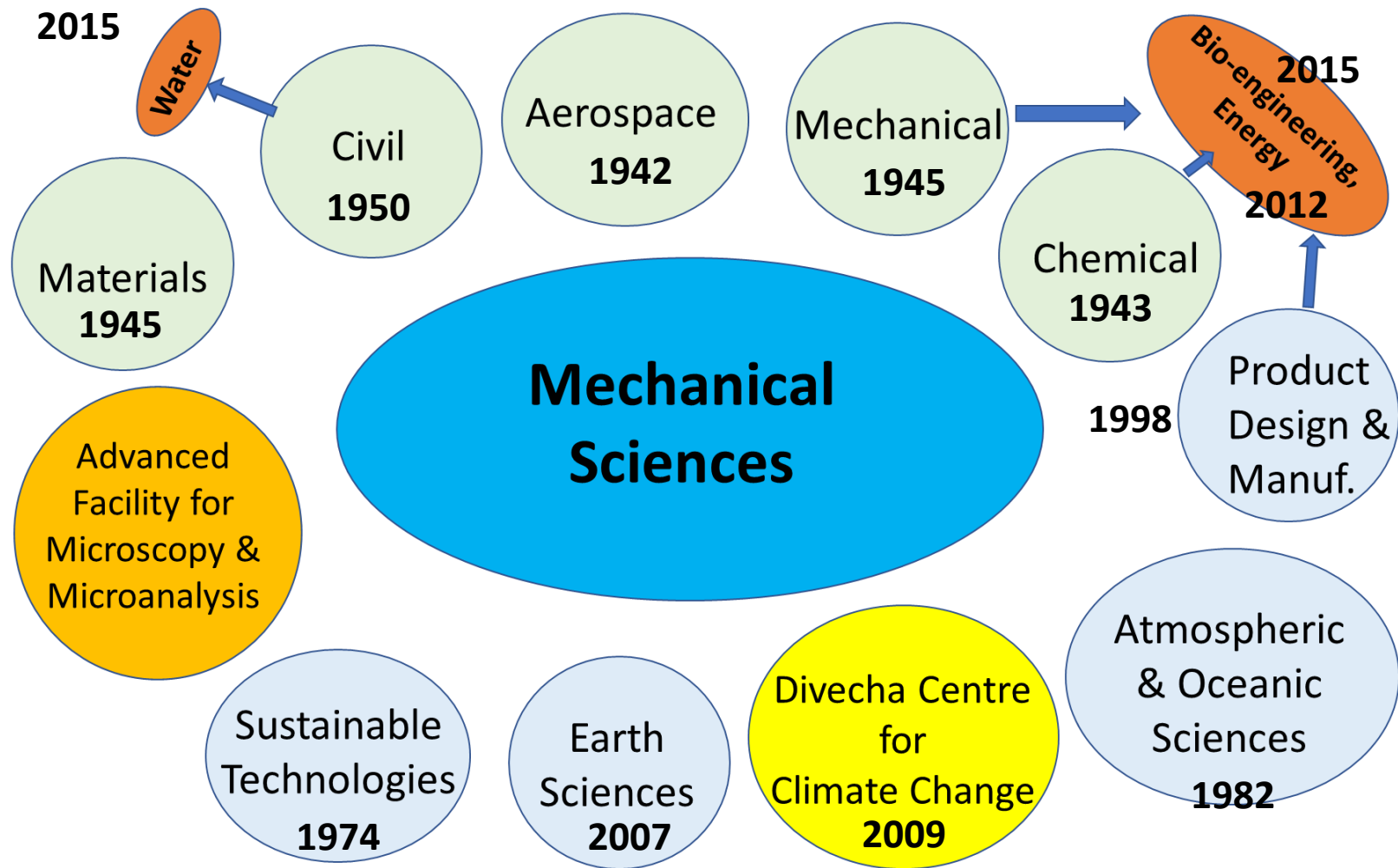


Division of Mechanical Sciences, IISc



147 Faculty/Scientific Staff, PhD Students: On roll 719, Graduated: 112



Mechanical Engineering

Research focus



Current Research areas

- ✚ Mechanics of Solids and Structures
- ✚ Fluid Mechanics and Flow Physics
- ✚ Manufacturing and Materials
- ✚ Heat Transfer, Combustion and Energy Systems
- ✚ Biomechanics and Biomedical Devices
- ✚ Robotics, Mechanisms, Design and Optimization
- ✚ Vibration, Acoustics and Control
- ✚ Micro- and Nanoscale Processes and Devices

Faculty Recruitment

- Department looking for candidates in all areas related to Mechanical Engineering
- Priority areas include *Manufacturing, Robotics, Dynamics, Controls and Mechatronics*
- Exceptional candidates in any area will be considered

Civil Engineering

Research focus



Current Research areas

- ✚ Earthquake engineering: structural and geotechnical
- ✚ Damage and fracture mechanics
- ✚ Mechanics of materials: Experimental, computational, and theoretical
- ✚ Foundation engineering
- ✚ Soil reinforcement and geosynthetics
- ✚ Rock mechanics
- ✚ Uncertainty quantification, risk and reliability engineering
- ✚ Structural health monitoring
- ✚ Fire structural engineering
- ✚ Building materials
- ✚ Transportation systems
- ✚ Climate hydrology
- ✚ Environmental engineering, hydrochemistry
- ✚ Water resources management
- ✚ Stochastic hydrology
- ✚ Watershed hydrology

Faculty Recruitment

All areas of environmental engineering, materials, cutting edge experiments, energy & buildings, cyber physical systems and emerging technologies, interface with biology

Chemical Engineering

Research focus

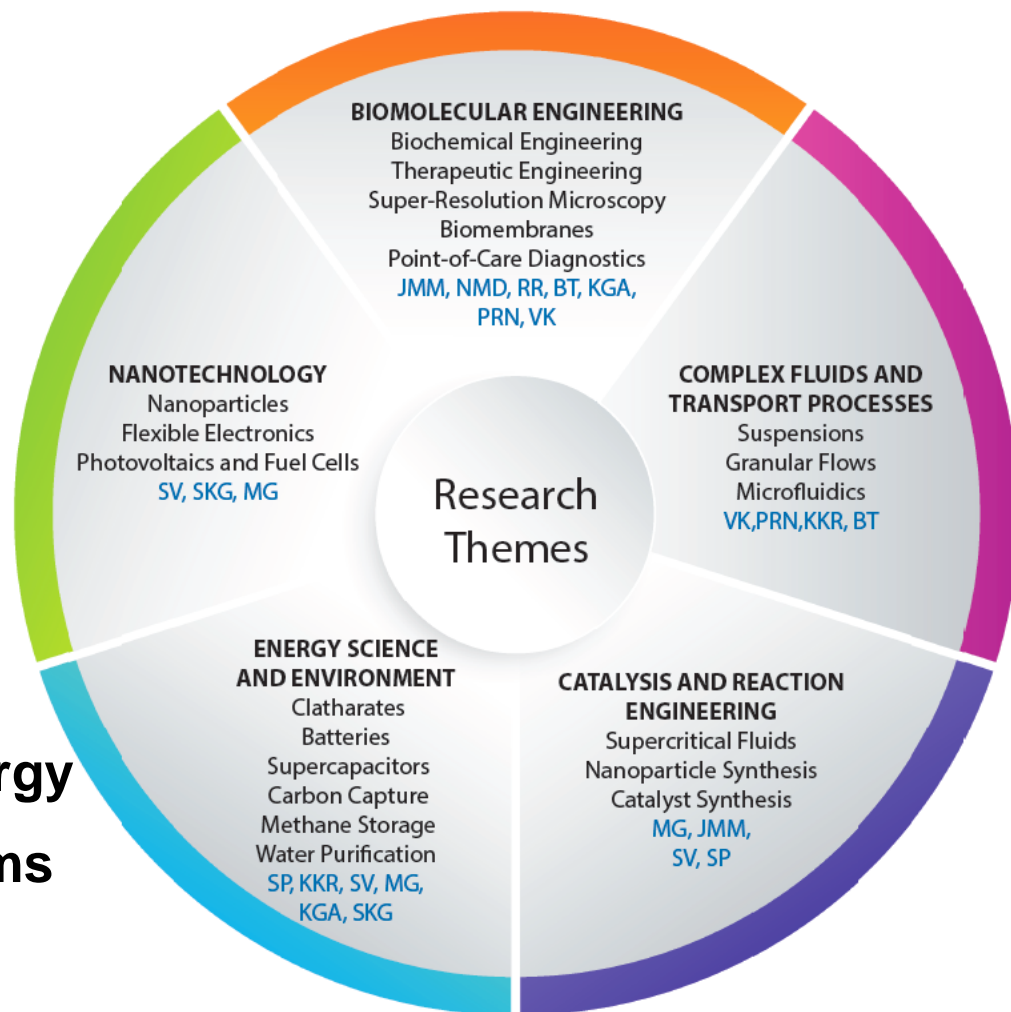


Recent Journal Highlights

- Nature Communications
- PNAS
- JACS
- Physical Review Letters
- ACS Nano
- Journal of Fluid Mechanics

Faculty Recruitment

- Novel Materials: Catalysis, Energy
- Controls and Dynamical Systems
- AI and Big Data
- Polymer Physics and Applications
- Ab Initio Modelling



Materials Engineering

Research focus



Nanomaterials

Nanocapsules / particles
Bulk nanomaterials, Ultra-fine
grained metals & composites
Thin film multilayers

Mechanical Behavior

Deformation processing,
Creep, Superplasticity, Fatigue,
Fracture, Small scale testing, High
strain-rate deformation, Indentation,
Tribology, Field effects

Bio-materials Processing

Surface chemistry,
Environmental Biotechnology
Bio-Processing, Tissue
Engineering, Drug Delivery

Chemical Processing

Thermodynamics of sensors
and fuel cells, Process
modeling, Transport
phenomena

Materials Engineering

Functional Materials / Ceramics / Composites

Electroactive polymers, Organic
Photovoltaics, Ferro/ Piezo electric
materials, electrochemistry, Ultra-high
T ceramics, Metal / Ceramic /
Polymer composites, Printed
electronics

Materials Design

Diffusion, Computational
modeling - Phase field and
atomistic simulations, Non-
equilibrium processing, Multi-
component systems. Metal
joining, Metallic glasses

Materials Heritage

Archaeometallurgy,
Metallurgical heritage of
India, Conservation

Aerospace Engineering

Research focus



- **Structural health monitoring**
- **Blast Mitigation Strategies**
- **CFD & LES**
- **Modelling at Nano Scales and Bio Inspired Modelling**
- **Green energetic materials as rocket propellants**
- **Fluid mechanics of bodies landing on water**
- **Identification of a new type of hovering motion**
- **Design and development of fixed wing nano air vehicles .**
- **Multiscale modelling and materials / structures simulation**
- **Systems design with advanced composite, sensors and actuators**
- **Unsteady combustion studies for next generation lean burn aircraft and gas turbine engines**
- **Trans Disciplinary Shock Wave Research and Applications**

- Established 1982; Masters and PhD programmes; 9 faculty members, 35 graduate students
- Theory, simple to complex models, satellite and *in situ* observations, strong legacy of field experiments. Many active collaborations within India and across the world.

Faculty Recruitment: We are looking for faculty in all areas of atmosphere, ocean and climate science



Observations and models: cloud microphysics, monsoon clouds and dynamics, rainfall variability from minutes to decades, aerosols and radiation, GFD, tropical and global climate



Field experiments, process studies, and observing networks: upper ocean physics, surface fluxes, air-sea interaction, atmospheric turbulence and boundary layer, land-atmosphere interaction

Divecha Centre for Climate Change



The Centre was established in 2009 with a financial contribution from Arjun and Diana Divecha and the Grantham Foundation for the Protection of the Environment. The primary goal of this centre is to understand climate variability and climate change and its impact on the environment. The centre has 12 associate faculty members, 26 Grantham Research Fellows, 6 interdisciplinary research scholars and 54 staff members.

Our vision: Impact on society and policy implications.

Areas of interest include: Climate change and policy, glaciers and water security, air quality and health, sustainable water future, renewable energy and policy, hydro-meteorologic extremes, monsoons-agriculture-food nexus and sustainable forests.

- ❑ The centre hosts South Asia regional office of the international “Future Earth” and the “Monsoon Asia Integrated Research on Sustainability (MAIRS)”.
- ❑ We undertake outreach activities and training programs to create awareness among people and policy makers.
- ❑ Faculty at the centre are often consulted by various ministries and departments for advice on issues related to climate change.



Biomass & renewable energy

Bio-reactors; Thermo-chemical conversion (waste to energy); Fuel Cells; Combustion devices (Cook stoves and driers)

Buildings & Habitat

Energy in Buildings; Low-Carbon constructions & green buildings; Materials from ternary blends & Industrial by products; Climate responsive architecture, Building Integrated PV

Water & Environment

De-fluoridation; Wastewater pollution & abatement; Sanitation; Engineered landfills

Waste to Energy & recycling waste

Thermo-chemical conversion of waste, Waste Recycling, Plasma Gasification, Syngas Cleaning and Enrichment, Plasma Activated Water (PAW), Wastewater Treatment

Turbomachinery for renewable energy, Micro/Pico-hydro

Areas for Faculty Recruitment

- **Areas in Design**

- Product Development Process
- Product and Process Informatics
- Aesthetics, Semantics, Semiotics, User Interface, User Experience
- Design for (additive) Mfg & Assembly; Embodiment Design
- Product Service Systems design; Design for Cost & Sustainability

- **Areas in Manufacturing**

- Digital Manufacturing; Industry 4.0
- Sustainable Manufacturing
- Digital Supply Chain; Factory Simulation and Optimisation
- Additive Manufacturing
- Advanced Robotics, Cobotics, Soft Robotics, Autonomous Systems



Centre for Earth Sciences (CEaS)

Research focus

Established in 2007

- To establish interdisciplinary research programs in broad areas of earth sciences
- To understand fundamental Earth and planetary processes using an interdisciplinary approach
- To focus on problems relevant to the Indian context especially in understanding the atmospheric, surface and internal Earth processes.

Broad Areas – Petrology, Geochemistry and Geophysics