

ME 581
Numerical Methods in Mechanical Engineering
Tuesday and Thursday 1:30-2:45pm
Room ME 156

Instructor: Pablo Zavattieri
Email: zavattie@purdue.edu
Office hours: Tuesday and Thursday 3-4 pm
Office number: ME 371
E-mail: zavattie@purdue.edu

Topics to be covered

- Tutorial on **C** and **Fortran**
- Introduction to scientific computing
- Systems of linear equations
- Solution to non-linear equations
- Interpolation and polynomial approximation
- Optimization
- Numerical differentiation
- Numerical integration
- Partial differential equations
- Ordinary differential equations
- Other topics

Course Objectives:

- Introduce the student to the classical numerical methods available for engineering problem-solving
- Familiarize the student with the computer as an engineering tool and to improve programming skills
- Emphasize fundamental understanding of the methods
- Importance of errors associated with scientific computing

Textbook: Scientific Computing. An Introductory Survey
Michael T. Heath
McGraw Hill, 2nd edition
<http://www.cse.uiuc.edu/heath/scicomp/>

Homework: every other week

Computer Projects: 2

Final Exam: Take Home

Schedule:

Session #	Date	Tentative topic	Reading	HW assigned	Projects
1	T 08/26/08	Introduction			
2	Th 08/28/08	Basics of C			
3	T 09/02/08	Basics of Fortran			
4	Th 09/04/08	Introduction to Scientific Computing	Chapter 1	HW#1	
5	T 09/09/08	Systems of linear equations	Chapter 2		
6	Th 09/11/08	Systems of linear equations	Chapter 2		
7	T 09/16/08	Systems of linear equations	Chapter 2		
8	Th 09/18/08	Systems of linear equations	Chapter 5		
9	T 09/23/08	Solution to non-linear equations	Chapter 5		
10	Th 09/25/08	Solution to non-linear equations	Chapter 5		
11	T 09/30/08	Solution to non-linear equations	Chapter 7		
12	Th 10/02/08	Interpolation	Chapter 7		1 st Project
13	T 10/07/08	Interpolation	Chapter 6		
14	Th 10/09/08	Optimization	Chapter 6		
	T 10/14/08	October Break			
15	Th 10/16/08	Optimization	Chapter 6		
16	T 10/21/08	Numerical integration	Chapter 8		
17	Th 10/23/08	Numerical integration	Chapter 8		
18	T 10/28/08	Numerical integration	Chapter 8		
19	Th 10/30/08	Numerical differentiation	Chapter 8		
20	T 11/04/08	Numerical differentiation	Chapter 8		
21	Th 11/06/08	Ordinary differential equations	Chapter 9		
22	T 11/11/08	Ordinary differential equations	Chapter 9		
23	Th 11/13/08	Ordinary differential equations	Chapter 9		
24	T 11/18/08	Ordinary differential equations	Chapter 9		
25	Th 11/20/08	Ordinary differential equations	Chapter 10		
26	T 11/25/08	Partial differential equations	Chapter 11		2 nd Project
	Th 11/27/08	Thanksgivings			
27	T 12/02/08	Partial differential equations	Chapter 11		
28	Th 12/04/08	Partial differential equations	Chapter 11		
29	T 12/09/08	Partial differential equations	Chapter 11		
30	Th 12/11/08	Last class: Other topics/Review			
	12/15/08-12/20/08	Week of Exams		Final Exam	
	12/20/08	Semester ends			