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

www.pbs.org/wgbh/buildingbig/
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

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Stone + Masonry

- columns
- walls
- lintels
- arches

http://www.berkeley.edu/godden

Wood

- columns
- beams
- trusses

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

Concrete
• columns
• beams
• slabs
• domes

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Building Framing
• Components or Assemblages
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