1. EM371 Introduction to Design

2. Credit Hours (3) / Contact Hours (4)

3. Course Director: Professor Peter Joyce

4. Text book: *Shigley's Mechanical Engineering Design* (11th Ed) by Budynas & Nisbett

   Other supplemental materials: McGraw-Hill Connect

5. Specific course information
   a. course catalog description
   b. Prerequisites: EM217 (Strength of Materials) and EM232 (Dynamics)
      Co-requisites: none
   c. This course is required for the Mechanical Program.

6. Specific goals for the course (course outcomes)
   a. Apply static failure theories to calculate factor of safety against brittle failure, yielding, or buckling.
   b. Apply fatigue failure theories to calculate the factor of safety against fatigue failure or the finite fatigue life for (1) zero mean and non-zero mean cyclic loads (2) combined axial, bending and shear loading (3) structures with a stress concentration (4) variable cyclic loading.
   c. Design shafts based on static loading, fatigue and deflection considerations.
   d. Design and analyze bolted joints for both static and fatigue loading conditions.
   e. Select bearings to obtain a particular lifetime considering pertinent design attributes.
   f. Analyze simple and planetary spur gear trains to determine reduction ratios and fatigue life for gear tooth bending and contact.
   g. Conduct a finite element stress analysis using SolidWorks.

7. Specific program outcomes address by this course

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Introduced							
Reinforced		x	x			x	x
Mastered	x						

8. Brief list of topics to be covered
   a. Static failure theories
   b. Fatigue failure

c. Shaft Design
d. Bolted Joints
e. Bearings
f. Gear Trains
g. Finite element modelling