Course Outline: Engineering Structures 101

CIVIL ENGINEERING DESIGN (70% of Course Assessment)

1: Concept of Design
   a: Identifying Alternative Solutions
   b: Weighing Advantages and Disadvantages
   c: Making Choices
   d: Determining Costs, Manpower and Materials

2: Statics
   a: Counting Equations of Equilibrium
   b: Creating Independent Equations
   c: Defining Both Indeterminate and Unstable Structures
   d: Using Hinges to Create Statically Determinate Structures

3: Solid Mechanics
   a: Internal Member Forces Defined by Cutting Structures
   b: Definition of Stress and Strain
   c: Equilibrium of Stress and Internal Forces
      i: $\sigma = \frac{P}{A}$
      ii: $\sigma = \frac{My}{I}$
      iii: $\tau = \frac{Tr}{J}$
   d: Section Properties (I and J)
      i: Parallel Axis Theorem
   e: Deflections of Beams and Bars
      i: Axial Load
      ii: Torsion
      iii: Bending Via Differential Equations
   f: Trusses vs Beams
      i: Method of Joints
      ii: Method of Sections
      iii: Estimating Truss Forces From Bending and Shear in Beams
   g: Buckling
      i: Spring Systems
      ii: Euler Column Buckling
      iii: Effective Lengths of Columns
      iv: Braced and Unbraced Systems

4: Design of Structural Members
   a: Design Loads
      i: Vertical: Dead and Live Loads
      ii: Horizontal: Wind and Earthquake Loads
   b: Design in Steel
AUTOCAD (30% of Course Assessment)

1. Introduction to engineering drawing, AutoCAD interface, (mouse skills, function keys, AutoCAD commands, practice examples,
2. AutoCAD commands, line, offset, circle, fillet, chamfer, zoom, trim, extend, break, practice exercises,
3. Modal object snap, selection sets, AutoCAD commands (move, rotate, mirror, array, practice examples,
4. Grips, text, practice exercises,
5. Layers, list of considerations in a new drawing, practice exercises,
6. Setting up a new drawing, plotting, practice exercises,
7. Advanced methods for setting up a new drawing, practice exercises,
8. Isometric drawing, hatching, practice exercises,
9. Dimensioning, Australian standards,
10. Dimensioning 2, blocks, practice exercises,
11. Multiple viewports, practice exercises
12. Polylines, practice exercises,