



ME 204 (AUG) 3:0

Mechanics of the Elastica

Instructor: Ramsharan Rangarajan

Course Description:

The course is a graduate-level elective emphasizing the interplay between geometry and elasticity. It adopts the one-dimensional Elastica model as a prototype to reveal the intricacies of geometric nonlinearity. The course will expose students to modern and exciting new structural mechanics applications without compromising on a hands-on problem-solving experience.

The subject and applications covered in the elective complement existing courses on solid, continuum, and structural mechanics in the Mechanical Sciences division. The material covered and assessment procedure will benefit students engaged in research and projects related to elastic buckling, shape optimization, structural design, etc.

Prerequisites:

Undergraduate-level strength of materials, preferably a course on Solid Mechanics such as ME 242 or CE 204.

Resources:

1. Shames and Dym, Energy and finite element methods in structural mechanics.
2. do Carmo, Differential geometry of curves and surfaces.
3. Frisch-Fay, Flexible bars.
4. Keith Hjelmstadt, Fundamentals of structural mechanics.

Outcomes:

- Formulate equilibrium equations for beams undergoing large deflections
- Evaluate the influence of geometric nonlinearity in applications
- Envision applications on nonlinear structures

Course website: TBD