**MEGN 424 – Computer Aided Engineering**

**Merging Fundamentals with Innovation in Engineering Analysis and Design through Partnership with Local Industry**

**BACKGROUND**

**Course Objectives**
The goal of this course is to help students acquire the necessary skills to make proficient use of commercial FEA software for effective engineering analysis and design. Students will learn to critically evaluate FEA results using best practices for verification and validation, and they will effectively communicate about the use of FEA in an industry-standard tech. reporting format. Students will recognize the limitations of FEA and develop the skills to identify mechanical engineering questions to which it can and cannot provide useful answers.

**Historically...**

Students spend several class days reviewing prerequisite material, learning ancillary math software, and solving low-level hand calcs. Them students was getting’ some proficiency, but they was not quite effective at using the software for practical engineering design and analysis... they need more time to learn skills for critical evaluation of results and clear COMMUNICATION of their findings.

**WHAT IS CHANGING**

Increased Emphasis on Proficiency with FEA Software and Effective Use for Practical Analysis/Design Problems

- Move prerequisite review material and ancillary software to pre-class activities
- Increase use of interactive instructional methods with group exercises
- Leverage local industry partners to bring practicing engineers & practical problems into the classroom...

**EXPECTED RESULTS**

Students Will...

1. Apply FEA theory...

2. Make proficient use of commercial FEA software SolidWorks Simulation and SolidWorks Simulation Engineer (Abaqus)...

3. Make effective use of FEA software...

4. Make a critical judgements about the credibility of an FE model and its results...

5. Make effective use of FEA in practical engineering design...

6. Clearly communicate findings...

**Local Industry Partners**

- Mighty Oak Medical
- syncroness
- Zimmer Biomet
- Proudfoot Cycles
- 3D Systems

**Teaching Innovation thru Teaching Innovation**

“Finite Element Analysis... is a computer simulation technique that allows any design... to be analyzed in great detail to carry out a stress, vibration or heat transfer analysis... The benefit of incorporating FEA into the design process is our designer engineers can verify that the product / equipment... will conform to a client’s performance criteria early in the design process. This can accelerate the product development process, [drive innovation], and... the design team can optimise the design at an early stage, saving time and money.” — PES-Performance.com

**Anthony Petrella**, Associate Professor, Mechanical Engineering

Director, Computational Biomechanics Group & Director, Biomechanics Research Division

**MEGN 424 – Computer Aided Eng**

- Industry-leading software
- Instructors with industry experience
- Student-driven content focus: med. devices, aerospace, sporting equip
- Design for additive manufacturing