Items that are developed to help you finish your S005317 course project

- For each of the following applications, outline:
  1) What would you calculate if you were asked to model the component for a design application?
  2) What level of detail is required in modeling the geometry of the solid?
  3) How would you model loading applied to the solid?
  4) Would you conduct a static or dynamic analysis? Is it necessary to account for thermal stresses? Is it necessary to account for temperature variation as a function of time?
  5) What constitutive law would you use to model the material behavior?
  - ✓ A load cell intended to model forces applied to a specimen in a tensile testing machine
  - ✓ The seat-belt assembly in a vehicle
  - ✓ The solar panels on a communications satellite.
  - ✓ A compressor blade in a gas turbine engine
  - ✓ A MEMS optical switch
  - ✓ An artificial knee joint
  - ✓ A solder joint on a printed circuit board
  - ✓ An entire printed circuit board assembly
  - ✓ The metal interconnects inside a microelectronic circuit

- What is the difference between a linear elastic stress-strain law and a hyperelastic stress-strain law? Think about examples of representative applications for both material models.

- What is the difference between a rate-dependent (viscoplastic) and rate independent plastic constitutive law? Think about examples of representative applications for both material models.

- Choose a recent publication describing an application of theoretical or computational solid mechanics from one of the following journals:
  - ✓ Journal of the Mechanics and Physics of Solids

- ✓ International Journal of Solids and Structures
- ✓ Mechanics of Materials
- ✓ Modeling and Simulation in Materials Science and Engineering
- ✓ Computer Methods in Applied Mechanics and Engineering
- ✓ European Journal of Mechanics A
- ✓ Acta Mechanica
- ✓ Mathematics and Mechanics of Solid
- ✓ Journal of Mechanics of Materials and Structures
- ✓ ...

Write a summary of the paper stating: (i) the goal of the paper; (ii) the problem that was solved, including idealizations and assumptions involved in the analysis; (iii) the method of analysis; and (iv) the main results; and (v) the conclusions of the study.

- Computing project
  1) Choose a problem to solve.
  2) Write a short proposal that defines the problem to be solved, describes what will be calculated, outlines briefly how the calculation will be done.
  3) Submit the proposal via email and obtain approval from the instructor.
  4) Set up a finite element model and perform the calculations.
  5) Write a formal report no more than 10 pages that summarizes the results.
  6) Give a short oral presentation to the rest of the class.