UNIFIED – MATERIALS AND STRUCTURES

Learning Objectives:

Students graduating from Unified will be able to:

use the one-dimensional idealizations of slender members (i.e. rods, simple beams, simple columns and circular cross-section shafts) **to calculate** 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 discussed above.

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

Measurable Outcomes:

Students graduating from Unified will be able to:

a) Explain the basic considerations of structural design (concept quizzes/quizzes)

b) Explain the basic assumptions underlying the idealizations of simple beams, columns, trusses, circular cross-section shafts and material properties. (concept quizzes/quizzes)

c) Apply a basic physical intuition for the function and sizing of structural elements and the selection of materials for use in them. (demonstrations, laboratory work, concept quizzes)

d) Calculate the two dimensional stress and strain state at a point given three components of stress or strain (problem sets, quizzes, design problems)

e) Calculate the stress and strain distributions and deformation of simple structural idealizations, such as those listed in part b) (problem sets, quizzes, laboratory work, design problems)

f) Design/specify an internal structural configuration for simple trusses, beams, columns and shafts in order to meet specifed loading and deformation criteria (design problems)

g) Assess the conditions under which the idealizations listed in (b) cease to be applicable (design problems, concept quizzes)