MEEG 5733 – Advanced Numerical Methods
Fall 2013 Syllabus

Douglas Spearot, Ph.D.
NANO 213, 575-3040, dspearot@uark.edu

Lecture:
Monday / Wednesday / Friday, 9:40 – 10:30 am, MEEG 228

Office Hours:
Monday / Wednesday / Friday, 10:30 – 11:30 am, NANO 213 (or by appointment)

Text
Numerical Methods for Engineering Application, Second Edition, Joel Ferziger, 1998.

Course Objectives
Numerical methods and computer application for the solution of linear and non-linear ordinary and partial differential equations, initial and boundary value problems, one-step and multi-step methods, predominantly finite difference but also finite element and control volume techniques.

Homework
Homework will be assigned at least one week prior to its due date. Assignments will be collected at the beginning of class on the due date. **No late homework assignments will be accepted without prior approval.** To receive full credit on each homework problem, solution must include all pertinent sketches or diagrams, code, equations, solutions and final answers with correct units. Homework must be legible and professional (neat, orderly, final solutions circled or boxed). Illegible homework solutions will be marked as incorrect. Homework solutions will be posted on Blackboard.

Exams
Three exams will be given during the semester. Exams will be "take home" exams assigned during the weeks identified on the course calendar. Exams will consist primarily of numerical problems but may also include short answer problems as appropriate for the course material.

Grading
Homework (about 8 assignments): 20%
Exams (3 equally weighted): 80%
Course grades will be "curved" if necessary – this decision will not be made until the end of the semester once all exams and homework assignments are graded.

Academic Integrity
All students are expected to be familiar with the University of Arkansas policy on academic integrity. Details can be found at: http://provost.uark.edu/academicintegrity/index.php.

MEEG 5733 – Advanced Mechanics of Materials
Fall 2013 Course Schedule*

Week	Dates (M,W,F)	Chapter	Topic(s)
Week #1	8/26, 8/28, 8/30	1	Introduction
			Linear algebra review
Week #2	~~9/2~~, 9/4, 9/6	2	Lagrange interpolation
			Labor Day holiday
Week #3	~~9/9~~, 9/11, 9/13	2	Cubic splines
			Tension splines
Week #4	9/16, 9/18, 9/20	3	Numerical integration
			Quadrature methods
Week #5	9/23, 9/25, 9/27	4	Differentiation: Initial value problems
			Euler explicit methods
Week #6	9/30, 10/2, 10/4	4	Stability and error
			EXAM 1 (Chapters 1, 2, 3)
Week #7	10/7, 10/9, 10/11	4	Predictor-corrector methods
			Systems of equations
Week #8	10/14, 10/16, 10/18	5	Differentiation: Boundary value problems
			Shooting and direct methods
Week #9	~~10/21~~, 10/23, 10/25	5	Fall break
			Partial differential equations: parabolic
Week #10	~~10/28, 10/30~~, 11/1	6	Explicit methods
			Crank-Nicolson methods
Week #11	11/4, 11/6, 11/8	7	**EXAM 2 (Chapters 4 and 5)**
			Partial differential equations: elliptic
Week #12	11/11, 11/13, 11/15	7	Finite different methods
			ADI methods
Week #13	11/18, 11/20, 11/22	8	Conjugate gradient methods
			Partial differential equations: hyperbolic
Week #14	11/25, ~~11/27, 11/29~~	8	Explicit methods
			Thanksgiving holiday
Week #15	12/2, 12/4, 12/6	8	Implicit methods
			Finite element methods
Week #16	~~12/9~~, 12/11	Topics	Finite element methods
			Finite element methods
Finals Week	12/18		**EXAM 3 (Chapters 6,7 and 8)**

* Course schedule may change over the course of the semester; changes will be communicated in class and/or electronically