

**UNIFIED ENGINEERING I, II, III, IV**  
**16.001 / 16.002 / 16.003 / 16.004**  
**2008-2009**

**MATERIALS & STRUCTURES**  
*Learning Objectives and Outcomes*

(Note that these are for the entire academic year -- both terms of Unified)

**The overall LEARNING OBJECTIVES are that students graduating from Unified will be able to.....**

.....**use** the one-dimensional structural idealizations/models of slender members (i.e. rods, simple beams, simple columns, and circular cross-section shafts) to **determine** stress and deformation states in structures, including trusses, beams, and shafts.

.....**apply** the basic concepts of material properties and the underlying deformation and failure mechanisms in order to **perform** materials selection and preliminary sizing of the classes of structure previously noted.

.....**assess** the applicability of such idealizations/models of materials and structures and the errors introduced in their use.

**.....with the MEASURABLE OUTCOMES that they are able to.....**

.....**explain** the basic considerations of structural design.

.....**explain** the basic assumptions underlying the idealizations/models of simple beams, columns, trusses, circular cross-section shafts, and material properties.

.....**apply** a basic physical intuition for the function and sizing of structural elements and the selection of materials for use in them.

.....**calculate** the two-dimensional stress and strain state at a point given three components of stress or strain.

.....**calculate** the stress and strain distributions and deformation of simple structural idealizations/models (as previously mentioned).

.....**design/specify** an internal structural configuration for simple trusses, beams, columns, and shafts in order to meet specified loading and deformation criteria.

.....**assess** the conditions under which the structural idealizations/models previously mentioned cease to be applicable.