

**Course Name:**  
Structural Analysis 1

**Course Number:**  
20121

**Credit:**  
3

**Prerequisite:**  
Solid Mechanics 1

**Corequisite:**  
Dynamics

**Course Description (Objectives):**

The main objective of this course is to provide the knowledge to calculate distribution of forces in members of determinate structures and to calculate the resultant deformations. The Force Method is also discussed as an introduction to analysis of indeterminate structures.

**Course Content (outline):**

- Introduction:
  - Aspects of structural analysis
  - Classification of structures
  - Their components, and supports
- Determinacy and stability of structures
- Analysis of statically determinate structures: Beams, frames, and trusses
- Shear and moment diagrams in determinate beams and frames
- Elastic deformation of beams
  - Double integration method
  - Moment-area theorems
  - Conjugate-beam method
- Energy methods
  - Internal work and external work
  - Unit-load method
  - Castigliano's Theorem
- Maxwell's Theorem and Betti's Law
- Influence lines for determinate structures: Beams, frames, and trusses

- Analysis of indeterminate structures by Force Method: Method of consistent deformations

**References:**

- Structural analysis, R. C. Hibbeler, Pearson Prentice Hall, 2014.
- Elementary theory of structures, Y.-Y. Hsieh, Pearson Prentice Hall, 1995.
- Elementary Structural Analysis, C. H. Norris, J. B. Wilbur, and S. Utku, McGraw Hill, 1976.
- Intermediate structural analysis, C.-K. Wang, McGraw Hill, 1982.
- Fundamentals of structural analysis, K. Leet., C.-M. Uang, and A. M. Gilbert, McGraw Hill, 2010.