Engineering Mechanics is a broad area of Applied Mechanics, which focuses on research, analysis and development of computational and experimental tools for solving problems in areas of solid mechanics and fluid mechanics. The major areas of expertise involve Linear and Nonlinear elasticity, Composite materials, Impact mechanics, Computational mechanics, Turbulence modelling, to name a few. Students of the department are equipped to deal with a wide range of technical and on-field challenges through the experience that they gain from the research as well as our industrially-oriented projects. The research and project works are intended at giving thrust to the development in the areas of:

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<td>Dynamics and Vibration</td>
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<td>Nonlinear Finite Element Analysis</td>
<td>Computational Fluid Dynamics</td>
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<td>Light Weight Structural Materials</td>
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<td>Failure Analysis</td>
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**IMPORTANT COURSES**

- Finite Element Analysis
- Theory of Plates and Shells
- Advanced Dynamics
- Advanced Solid Mechanics
- Computational Fluid Dynamics
- Advanced Fluid Dynamics
- Turbulence & its Modelling
- Turbulent Shear Flows
- Fracture Mechanics
- Mechanics of Composites
- Physics of Turbulence
- Continuum Mechanics

**SOME OF THE ON-GOING PROJECTS BY M. TECH. STUDENTS**

**A. Computational Modelling and Analysis using in-house code**

Involves numerical and analytical modelling and analysis of structural solid and fluid problems. These projects include coding using languages such as MATLAB, FORTRAN and MATHEMATICA.

Some of the ongoing projects are:
- Thermal shock response of Functionally Graded Material plates using XFEM
- Elasto-dynamics of finitely deforming shells under aerodynamic load.
- Constitutive modelling of Nano rods and energy harvesting materials.
- Linear Stability of liquid flow based on energy budget method.

**B. Simulation using commercial FEA and CFD packages**

Computational packages such as ABAQUS, ANSYS, COMSOL, GAMBIT, OpenFOAM, Fluent, CFX etc. are used for simulation of specialized problems. Major ongoing works include:
- Study of ballistic impact on steel (Johnson cook’s model)
- Heat transfer enhancement in Microchannels.
- Turbulence Modelling of flow over an airship using CFD.
- Fatigue creep interaction analysis through continuum damage mechanics

**C. Experimental Analysis**

Involves design of experimental set up and investigation of different problems related to solids and fluids.

The ongoing projects involving experimental analysis are:
- Investigation of dynamic material response using SHPB.
- Development of fluid dynamics model for flow analysis of cardiovascular defect.
- FE modelling and experiments on impact of 3D composites.