Department:          CEMS/MECH (Ceramics or Mechanical Engineering)
Course Number:      417/517
Title:              Introduction to Finite Element Analysis
Designation:        required course
Course Description: Use of the finite element method to solve problems in the areas of stress analysis, heat conduction, and fluid flow. [For graduate level study: weighted residual and variational approaches, shape functions, numerical integration, and the patch test.] 3 Credit Hours
Prerequisites:      CEMS 251 or MECH 241 plus MATH 271
Credit Hours:        3 credits, lecture type
Semester/Year:      Fall / 2016
Course days, time, duration: MECH 417: M 7-8 pm, TW, 10:20 am -11:10 am, full semester
Class location:      358 McMahon
Instructor name/title: William Carlson, Professor
Office location:     338A McMahon
Office hours:        11:20 am -12:10 pm MTW
E-mail address:      carlson@alfred.edu
Website URL:         http://mechanics.alfred.edu/   note: class is the official source of information
                     Fusion 360 software, Autodesk, Inc.  - Required
Course Learning Outcomes: see ABET documentation : a, e, g, k
Homework:           Problems or projects will be assigned by the instructor.
Grading:            Exams (50%) , Homework & Project (50%)
Topics:

1) Fundamental Concepts
2) Matrix solution method
3) Axial finite element techniques
4) Trusses
5) Planar finite elements
6) Solid finite elements
7) Element types
8) Differential equation types and physics
9) Multiphysics
10) Boundary conditions

Class/Laboratory Schedule: 1 lectures + 2 studio periods per week (each 50 minutes)

Contribution of course to meeting curriculum requirements:
- contributes to numerical techniques for mechanics problems
- advances the students capability for formulation and design

Relationship of course to program outcomes:
  a - advances the knowledge of mathematics (calculus, linear algebra), science (physical PDEs), and engineering (mechanics) concepts
  e - develops the design process (numerical experiment) to meet mechanics of the design within given constraints (boundary conditions) via problems or projects
  g - advances formulation (physical equations), reporting, and solution via linear algebra and finite element techniques of steady state problems
  k - finite element software is used for solutions of problems

Prepared by: W. B. Carlson Date: August 2016