

CE 201 Civil Engineering Computing, Spring 2007
Part 1 – Numerical Methods with Excel and Visual Basic

When & Where:

Lecture: MW 9:00 - 9:50, AEC 327;

Computer Lab Section: Th 8:00-9:50, Th 1:10-3:00, AEC 223B

Instructor:

Dr. David Brandes

Office: AEC 320

Phone Number: x5441

Office Hours: M&W 3-5, Th 10, 3

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Objectives:

This 7-week module provides students with an introduction to numerical methods in civil engineering, using Excel and Visual Basic as programming tools. Each student will:

- 1) develop an understanding of how Excel and Visual Basic can be used to do numerical methods;
- 2) apply Excel/VB programming skills to applications involving numerical solution methods from two areas within civil and environmental engineering (e.g., structures, geotech, water resources, environmental);
- 3) develop a final program and users' manual to solve an application in one of the two areas of civil engineering covered in class, or another application of your choosing

Course Webpage:

<http://www.lafayette.edu/~brandesd/class/ce201/index.html>

Text:

None required, however, you will find it useful to have introductory reference books like *Visual Basic 6 for Dummies* and *VBA for Dummies* (available at Amazon or a bookstore near you). There is also a lot of information (and free code) about Excel, VBA, and VB programming available on-line.

Grading:

Six programs: 75 pts

Final project: 25 pts

Attendance and effort will also play a role in your final grade. Attendance is mandatory at lab.

Programming Assignments

Programs will be assigned each week in Lab. Students are encouraged to discuss the assignments and help each other with Excel/VB syntax, but the work submitted for grading must be each individual student's work. Program grades will be based on:

1) whether they work correctly (instructor will use test cases) = 5 points; 2) clarity, user friendliness, and documentation (all Excel spreadsheets must be annotated and all code must be commented) = 3 points; 3) professionalism/aesthetics = 2 points. Grades will be marked down by 10% for each day late.

The work for this module will consist of programs in Excel or Visual Basic. Assignments will be submitted to P:\CEE Drive\CE201\NumMethodsAssignments

Final Project

The final project will be a more advanced version of a program developed previously in the semester, or a program that uses numerical methods to solve a problem of particular interest to you (e.g., in your area of research). The final project must also include a written user's guide. Additional details will be provided on a separate handout.

Course Schedule (subject to minor adjustment):

WEEK	TOPICS	PROGRAM ASSIGNMENT
1	Introduction, Excel and Visual Basic	Excel – Root-Finding
2	Programming – Variables, Loops, and Branches	Excel - Numerical integration
3	Input/output files, Graphics	Visual Basic - Mannings Equation
	<i>Structures Application – Beam Deflection</i>	
4	Matrices and systems of linear equations, Arrays	Gaussian elimination
5	Finite difference method (FDM)	FDM in Visual Basic
	<i>Water Resources Application – Detention Basin Routing</i>	
6	Nonlinear ODEs with Runge-Kutta	Routing in Excel
7	Detention basin routing	Routing in Visual Basic

A note on academic dishonesty:

You are encouraged to use a USB memory stick or your home directory to save your work, not a publicly accessible drive. If programs show evidence of direct copying between students, the assignments will be forwarded to the Dean of Studies for disciplinary action according to college policy (as faculty members, we are required to report any suspected cases of academic dishonesty).