Short Term Course on

Compliant Mechanisms

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Course Schedule

June 9 – 14, 2025

Course Mode: Offline

Course fee per participant: Rs. 20000+18%GST

Registration Deadline: April 30, 2025.

Registration link:

https://iisc.online/shortterm/home.html

Who is eligible?

- Anyone from academic institutions, R&D institutions, and industry with a bachelor's or higher degree in mechanical engineering or any other allied engineering disciplines. Freelancers, inventors, and designers from startups are also welcome.
- Undergraduate students who have completed two years or four semesters of bachelor's programme in mechanical engineering.

Participants: Only 30 will be taken.

Minimum qualification:

BTech degree in Mechanical, Aerospace, or allied Engineering; Current BTech students who have completed third year are also welcome.

Course structure

Lectures and hands-on sessions will be in 3:1 ratio for a total of 36 hours plus 4 hours for discussions. Exercises, working with the state-of-the-art softwares, creative design, prototyping, a written examination and a project presentation at the end are part of the course. For interested participants who complete the course, a personalized follow-up course for exploring own designs is also possible at a mutually convenient time.

https://cce.iisc.ac.in/self-support-courses-2/compliant-mechanisms/

https://cce.iisc.ac.in/

Course content

Compliant Mechanisms rely on elastic deformation to transmit, transform, and transduce motion, force, and energy. Although they may sometimes consist of rigid segments and kinematic pairs (i.e., joints), they are mostly understood as deformable elastic continua that can be made as single-piece entities that do not need assembly. Hence, they are suitable for almost any size (macro to nano), material, and manufacturing process. Their advantages include reduced manufacturing cost, improved precision due to the absence of backlash, no need for lubrication or maintenance, compact size, etc. The challenges include reduced mechanical advantage and efficiency, special attention to be paid for dynamic response and fatigue design, and the right choice of materials for a practical application.

This course provides a comprehensive view of research and development in compliant mechanisms spanning over the past four decades and covering the following:

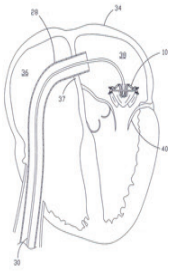
Systematics: From kinematic pairs to elastic pairs, extended Grübler's formula, Maxwell-Calladine rule for mobility analysis

Energetics: Mechanical advantage and efficiency; static balancing; bistability; multi-stability; zero- and negative-stiffness mechanical elements

Analysis: Geometrically nonlinear finite element analysis; pseudo-rigid-body model; spring-mass-lever model; stiffness ellipsoids; beam constraint models; and non-dimensional kinetoelastic models

Synthesis: Extended Burmester method; topology optimization; instant centre graphical method; selection using feasibility maps; building-block method; hands-on compliant mechanism kit

Applications: Hand-held tools; precision instruments; MEMS; biomedical devices including surgical tools; automotive components; aerospace mechanisms including deployable structures; human-assistive devices; continuum and soft robotics; and more.

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Contact Us

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