MECH 5312 - Technical Report

In lieu of a final exam, a portion of the final grade will be based on a technical report. The paper will serve to gauge overall mastery of the subject of solid mechanics, its sub-topics, and recent advances facilitating its evolution. This final project consists of two portions: a proposal and a final paper. Each is described below.

Proposal: Write a short introduction that proposes the topic of your final paper. This document should take the form of an abstract of a technical review paper. This prelude should at minimum answer several key questions (e.g., why is this topic important, has there been much attention addressed to this topic in the past or recently, how will the final paper address this topic). It should give a clear indication of the nature and range of the results that are expected in the final paper content. Other guidelines are as follows:

- Formatting – The document must be single-spaced, typed, and no longer than one page. The title and author should be listed first and up to five keywords can be included last. An outline of the structure of the document should be provided with the headers and subheaders listed.
- Due Date – On or before Thursday, March 8th, 2018 at 3:00 P.M.
- Submission – Hardcopy or e-mailed as an attachment to cmstewart@utep.edu (Note: Adobe PDF or MS Word DOC are preferred). Please include your name in the filename of the attachment (e.g., MinerP_proposal.pdf).

Final Paper: Content for the paper can be either derived from other sources and/or completely original. Sources should be cited. Listed in order of decreasing reliability, some are as follows: textbooks, books, edited books, reference texts, manufacturer's catalogs, journal articles, conference proceedings, magazines and newspapers, the internet, and personal communications. It is strongly suggested that the instructor comments based on the proposal should be implemented in the final paper. Other guidelines are as follows:

- Formatting – The document should be in the form of a manuscript to be submitted to a journal that frequently includes technical works on the mechanics of materials. The document must be typed and double-spaced. There is no page limit. The title, author, abstract, and keywords should be given first. The main body of the paper should consist of various sections (including but not limited to: Introduction, Methods, Results, Conclusions, and References). Relevant tables and figures should be included at the end and not within the main body.
- Due Date – Between Monday, May 7th, 2018 at 1:00 P.M. and Friday, May 11th, 2018 at 1:00 P.M.
- Submission – E-mailed as a single file to cmstewart@utep.edu (Note: Adobe PDF or MS Word DOC are preferred). Resubmissions of final papers are allowed and encouraged up to the final due date and time (above).

Topic Selection: The instructor is available to help with the selection of topics, but the final decision is the responsibility of the student. A general rule of thumb is that if a student selects a topic near to his/her own interest, then he/she will develop a better paper. Final projects can take either of the following forms:

- Review Paper – a critical review of papers related to one specific area. Identify what is well-known, somewhat known, and not known at all. Provide a detailed outline of avenues for future study.
- Numerical Paper – implementation of a model (or an array of models) in a solver package (Matlab, FEA, etc.). Thoroughly characterize trends in the results. Suggest avenues for future study.
- Experimental Paper – conduct experiments or use experimental results gathered elsewhere. Thoroughly characterize trends in the results. Suggest avenues for future study.
- Analytical Paper – extend an existing (or develop an) analytical model(s). Exercise your model(s) and thoroughly characterize trends in the results. Suggest avenues to prove or disprove your model(s).
- Failure Paper – focuses on a component that has failed. A variety of techniques are typically used to analyze the component.

Example Topics:

A Critical Review of the Fatigue Behavior of Materials subject to Cryogenic Temperatures
The Mechanics of Glacier Ice: Elasticity, Plasticity, and Creep Flow
Analysis of Regenerative Cooled Rocket Engines
A Critical Analysis of Gas Turbine Blades Failure Modes
Creep Behavior in Weldments
Notch Effects (Strengthening or Weakening) during Creep
Micromechanics of Composite Materials
Application of Digital Image Correlation for Fracture and Fatigue Mechanics
Applicability of Fatigue Life Approaches to Polymers
Accounting for Strain Rate Dependence in Fatigue Life Prediction
Contact Fatigue Behavior of Dental Materials
Designing Against Thermal Fatigue
Standard Practices for Determining Fatigue Behavior of Shape Memory Alloys (SMAs)