The Institute

The Indian Institute of Technology Kanpur was founded in 1958. Since then it has emerged as premier center for research and academics. It has a lush green campus spread over approximately 430 acres. The Institute provides extensive research support via centralized research facilities in addition to the departmental and also several recreational facilities.

Research facility: The P K Kelkar Library is one of the best academic libraries in the country with a collection of more than 2,000,000 volumes and subscriptions to several thousand periodicals. The Computer Centre supports computational facilities via several terminals and the PARAM 1000 supercomputer. It will house a high-performance computing facility. IT Kanpur is extensively networked with institute-wide LAN and Ethernet access available everywhere. Several specialized testing facilities are maintained, and these include the National Wind Tunnel Facility, the Advanced Centre for Material Sciences, a Nano-science Centre, the Advanced Centre for Electronic Systems, the Cental Centre for Display Technology, Centre for Neuchromatics, Centre for Laser Technologies, Prathap Gopal Research Centre for Computer and Internet Security, and the Facility for Ecological and Analytical Testing.

Recreational opportunities: The campus has one of the best sports facilities in the country, including a full-sized swimming pool, modern courts for squash, badminton, tennis, table-tennis, basketball and volleyball, as well as lush green fields for athletics, football, hockey and cricket. The green campus allows for long leisurely walks/strolls. Culturally, the institute supports many active clubs that include fine arts, music, literature, dramatics, photography, astronomy, etc. We have our own private airfield and flying club. Nature lovers and photographers will be delighted by the birds, butterflies, reptiles and other animals that reside within the campus.

Kanpur

Situated on the Ganges River, Kanpur stands as one of India’s major industrial centres of historical, religious and commercial importance. History: The first mention of the city is dated 1579 during Sher Shah Suri’s reign. In 1860, Kanpur passed into British hands, under a treaty with the Nawab of Awadh. It became Britain’s important military station, and played a pivotal role during 1857’s Independence War when Nawab Bahadur took Kanpur. At the time of Independence, Kanpur was India’s most important industrial city. Nationalists like Chandrashekhar Azad, Bhagat Singh, poets like Baldeo Sharma “Navin”, Suryakant Gupta “Pancharatna” and Gopal Das “Nagri”, and Hindu Mohommad Mohammed Ansari, Ashwini Shankar Sanyal, Pratap Narayan Mishra, Brij Mohommad Ashvina and Ashwini Prasad Shukla “Swaraj” are associated with the city.

Sights: Bithoor is located about 10 km from IT Kanpur. According to mythology, just after creating the universe, Lord Brahma performed the Ashvamedh Yagna at Bithoor and established a Shivalingam there. Also at Bithoor is the Vatsali Ashram, where the great sage is supposed to have composed the Ramayana and where Bholenath was waked. Bithoor ghost on the Ganges is historic, Jajmau, about 20 km from Bithoor, has an ancient fort that archaeological excavations have dated back to the Vedic age. Legend has it that the fort belonged to King Yavali of the Chanderavanshi race, the eighth in succession to Lord Brahma. The famous Siddheshwar Temple of Lord Shiva and the Shatamool Temple at Jajmau belong to the Buddhist period. The nearby Shyamgarh Temple is an astonishing terraced brick structure built in a temple style. Built in the 6th century by the Gupta Empire, it is the oldest remaining Hindu shrines with a roof and a high Bhairav. Other sites include an ancient and beautiful temple on the Ganges at Shivapuri and the ancient temple at Tarai. The Kanpur zoo is famous for its cages designed to provide a natural habitat for the animals, and has a vast variety of animals. The zoo’s water supply system is a work of art. The city has one of Asia’s biggest zoological gardens. Exotic species of flora and fauna are present at the Chandrakhanar Azad Agricultural Campus. Kanpur is also home to many resident and migratory birds that can be spotted at Bithoor, IT Kanpur and the Ganga Canal. Finally, Kanpur is well-connected by road and rail to nearby Allahabad (Prayag), Lucknow (Awadh) and Varanasi (kashi). Some weekend trips are easily arranged.

How to get there?

By air: Flights from New Delhi, Kolkata, Bhopal, Ajmer, Allahabad, Varanasi, Lucknow, Mumbai, Kolkata, Bhopal (two hour taxi ride from IIT).

Climate:

Summer: April to June, High - 45°C
Monsoon: July to September
Average rainfall: 850 mm
Winter: December to February, Low - 2°C

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The Department

Mechanical Engineering is a fundamental branch in Engineering that trains many modern technological innovation engineers. Mechanical engineers deal with the design and analysis of mechanical systems and devices, which are heavily utilized in nearly every industry, from aerospace and automotive to manufacturing and construction. The Department of Mechanical Engineering at the Indian Institute of Technology Kanpur is one of the most respected and renowned engineering departments in India, known for its rigorous academic programs and cutting-edge research activities.

Academics

The department offers the following three degrees programs:

- Biomedical engineering
- Energy systems
- Multiscale mechanics

Research

We conduct fundamental and applied research in major areas of Mechanical Engineering, reaching well beyond traditionally identified domains. Researchers are engaged in extremely diverse, and often interdisciplinary, energy-related research. Advanced research is focused on the development of new technologies and materials that can contribute to solving some of the world's most pressing problems, such as climate change, energy efficiency, and sustainability. The department's research outputs are translated into practical applications through our collaborations with the industry and the government.

Academic programs:

- Biomedical engineering
- Energy systems
- Multiscale mechanics

Most flows in nature and in the industry contain two or more constituents and involve the interaction of different physical fields. Analyzing such systems is extremely challenging, and the department has ongoing research in the areas of flow through porous media, reacting flows, nuclear reactors, granular flows, combustion, boiling and condensation, capillary flows, magneto-hydrodynamics, and turbulence modelling. We utilize and develop tools such as computational fluid dynamics, statistical mechanics, kinetic theory for dense gases, and also experimental methodologies like hot-wire anemometry and other imaging techniques employed in various in-house water and wind tunnels. Important areas of application are geophysics, nuclear reactors, gas turbines, heat exchangers, heat pipes, and micro-fluids.

Imaging and non-destructive techniques

Non-invasive techniques are essential, whether it be for imaging the brain, identifying flaws in an aircraft’s fuselage or a nuclear reactor, probing fluids without physical interference, locating impurities in nuclear reactors, or thermally imaging crystal growth. The department has developed several theoretical and experimental tools to meet this end. Our research encompasses optical techniques such as interferometry and schlieren, particle image velocimetry, laser-based flow visualization, high-speed photography, holography, photoelasticity, digital image correlation, ultrasonics, computerized tomography, and error estimation.

Applied mathematics: Engineering computation; Variational methods; Asymptotic and perturbation methods; Sobolev space & extremum principles; Inverse problems.

Fluid mechanics: Turbulence modeling; Computational fluid mechanics; Non-Newtonian fluids; Convection; Experimental techniques; Jets; Two-phase flows; Granular flows; Shocking; Gas bubbles; Fluid instability and transition.

Geophysics: Magneto-hydrodynamics; Planetary dynamics; Asteroids; Solar system studies.

Manufacturing technology: Advanced machining processes; CAM; Metal forming; Nano-fabrication; Nanocomposites; Die and mould design; Tribology; Rapid prototyping.

Micro-/ Nano- scale technology: Bio-MEMS; Micro-fluidics; Micro-rheology; Carbon nanotubes; Nanoparticles.

Nonlinear dynamics and Vibration: Time-delayed systems; Stability; Bifurcation; Chaos; Pattern formation; Vibrational control; Acoustics; Noise control; Structural vibrations; Non-smooth systems.

Optimization and design: Genetic algorithms; Optimization theory; Constrained nonlinear optimization; CAD; Product design; Reverse engineering.

Robotics and Multi-body dynamics: Autonomous systems; Parallel manipulators; Humanoid robots; Intelligent control systems; Flexible manipulators; Mechanism theory; Constraint mechanisms.

Solid mechanics: Composite materials; Polymers; Solidification dynamics; Plasticity; Fracture mechanics; Experimental techniques; Impact mechanics; Finite element method; Material modeling.

Continuum thermodynamics; Lattice dynamics; Phase transformations; Defects: Thin films; Contact mechanics; Fluid dynamics; Fluid-structure interaction.

Thermal Sciences: Computational heat transfer; Boiling; Condensation; Convection; Thermal management; Heat pipes; Combustion; IC engines; Alternative fuels.