

ARC 361: STRUCTURES I: STATICS AND STEEL

3 Credits

Course Description: Elementary study of forces and force systems using graphic and analytic methods. Basic structural concepts: reactions, shear and moment diagrams, axial, eccentric and combined loading on beams and columns. Design of floor and roof structural systems: load analysis, acting and resisting stresses. Truss stress analysis. Introduction to steel design. Prerequisites: PHYS 203A, PHYS 253A. Restricted to major.

Course Goals and Objectives:

Upon completion of this course, the student will:

1. Provide a basic understanding of force systems, the graphical, analytic, and arithmetic resolution of unknowns, and application in the design of structural frames.
2. Provide a basic understanding of the principles of statics, elasticity, and strength of materials for application in the design and investigation of structural components.
3. Apply elementary mathematical skills that will enable continued study in the usage of structural materials.
4. Develop an understanding of the principles of structural behavior in withstanding gravity and lateral forces and the evolution, range, and appropriate application of contemporary structural systems.
5. Develop basic skills in the Load & Resistance Factor Design (LRFD) method of steel design.
6. Understand codes, regulations, and standards issues related to building structural design using steel.
7. Develop an appreciation for the aesthetic, economic, and functional characteristics of steel structural framework and its influences upon architectural design.
8. Introduce the topic of sustainable design in architectural structures, focusing on embodied energy, permanence, reusable materials, resources, and integration.

NAAB Student Performance Criteria:

A.4: Technical Documentation **B.9:** Structural Systems

B.12: Building Materials and Assemblies

Topical Outline	Percentages of Time
I. System of Forces	10%
II. External Forces and Stresses	10%
III. Properties of Cross Sections	10%
IV. Internal Stresses and Strain	10%
V. Basic Design of Structural Members	10%
VI. Design of Roof Trusses	5%
VII. Steel Structural Design	45%

Textbooks:

American Institute of Steel Construction. *Load and Resistance Factor Design – Manual of Steel Construction*. 13th ed. Chicago, February 2006.

Onouye, B. & K. Kane. *Statics and Strength of Materials for Architecture and Building Construction*. 3rd ed. Upper Saddle River, NJ: Prentice Hall, 2006.

Offered: Fall semester

Faculty: Dobbins