Pandit Deendayal Petroleum University (PDPU), Gandhinagar
School of Technology
Department of Solar Energy

M.Tech in Energy Systems (focused on Solar Energy)

About the Program

The global energy requirement to sustain a significant economic growth is increasing day by day. World's energy demand is expected to increase by over 50% by 2030 (a conservative estimate). Current sources of energy, particularly the fossil sources, which comprises of approximately 80% of energy requirement, cannot support this demand given the environmental concern of carbon footprints. Therefore, enormous development is underway to over alternative sources of energy.

In this aspect, the energy sector globally provides significant research challenges in the continuous development of new materials, devices and energy systems. Fundamental research contributions are required for the development of cost-effective and sustainable energy systems. It requires fundamental breakthroughs in energy extraction, processing, conversion and utilization. Several innovative research solutions are required to shape the sustainable energy systems and to provide substantial energy security of the future.

So far, solar energy is one of the promising alternative energy sources that can meet new energy demands without degrading and affecting the environment. The Solar Energy, therefore, has a tremendous potential in terms of harvesting it with smart technologies and integrating with existing infrastructures. The M.Tech. - Energy Systems (focused on Solar Energy) programme has been designed by looking at the growing need of manpower by the acclaimed industries in Solar Energy sectors as well as the R&D which can make it more efficient and cost effective. Beside the above target, the energy storage also bears great importance where both mobile (such as hybrid electric vehicles) as well as ground based installations are concerned.

At the end of the course, the Graduates of the program will be able to:

- Provide fundamental inputs required to meet the challenges of the renewable energy sectors with greater face up to the solar energy technologies, in both PV and solar thermal applications.
- Keep updated on recent techno-economic aspects of solar energy, its distribution and storage.
- Practice hands-on fabrication, design, engineering, procurement, commissioning, operation and maintenance of solar PV systems.
- Create employment through manufacturing in solar equipment and project development.
- Create self-employment and entrepreneurship in solar PV as well as thermal areas

Opportunities of research and higher studies

The Department of Solar Energy has parallel research wing of The Solar Research and Development Center (SRDC), one of the center of excellences at PDPU which was established by the government node in 2013 has been working on the following mandates:

- ❖ Develop and contribute over fundamental and applied research capabilities solar photovoltaic, solar fuel and energy storage
- ❖ Providing experimental and various computation facilities to PhD level projects at PDPU.
- ❖ Performance monitoring of the 1MW PV power plant at PDPU.
- ❖ Knowledge proliferation in Solar Energy through seminars, invited talks and conferences.
- ❖ Intellectual property creation

Students in this programme in their 3rd and 4th semester, gets opportunities to work on following faculty offered research areas providing them a prospect for higher studies at the level of MS and PhD in India and abroad :

- Solar energy materials and devices (Photovoltaic and Photocatalytic)
- Hydrogen Fuel and water decontamination
- Emerging PV technologies (hybrid, perovskite etc)
- Li ion battery and beyond; battery management
- Decentralized energy solutions (PV and Hybrid)
- Nanotechnology in energy
- Solid state sensors and bio-sensors
- Fuel Cell technologies – Cost reduction and Nanotechnology Intervention
- Solar energy in water treatment
- PV module recycling technologies
- PV plant O&M

Who is eligible to apply?

Minimum 60% in aggregate or CGPA/CPI 6.5/10 in the qualifying degree: B.E./B.Tech. in Electrical/ Mechanical/ Electrical and Electronics/ Instrumentation and Control; OR M.Sc. in Physics/ Applied Physics/ Electronics.

About Curriculum

The curriculum for the course has been designed in house to cater the need of solar energy industries, ranging from generation, utilization and storage.

The curriculum has been structured in three phases:

1. **Core Courses**: The core courses are essential to provide critical understanding of theoretical and practical issues relating to fundamental aspects, mechanisms of solar energy, its utilization and storage.

2. **Elective Courses**: While core courses provide the breadth of program, the elective courses provide topics which are specialized in the domain of energy generation, storage, e-mobility etc.

3. **Research Project**: In the final year of the programme, students pursue two types of projects: (i) problems associated to industries, their solutions and new design in the field. (ii) Fundamental materials and devices for new technologies and their efficiency improvement.