



INDIAN INSTITUTE OF SCIENCE

# Welcome to the Department of Mechanical Engineering at IISc Bangalore!

The origins of Mechanical Engineering at IISc, or ME as it is popularly known, can be traced back to the establishment of Internal Combustion Engineering in 1945 and Power Engineering in 1951. Born in an institution that was primarily focused on fundamental sciences, ME has played a pivotal role in creating technologies at the heart of engineering innovation in and beyond the walls of IISc.



Research in ME has evolved over the decades, and now spans a broad range of areas including Biomechanics & Biomedical Devices, Fluid Mechanics & Flow Physics, Heat Transfer & Energy Systems, Manufacturing & Materials, Mechanics of Solids & Structures, Mechanisms, Design & Optimization, Micro- and Nanoscale processes & Devices, Robotics & Autonomous Systems, Vibration, Acoustics & Control. These fields encompass traditional aspects of engineering that represent current technological needs, as well as emerging fields that will shape the future.

As one of the best of its kind in the country, ME attracts the best students to campus. Our post graduate program strives to create the next generation of engineers, researchers and technology entrepreneurs. Our students go on to become scientists at R&D labs, leaders in industry, faculty at premier institutions and founders of start-ups.

## Graduate level Academic programs

ME offers three graduate level programs: Doctor of Philosophy (PhD), Masters by research (M TechRes) and Masters by coursework (M Tech).

Masters by Coursework: The 2-year M.Tech program is intended for students with undergraduate degrees in mechanical engineering. The program is based on rigorous and well-rounded training in mechanical engineering subjects through a set of core courses and electives, along with a year-long project to give the students experience of research and in-depth study on a specialized topic.

Masters by Research: The 2-year M.Tech (Research) program is designed for students seeking advanced training in areas of mechanical engineering through a balanced curriculum, along with research experience through a thesis.

**Doctor of Philosophy**: The PhD program is primarily intended for students who desire a career in research, advanced development or teaching. The program is designed to give students sound fundamentals in mechanical engineering sciences, along with intensive study and research experience in a specialized area over a 4-5 year period.



# **Research Areas**

## **Biomechanics and Biomedical devices**

Recognizing the critical role of mechanics in biology, research in biomechanics and biomedical devices addresses fundamental questions at cellular scales as well as develops new devices and point-of-care diagnostic tools. (Details)

## **Fluid Mechanics and Flow Physics**

A range of fluid mechanics phenomena spanning a multitude of length and time scales are being studied using novel experimental and computational techniques. (Details)

## **Heat Transfer and Energy Systems**

By exploiting principles of thermodynamics, heat & mass transfer, and detailed understanding of chemistry, research in heat transfer and energy systems seeks to improve efficiencies of conventional systems and devise new ones. (Details)

#### **Manufacturing and Materials**

Research activities in the areas manufacturing and materials at ME broadly focuses on understanding processspecific mechanics and material-specific mechanisms that underlie various manufacturing and finishing processes, with the goal of improving existing techniques and to guide the development of new technologies for novel materials. (Details)

## **Mechanics of Solids and Structures**

A combination of experimental methods, computational tools, numerical algorithms and expertise on material models forms the basis of research on mechanics of solids and structures. (Details)

## Mechanisms, Design and Optimization

Research activities in these areas broadly focus on Geometric modeling and Computer-Aided Design (CAD), kinematics from the viewpoint of geometry, compliant mechanisms, and topology optimization. (Details)

#### **Micro- and Nanoscale Processes and Devices**

Research spans varied areas from mechanics of solids and fluids at small length scales, micro-scale transport phenomena, as well as design and fabrication of miniature sensors and actuators. (Details)

## **Robotics and Autonomous Systems**

Research focuses on both foundational and applied aspects of kinematics, dynamics, control and motion planning by development, implementation and validation of associated theories and algorithms. (Details)

## Vibration, Acoustics and Control

With applications ranging from noise control and passenger comfort in automotives to covert operation of submarines, research in Vibration, Acoustics and Control addresses fundamental questions having immediate practical applications. (Details)





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