

General Information

EGN-3420 - Engineering Analysis. Fall 2009: Tu, Th 12-1:15, HEC 104

Instructor: Dan C. Marinescu

Office Hours: Tu-Th 11-12. Office Location: HEC 439 B.

TA: Zhao Wang; Email: zhaowang@mail.ucf.edu

TA's office hours: M, W 1:00 - 2:30 PM. TA's office: HEC 308.

Final Exam: Thursday December 10, 2009, 10:00 AM -12:50 PM.

Course Objectives: Introduce numerical methods and numerical simulation for problem-solving in science and engineering. The course will emphasize three aspects, Figure 1:

1. The algorithmic approach of numerical methods such as: Polynomials, roots, and optimization; linear algebra; curve fitting; and integration and differentiation.
2. Applications of numerical methods in science and engineering.
3. Practical insights on how to use Matlab for problem-solving.

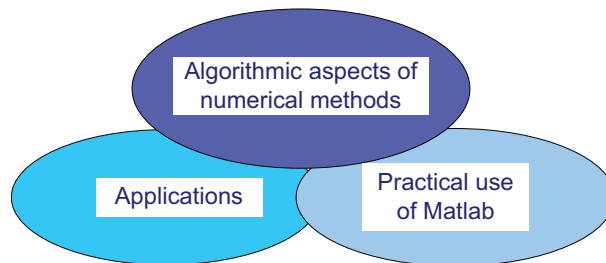


Figure 1: The three aspects of the course

Prerequisites: Programming language (C, C++, Java), an undergraduate calculus class, an undergraduate probability and statistics class, an undergraduate linear algebra class, or consent of the instructor.

Textbook: "Applied Numerical Methods with Matlab" (Second Edition) by S. C. Chapra. Publisher Mc. Graw Hill 2008. ISBN 978-0-07-313290-7

Additional references:

W. Rudin, *Principles of Numerical Analysis* (Third Edition). Mc-Graw Hill, 1964.

S. D. Conte and Carl de Boor, *Elementary Numerical Analysis; An Algorithmic Approach* (Third Edition). Mc-Graw Hill, 1980.

W. J. Palm III, *A Concise Introduction to Matlab*. Mc-Graw Hill, 2008.

D. M. Etter, *Introduction to Matlab for Engineers and Scientists*. Prentice Hall, 1996.

Matlab access: All Engineering students have accounts on the systems in the Harris Lab in Engineering 2 building and have Matlab access from these systems. To get your own copy of Matlab visit: <http://www.mathworks.com/products/matlab/pricing> .

Assignments: There are weekly assignments, 5 (five) homework assignments and 4 (four) projects posted and due according to the schedule in Table 1. The assignments should be

prepared using a text processing program such as Word or Latex. Drawing should be done using Visio or the graphing facilities of Matlab.

Each assignment will be posted on the Web site of the class on Tuesday and will be due at the beginning of the class on Thursday of the week specified on the assignment; a homework is typically due the week following the one when it was assigned, a project is due either 2 or three weeks after the one when it was assigned. Late assignments are *not accepted and there are no exceptions to this rule*. Do not expect the TA to debug your Matlab programs.

The assignments are extremely important for understanding the material; consequently, the homeworks and projects have a considerable weight in grading (50%). Moreover, to get an A or a B in the class a student should accumulate at least 85% and, respectively, 70% of the points given for the assignments. The students are expected to work on their assignments individually; software to detect cheating will be used. *Do not procrastinate, start working on an assignment as soon as it is posted*, it usually takes longer than you expect!! Plan to spend each week 3 hours (or more if you do not have the necessary background in calculus, linear algebra, probabilities) for the assignments.

Class attendance and grading: The students are strongly encouraged to attend every class and be active. Extra credit is given at the discretion of the instructor for active participation and is used when a student is at the border line between two grades. Once given the credit during the lectures, the student is expected to send an Email to the TA and cc the instructor, to claim the credit. Material not covered in the text will be discussed in class. The grading scheme is summarized in Figure 2. Acts of academic dishonesty will not be tolerated; when detected they lead to unconditional failure of the class.

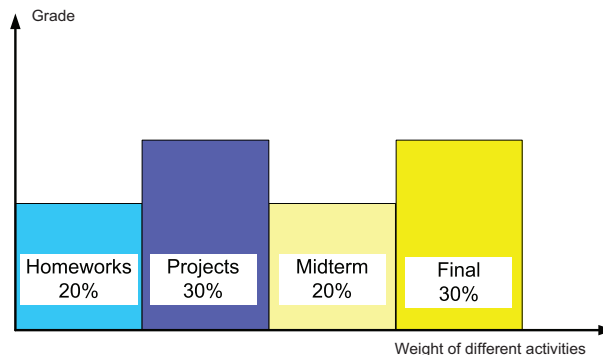


Figure 2: Grading

Communication with the students: The students are encouraged to come to the office hours of the instructor to discuss topics covered during the lectures and to the office hours of the TA to discuss the assignments. If a student has a question regarding grading of the assignment s(he) should first discuss it with the TA and only if the issue is not resolved bring it to the attention of the instructor. Information regarding the class, including the assignments will be posted on the class site: <http://www.cs.ucf.edu/dcm/Teaching/EngineeringAnalysisEGN3420/Fall09>.

Weekly schedule: The schedule in Table 1 is tentative and will be adjusted to the needs of the class. In other words, when a topic seems more difficult we shall spend more time on it.

Table 1: Weekly schedule. Topics and assignments (HW-homeork, P-project).

	Topics covered	Assignments posted (on Tu)	Assignments due (on Th)	Reading assignments
1	Class overview, organization Computer simulation Transform methods		-	Chapter 1 and the “Transform Methods” class notes.
2	Introduction to Matlab Problem solving with Matlab	HW1		Chapters 2 and 3 and “Matlab” class notes
3	Number representation Roundoff and truncation errors Taylor series expansion	P1 (optimization)		Chapter 4
4	One and Multi-dimensional Optimization Case Studies		HW1	Chapter 7
5	Roots Bracketing Method Open methods	HW2		Chapters 5 and 6
6	Linear Algebra Gauss Elimination Case Studies	HW3	P1	Chapters 8 and 9 “Linear Algebra” class notes.
7	LU Factorization Matrix Inversion System Conditions	P2 (linear algebra)	HW2	Chapters 10 and 11
8	Iterative Methods Gauss-Seidel.		midterm	Chapter 12
9	Linear Regression Least Squares and Non-linear Regression	P3 (linear regression)	P2	Chapters 13 and 14
10	Polynomial Interpolation	HW4	HW3	Chapter 15
11	Splines and Piecewise Interpolation	HW5	HW4	Chapter 16
12	Numerical Integration	P4 (numerical integration and differentiation)	P3	Chapters 17 and 18
13	Numerical Differentiation		HW5 + P4	Chapter 19
14	Ordinary Differential equations Initial-value Problems Adaptive methods			Chapters 20 and 21

Note: If the Thursday of the week when an assignment is due is free (e.g., during the Thanksgivings week) the assignment is due earlier, on Tuesday of that week.