

Catalog Description:

(1-1) 2 credits. An introduction to chemical engineering through the development of computational and laboratory skills. The extended use of spreadsheets, programming, and computational software packages will be covered. Elementary numerical methods will be utilized in process modeling and laboratory experiments.

Prerequisite Courses: Pre/co-requisite Math 123

Prerequisite Knowledge: Students entering this course are expected to know how to:

- login to the campus computer systems
- save and retrieve files from their files server space (on H: drive)
- use the GUI interface on typical Microsoft software applications
- use MS Excel or equivalent spreadsheet program.

Course Objectives: (Knowledge the average student should have after taking this course)

- To use MS Excel to solve advanced engineering calculations and present the results in a clear and professional manner.
- To apply knowledge of visual basic to create a program capable of solving a complex problem.

Expected Outcomes: After completion of this course the average student passing the course should be able to:

- demonstrate basic Excel plotting and table formatting for data presentation;
- demonstrate how to use Excel formulas, solvers, and iterations to solve engineering problems;
- write a visual basic program to solve an engineering problem;
- create a VB program that uses arrays, logic, and loops to solve a problem;
- demonstrate how to find the root(s) of a single non-linear equation using a numerical algorithm, such as Newton's method, incremental search, or the bisection method;
- demonstrate how to program a numerical integration algorithm, such as the trapezoidal or Simpson's method;
- record a macro in MS Excel using VBA.

Time/Place: Tuesday 11am – 11:50am CB 203
Tuesday 2pm - ~4:50pm CB 203

Instructors: Dr. Jason Hower, EEP 119
394-2627; jason.hower@sdsmt.edu

Office Hours: MWF 2pm – 3 pm and Friday 11am – 12am
You may wish to call ahead, use email, or make an appointment to see me at a specific time. Optional recitation: I'm available to set something like this up if the class is interested.

Texts: *Power Programming with VBA/Excel*, Steven C. Chapra, Prentice Hall, 2003.
Engineering with Excel, 3rd ed., Ronald W. Larsen, Prentice Hall 2009.

References: *MS Excel 2007 Power Programming with VBA*, John Walkenbach, Wiley Publishing, Inc., Indianapolis, IN, 2008.

Grading:

Your grade will be calculated based on the percent of points you earn. In this class, homework, quizzes, and a final Toolbox project will be used to evaluate your performance. The table below summarizes the relative weight of the total grade given to each category. You will be allowed to drop one (1) homework assignment and one (1) quiz. Therefore, neither late work, nor make up quizzes will be allowed.

Homework , roughly weekly assignments, 10pts each	30% of final grade
Quizzes , as shown in schedule, 20pts each	50% of final grade
Toolbox , to be completed by May 4 th , 100pts	20% of final grade

The grade range connecting percentages to letter grades are shown below. I reserve the right to make changes to the letter grade ranges as needed to reflect the class performance and relative difficulty level.

A	90% and up
B	80% to 89%
C	70% to 79%
D	60% to 69%
F	below 60%

Topics to Be Covered:

Note, this is a tentative list and schedule. It may be subject to change depending on class needs. All topics in the chapters may not be covered and some may be covered to a greater depth than others. Please read the textbook chapters.

<i>Week</i>	<i>Date</i>	<i>Subject</i>	<i>Readings (Chapters)</i>		<i>Quizzes</i>
			<i>Chapra</i>	<i>Larsen</i>	<i>T 11am</i>
Jan	Jan		Chapra	Larsen	T 11am
1	19	Introduction to Excel and VBA	1-2	1	
2	26	Excel Data presentation		2	
Feb	Feb				
3	2	Excel Functions and Macros	1-4	3 & 7	X
4	9	Excel Goal Seek, Solver, Iterations		6	
5	16	Advanced Excel Applications		6, 10-13	
6	23	Basic Programming Structure	1, 5, 11, 12	8	X
Mar	Mar				
7	2	Custom Function Procedures	4, 5, 9	3, 8	
	9	Spring Break (8 – 12 March)			
8	16	Sub Procedures	5	8	
9	23	Debugging and Program Interfaces	7, 14, 15	9	X
10	30	Loops and Decisions	11, 12		
Apr	Apr				
11	6	Numerical Differentiation		13	X
12	13	Numerical Integration	12	14	
13	20	Arrays	13	5	X
14	27	Matrix Math	13	4	
May	May				
15	4	Toolbox			X
		Finals week (4 – 8 May)			

Toolbox

One significant goal of this class is to create an Excel and VB toolbox of standard calculations, procedures, functions, and programs for use in your future CBE courses. As such, you will be required to complete, document, and demonstrate a suite of programs, macros, functions, or sub routines that can accurately automate some of the most common CBE calculations. The final list will be finalized an assigned by the 12th week of the course. An incomplete initial list is presented below:

- Linear interpolation
- Integral of tabulated heat capacity equations over a given temperature range
- Solving cubic equations of state for system properties
- Iterative evaluation of a tear-stream material balance

Academic Dishonesty

In accordance with the Board of Regents and University policy, academic dishonesty will not be tolerated. Please read Policy Governing Academic Integrity (pg 60-61) in the 2000-2010 Undergraduate and Graduate Catalog. Cheating is a serious offense and completely unacceptable in our department and professional field. As practicing chemical engineers, you will be responsible for choices, designs, and calculations that directly impact human safety and well being. Therefore, YOU must demonstrate not only the technical ability to perform such work, but also the ethical quality that suggests you are deserving of such responsibility. Unless assignments are specified as being team assignments, individual work is expected. This is not meant to preclude students helping each other, but outright copying is not allowed and will be penalized. Quizzes or exams are always to be completed individually.

In this class academic dishonesty will include, but is not limited to, the following:

- Presenting another person's work or ideas as your own
- Copying another person's work or ideas
- Inappropriate use of outside resources without express permission of the instructor
- Unethical behaviors such as lying, cheating, and plagiarism

If you are caught breaking the ethical code of this class, or violating the academic dishonesty policy you will at the very least receive no credit for the assignment in question. Should the behavior continue, or the single event is severe enough, you will be removed from this course, this department, and even this university. I take cheating very seriously and will not hesitate to use all resources available to me to prevent and punish this inexcusable behavior. Should you find yourself in a position where cheating appears to be your only option, come see me; I am sure we can find a much better solution to the problem.