

**Syllabus**  
**MAE384 Numerical Methods for Engineers - Fall 2009**  
**Tu/Thu 12:00-1:15 PM SCOB 252**

Instructor: Huei-Ping Huang, ISTB2 Room 219A, Email: hp.huang@asu.edu  
Office Hours: Tuesday 2:30-4:00 PM, Wednesday 2:30-4:00 PM, or by appointment

Textbook: *Numerical Methods for Engineers and Scientists: An Introduction with Applications Using Matlab*, Gilat & Subramaniam, Wiley 2007, **Required**

Course website: <http://www.public.asu.edu/~hhuang38/MAE384.html>

Please review (1) Calculus and ordinary differential equation, (2) Linear algebra, (3) Matlab  
Self study: Ch.2, Ch.4 (Sec 4.1-4.6), and Appendix A of textbook

### Course Outline

#### Part I Basic Numerical Methods (Gilat & Subramaniam)

- Overview (Lecture note and Ch. 1 of G&S)
- Nonlinear equations (Ch. 3)
- System of linear equations (Ch. 4)
- Curve fitting and interpolation (Ch. 5)
- Numerical differentiation (Ch. 6)
- Numerical integration (Ch. 7)
- Ordinary differential equation - Initial value problem (Ch. 8)  
- Boundary value problem (Ch. 9)

#### Part II Introduction to Partial Differential Equation (PDE) (Lecture note)

- Overview and analytic solution
- Numerical solution

**Grade: 50% Homework (5-6 assignments expected)**  
**20% Midterm (One exam) 30% Final**

### Matters related to Matlab

Some homework will require computer programming using Matlab. Tutorial will be given at the beginning of the course and on a learn-while-needed basis through the semester. Because free online resources abound, no additional textbook is required for Matlab. For example, the most accurate descriptions of Matlab commands and functions can be found at mathworks.com (the maker of Matlab). More detail will follow as the course progresses. While computer programming is needed to perform lengthy calculations for homework, the use of Matlab is strongly recommended. Two alternatives will be accepted: (1) Programs written in C/C++ or Fortran will be accepted, but note that barebone C and Fortran compilers normally do not support graphic applications/interface as Matlab does. Instructor will not provide help on C or Fortran. (2) Solutions done by hand will always be accepted. Beware that some of the homework problems may take exceedingly long time to complete if the calculation is done by hand. Matlab will not be needed for exams.