Course Description

• synthesis in structural design
  – form and function
  – safety
  – serviceability
  – feasibility
• context of
  – design codes (loads, method, limits)
  – material properties and behavior

Architectural Space and Form

• structure is a device for channeling loads that result from the use and/or presence of the building to the ground
  – span a roof
  – hold up a floor
  – cross a river
  – suspend a canopy

Syllabus & Student Understandings
Structure Definition

- alternatively:
  - “a physical entity having a unitary character that can be conceived of as an organization of positioned constituent elements in space in which the character of the whole dominates the interrelationship of the parts”

Structural Organization

- classifications
  - geometry
    - line-forming
    - surface-forming
  - stiffness
    - rigid
    - flexible
  - one-way or two-way
    - spatial organization and load transfer
  - materials

Structural Components

- bearing walls
- columns
- beams
- flat plates
- trusses
- arches
- shells
- cables

Bearing Walls
Beams & Plates

Stone + Masonry
- columns
- walls
- lintels
- arches

Wood
- columns
- beams
- trusses
Steel

- cast iron – wrought iron - steel
- cables
- columns
- beams
- trusses
- frames

Concrete

- columns
- beams
- slabs
- domes

Building Framing

- Components or Assemblages

Load-bearing walls

(a) Common types of horizontal spanning systems (one, two, and three level systems) used in relation to different types of load-bearing wall and columnar vertical support systems.
System Selection
• evaluation of alternatives

Structural Design Criteria
• components stay together
• structure acts as whole to be stable
  – resist sliding
  – resist overturning
  – resist twisting and distortion
• internal stability
  – interconnectedness
• strength & stiffness