AE/ME 5830

Applied Computational Methods

Tuesday/Thursday 11:00 AM – 12:15 PM
BCH 213

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Catalog Description

Detailed study of computational methods for efficient solution of selected fluids, structures, thermodynamics, and controls problems in aerospace and mechanical engineering. Besides basic numerical techniques, topics covered include gradient-based optimization and uncertainty quantification.
Course Pre-Requisites

• Comp Sci 1570 or 1970 or 1981; Math 3304
Or
• Consent of the instructor
Course Website

Missouri S&T Blackboard System
(http://blackboard.mst.edu/webapps/login/)

Announcements, course slides and documents, handouts, homework etc. will be all posted to the course website on Blackboard, so check the page regularly.
Office Hours

- TBD

- Open door policy: you are welcome to come to my office anytime, however an appointment will be useful to make sure that I am in my office and available
Textbook

**Title:** Numerical Methods for Engineers  
**Authors:** Steven C. Chapra and Raymond P. Canale  
**Publisher:** McGraw Hill  
**Edition year:** 2010 (7th or 6th Edition)

(In addition to the textbook, instructor will extensively use his own notes/slides coming from various references and his research on each topic)
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Objective of the course

• The main objective is to teach students the numerical methods that may be applied to various problems in mechanical and aerospace engineering in their career
Grading

Homework  40%

Project  20%

Tests (2)  20% each
Homework

• Will be assigned after each topic area
  – Typically on a 10 day or every two week basis
• No late homework will be accepted
  – Topics build on the previous material
  – It is essential that you keep up with the work
• If you do your own work, you will learn a lot more!
• Assignments will require programming
• You are free to use the software of your choice
  – Matlab, Mathematica, C, Fortran, …
Links to Matlab and Mathematica Tutorials

- Matlab:
- Mathematica:
  http://www.wolfram.com/broadcast/#Tutorials
  http://www.wolfram.com/broadcast/
Academic Dishonesty

• Feel free to discuss the course material, homework, and projects with others. You may give advice and guidance to a colleague but stop there.
• Submitted work must be yours
• Do not allow others to copy your work
1st Assignment

• TBD

• Return the answers for following:
  1. Level (Graduate or undergraduate)
  2. Major (AE, ME, or other)
  3. Research area (for graduate students)
     • Numerical or experimental (or both?)
  4. Computer literacy (software and program languages that you know)
  5. Why have you selected this course?
  6. Are you interested in a certain computational method/area?
  7. Expectations from the course
Reading Assignment

• Chapter 1
  – Mathematical Modeling and Engineering Solving
• Chapter 2
  – Programming and Software
• Chapters 3 & 4
  – Error Definitions
  – Taylor Series and Truncation Errors