IIT Kanpur

Student Demographics

The Department of Sustainable Energy Engineering at IIT Kanpur attracts a diverse and talented student body from across India. Our students come from a wide range of academic backgrounds, united by a passion for sustainable energy and a drive to make a positive impact on the world.

Degree Programs

The 2024-25 batch of the Department of Sustainable Energy Engineering consists of:

- **20 students in M.Tech program**
- **4 students in MS(R) program**
- **9 students in PhD program**

Diverse Backgrounds

Students in our interdisciplinary department come from a variety of engineering backgrounds, including:

- **Mechanical Engineering**
- **Electrical Engineering**
- **Chemical Engineering**
- **Civil Engineering**
- **Material Science**
- **Aerospace Engineering**

Research Areas

Solar Energy

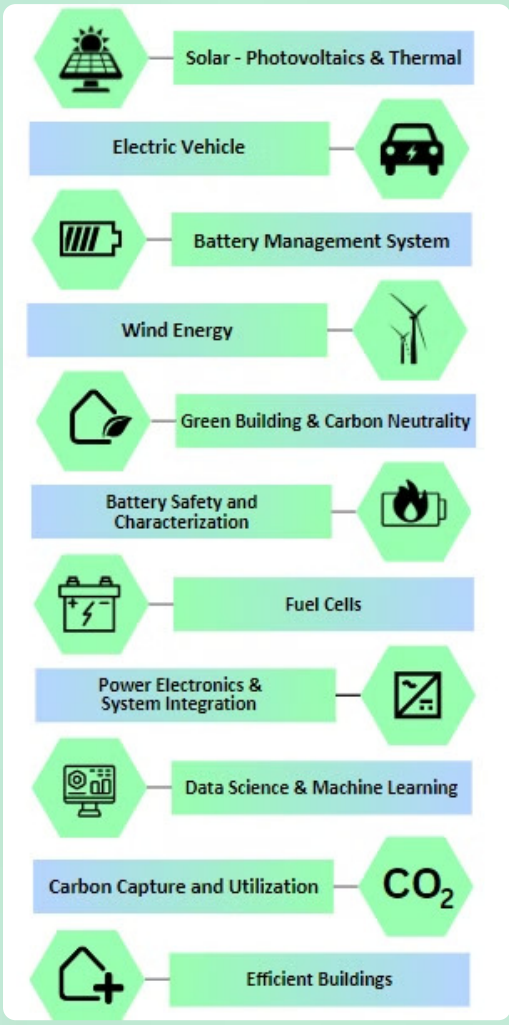
- Real-time fault detection in solar PV systems
- Solar photovoltaics: Organic, perovskite, and tandem materials and solar cells
- Solar PV recycling
- Dust transport and deposition on solar PV panels or reflectors/concentrators
- Scalability of floating solar power in India: Challenges, strategies, and policy implications
- Assessing the influence of pollution on solar radiation and forecasting solar irradiance for future installations
- Block copolymer-grafted quantum dot-based luminescent solar concentrator coatings for highly transparent building-integrated photovoltaic glazings
- Solar PV-based microgrid design and development for on-grid and off-grid applications
- Development of technologies for concentrated solar thermal systems like receiver, thermal energy storage, heat transfer fluids, etc.

Batteries and EV

- Advanced thermal management strategies for enhancing battery safety and thermal abuse in Li-ion batteries
- Equivalent circuit modeling of Li-ion batteries with integrated hysteresis loss optimization
- Enhanced ionic conductivity for NASICON-type solid-state electrolytes for solid-state sodium batteries
- Converter control with partial power processing for EV charging
- Design, modeling, and control of multi-port converters for EV charging

Wind Energy

- Offshore wind power prediction in India
- Vertical axis wind turbine (VAWT) cluster analysis
- Flexible foil wind turbine
- Microchannel dehumidification of data centers with the help of low-grade energy



Research Areas

Energy Policy

- Energy transition plan considering renewable energy resources for optimizing overall cost and emissions
- Sustainability, ESG reporting, and energy market
- Life cycle assessment of different types of houses
- Price prediction in electricity markets using machine learning-aided Kalman filtering (KF) algorithm
- Net-zero energy and net-zero building

Hydrogen Energy

- Solid-state hydrogen storage in carbon nanohybrids
- Hydrogen production and activation of sulfur dioxide and carbon dioxide through chemical and electrochemical methods
- Concentrated solar thermal-based ammonia heating for hydrogen generation
- Hydrogen production via solar thermal gasification and natural gas reforming

Biofuels & CCUS

- Synthesis of solid adsorbents for carbon capture and their application
- Elemental and organic aerosol source apportionment
- Air pollution measurements, modeling, and control
- Enhancing the production of ethanol, methanol, bio-CNG, aviation fuel, and green hydrogen from biomass, a renewable source of energy

Academic Courses Offered

The Department of Sustainable Energy Engineering at IIT Kanpur delivers industry-relevant courses that bridge classroom learning with real-world applications. By aligning our curriculum with the latest professional developments, we equip students with practical skills, up-to-date knowledge, and hands-on experience, preparing them to excel in the modern workforce.

Introduction to sustainable energy technologies (with Lab)	**Fundamentals and applications of electrochemistry**	**Electric vehicles**
Solar thermal engineering	**Hydrogen energy**	**Solar Photovoltaics**
Introduction to sustainable energy policy	**Computational methods in engineering**	**Energy systems: Process analysis and modelling**
Smart grid technology	**Physics of energy materials**	**Electrochemical energy systems**
Bioenergy	**Mathematical & Computational tools for engineering**	**Net Zero: Carbon neutrality**
Fuel cells	**Wind energy**	**Simulations of power systems**
Basics of power electronic converters	**Essential electrical engineering for renewables integration**	**Introduction to materials modelling and simulations**

Facilities and Laboratories

At the Department of Sustainable Energy Engineering, we pride ourselves on our state-of-the-art facilities and well-equipped laboratories, which provide our students and researchers with the resources they need to push the boundaries of sustainable energy innovation. The Department of Sustainable Energy Engineering at IIT Kanpur has two main types of laboratories:

1

Hands on Laboratory

The Sustainable Energy Technologies Lab encompasses a range of experiments focused on providing hands-on experience for students in various areas such as solar photovoltaics, solar thermal techniques, energy storage, hydrogen and fuel cell technologies, smart-grid systems, wind energy, fundamental electronics, temperature and flow gauging, as well as materials creation and analysis. This lab is part of an interdisciplinary department that has recently been set up. It offers students the opportunity to utilize a variety of laboratories and resources available at IIT Kanpur, all based on ongoing research projects.

2

Key Research Laboratories

- Battery materials and cell development and characterization laboratory
- Photovoltaics, Ultra-fast LEDs, and Storage of Energy Research Laboratory (PULSE)
- Advanced Combustion and Acoustic Laboratory (ACAL)
- Solar Energy Research Enclave (SERE) Laboratory
- Solar Photovoltaics Fabrication Laboratory
- Hydrogen Generation and storage laboratory
- Thermal Systems Laboratory (TheSLa)
- Smartgrid Facilities
- Solar Thermal Storage
- Wind Tunnel Facilities

Centers

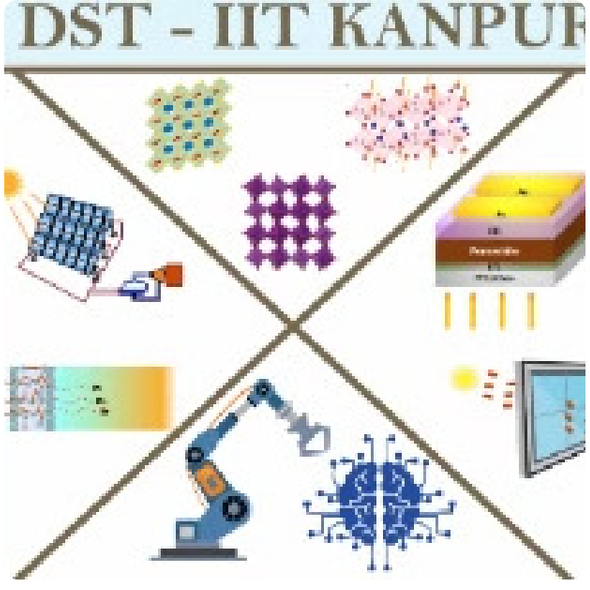
The Department of Sustainable Energy Engineering at IIT Kanpur is committed to fostering a collaborative ecosystem that drives innovation and progress in the field of sustainable energy. We actively engage with industry partners, government agencies, and research institutions both in India and globally to create a vibrant ecosystem for knowledge exchange and joint ventures.

CKC

Chandrakanta Kesavan Center for Energy Policy and Climate Solutions. The Center leads IIT Kanpur's commitment to becoming carbon neutral, serving as a testbed for a low-to-zero carbon campus. This includes studies on electricity use, conservation, mobility, water, and waste recycling, followed by policy implementation. Several projects are undertaken by undergraduate and graduate students.

RICE IITK center

The Rice-IITK Collaborative Center is a partnership between Rice University and IIT Kanpur. It aims to foster groundbreaking research in sustainable energy and the environment, addressing global energy demands. By promoting collaboration and knowledge exchange, it leverages the strengths of both institutions to tackle major energy challenges.



DST - IITK

The platform aims to design energy-harvesting materials using quantum mechanics-enabled atomistic simulations, AI, ML algorithms, and automation. Researchers from 13 elite institutions are involved. The Material Acceleration Platform, established by the Department of Science and Technology (DST), leverages next-gen computing, AI, ML, and robotics to accelerate materials discovery up to 10 times faster.

Initiatives

SUSTAINABILITY CELL - IITK

It is an independent student body mentored by the Department of Sustainable Energy Engineering and supported by the Chandrakanta Kesavan Centre for Energy Policy and Climate Solutions.The primary aim of the cell is to work in close collaboration with the institute's administration and the campus residents to make the campus more sustainable and healthier to live, study & and work in. The cell also aims to:

- Foster a culture of debate & and discussions on the global polycrisis.
- Educate & and engage the community on various topics (climate change, biodiversity loss, soil degradation, etc.)

IGBC - IITK STUDENT CHAPTER

The Indian Green Building Council (IGBC), part of the Confederation of Indian Industry (CII), was established in 2001 with a vision to create a sustainable built environment and make India a global leader in this field by 2025. The council offers green building rating programs, certification services, and training, and organizes the annual Green Building Congress. It is a committee-based, member-driven, and consensus-focused organization, involving architects, developers, manufacturers, corporates, government, academia, and agencies through local chapters.

Past Recruiter

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