

Course Project Guidelines (4-Hour Section)

- Choose any analysis problem based on a real-world engineering application
- Examples include ...
 - Temperature distribution in an electronic circuit board
 - Stress distribution in a prosthetic biomedical implant



- Solve the problem using finite element analysis
 - All 4-hour groups must code their own FEM solver, however you may use commercial software for validation
 - Work in groups of 3 students (groups have been pre-selected)

Course Project Guidelines

- **Final report must contain...**
 - Potential function or ODE
 - FEM formulation: $[K]\{d\}=\{P\}$
 - Derive element stiffness matrix using variational or weighted residual approach
 - Geometry, boundary conditions, and loading conditions
 - FEM solution (temperature distribution, deformed structure, etc.)
 - Post-processing (stress field, max stress, max T, etc.)
 - Discussion and analysis of results (eg. implications for system failure, etc.)
 - Plot and discuss convergence of FEM model
 - Analyze the structure using multiple (>3) loading conditions (simulate best- and worst-case scenarios)
 - Use FEM results to design an improved system
 - Analyze the improved design using FEM and compare with the original
- **Format**
 - 12 pages maximum
 - Journal paper format (**no code or models**)
- **Due Wednesday, December 8th, 2020**

Course Project Guidelines

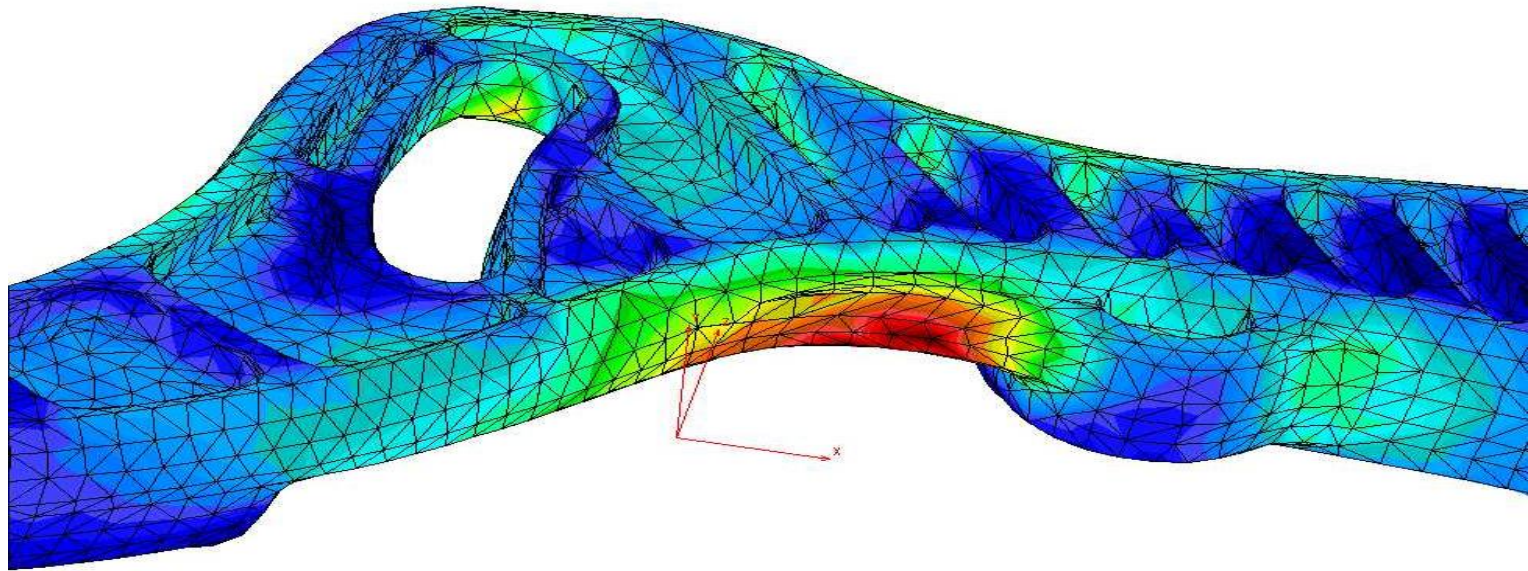
Grading Criteria

Technical Criteria (50%):

- Level of difficulty
- Problem formulation, FEM discretization, & results
- Analysis and discussion

Qualitative Criteria (50%):

- Originality
- Presentation:
 - Completeness
 - Organization
 - Readability/clarity



Course Project Guidelines (3-Hour Section)

- Choose a research article from the published literature that used FEA
- Write a review of the article that includes the following
 - Objective/purpose of the FEA analysis
 - Describe the methodology used (FEA formulation, computer hardware, etc.)
 - Provide the PDE or the potential function
 - Present the results (you may paste the actual figures into your report)
 - Discuss the significance of the research (potential societal implications)
 - Identify and discussion shortcomings and limitations of the study
- **Format:**
 - 5 pages maximum
 - Journal paper format
 - Pre-assigned groups of 3
- **Grading Criteria:**
 - Completeness
 - Readability/clarity
 - Analysis/insightfulness
- **Due Wednesday, December 8th, 2020**