

**Syllabus**  
**ChE 101 Approaches to Chemical Engineering Problem Solving**  
**Spring 2008**  
*Ohio University*  
*Department of Chemical and Biomolecular Engineering*

**Instructor:** Dr. Gerardine G. Botte  
**Office:** 183 Stocker Center  
**Office Hours:** 10:00-11:00 T-Th and by appointments (please use phone or e-mail to schedule appointments). I will see you almost any time I am in.  
**Phone:** 593-9670 (Stocker Office)  
**E-mail:** [botte@ohio.edu](mailto:botte@ohio.edu)  
**Class:** Section 1: 12:10 pm-2:00 pm W and F at Stocker 308  
Section 2: 2:10 pm-4:00 pm W and F at Stocker 308

**Class e-mail:** Make sure to check your e-mail routinely (at least once a day) as I will use it to communicate with you at times. E-mails will be considered an official way to communicate with the class.  
If you need to communicate via e-mail you must use your oak account e-mail.

**Required texts:** Matlab; An Introduction with Applications, Amos Gilat. Wiley, First edition, 2004, ISBN 0-471-43997-5  
Class notes, handouts, and tutorials. You can download the material from the web at the following site [http://webche.ent.ohiou.edu/course\\_index.html](http://webche.ent.ohiou.edu/course_index.html) (click on ChE-101)

**Recommended texts:**

1. Matlab for Engineering Applications, William J. Palm III, McGraw-Hill, First edition, 1999.
2. The Student Edition of Matlab, Prentice-Hall. We now have version 6 in room 049
3. Getting Started with Matlab, Rudra Pratap, Oxford University Press, First edition, 2002.
4. Additional Matlab tutorials available at <http://webche.ent.ohiou.edu/matlab/matlab.html>

**Grading:**

Homework	25%	A	93-100
Exams	55%	A <sup>-</sup>	90-92
Class Participation	5%	B <sup>+</sup>	85-89
Class Project	15%	B	82-84
		B <sup>-</sup>	79-81
		C <sup>+</sup>	76-78
		C	73-75
		C <sup>-</sup>	70-72
		D <sup>+</sup>	66-69
		D	63-65
		D <sup>-</sup>	60-62
		F	0-59

Class participation means to contribute to the success of the class by: solving class exercises, participating in class discussions, working in the tutorials, etc. Doing other activities (e.g., surfing the web, reading e-mails, chatting, playing games, talking while the instructor is teaching, etc) during the lecture and lab sessions will result in losing credits from class participation.

I do not curve or scale the class. There is no a predetermined number of A's and F's.

## Course description and objectives:

### Catalog description:

Introduction to goals and methods of problem-solving techniques; uses of computers for calculations, document preparation. Implementation of selected professional software. (Ohio University, Undergraduate catalog 2006-2008).

### Course details:

In order to solve problems in chemical engineering we need to apply problem solving techniques. Part of the strategy includes recognizing the type of mathematical equation and developing a computer code that allows the solution of the problem. In this course you will be introduced to a methodology that will allow you solving any given situation (system) in chemical engineering. In few words, you will start thinking and acting as a CHEMICAL ENGINEER.

The objectives of the course are:

1. To begin to develop your “toolbox” of skills. These include the use of Matlab and Excel, logic flowsheets, preparing graphs, and tables.
2. To develop your ability to recognize the mathematical form of typical problems that arise in chemical engineering.
3. To learn the basics of Matlab as a method of solving problems and to see a few solution techniques you will implement to solve these problems.
4. To develop your ability to understand program structure and proper programming skills.
5. To practice team working strategies as used by corporations

To fulfill the objectives of this course the class has been divided into *lecture and lab sessions*.

The *lecture sessions* will be used for presenting new concepts closely related to the Matlab material (rules of preparing tables and graphs, programming tips and rules, developing logic flowcharts, recognizing and solving linear and non-linear algebraic equations, linearizing equations, linear regression). Homework and exam's solutions will also be reviewed in class if necessary. The students are expected to read and understand all of the material in the sessions assigned in the textbooks, class notes, and handouts before the lecture.

The *lab sessions* will be used to develop the programs provided in the tutorials as well as the proposed class problems. The students are expected to develop their own programs. All the exercises provided by the instructor in the tutorials should be practiced during the lab sessions. The MORE you PRACTICE the MORE you will LEARN, therefore, it is recommended that you invest out of class time working in programming with Matlab.

The list of the topics that will be covered in the course is given next (see Tentative Schedule):

1. Matlab Basics
2. Flowchart diagrams
3. Matlab Files: script-m and functions
4. Arrays and Matrices
5. Quality Plots and Tables
6. Solution of Linear Algebraic Equations
7. Solution of Non-linear Algebraic Equations
8. Linear Regression
9. Excel Basics

**Homework:** Homework will be assigned regularly during the quarter (see Tentative Schedule) and you are responsible for their solutions. Students are expected to attempt every problem and ask any necessary questions before their due dates. The electronic version of your homework will be due by e-mail at 11:00 am of the target day (usually you will have a week to do your homework). The hardcopy of the homework

(usually the flowchart diagram for your code) will be collected in class the due date. No late homework will be graded. The homework will usually involve a computer solution. You will use Matlab or Excel for this. Your program must be legible. It is your responsibility to determine how to access the machines, run programs, get printouts, etc. Homework should be presented clearly. Homework that does not provide clear communication will not receive full credit. Most of the homework assignments will consist on developing a Matlab program for the solution of a particular chemical engineering problem. Homework will count 25% of your grade (each homework assignment will have the same weight percentage of your grade). The submission of your programs for the homework assignments will be done by e-mail at [che101@bobcat.ent.ohiou.edu](mailto:che101@bobcat.ent.ohiou.edu). Your files must be e-mailed no later than 11:00 am the day your homework is due. It is your responsibility to e-mail your files on time. Make sure that you receive a confirmation e-mail that I had received your homework (either me or Mrs. Ostermann will confirm receiving your e-mail). If you don't receive a confirmation e-mail by 1:00 pm the day the homework is due contact me immediately. Instructions for labeling your files will be specified in the homework statement (you must follow these instructions closely or your homework will not be graded). You are required to follow the homework standards given below.

### *Homework Standards*

Below are given the minimum standards for assignments and homework:

1. All written homework and computer print outs are to be done on 8.5x11" white paper. Write on the front side of each page only. Do not crowd your work.
2. The first page of your homework must contain your name, course number, due date, and homework number.
3. Pencil is preferred. Pen is acceptable if there are no substantial splotches. Write neatly.
4. All pages, in the correct order, must be numbered sequentially in the upper right-hand corner: 1/7, ..., 7/7, for example. Staple pages together in the upper left-hand corner.
  - 1.1 Show your work. Your final answers must be marked in a block.
5. *Graphs:* All graphs must be clearly labeled and explained using narrative text.
  - 1.2 All graphs must have titles and axis labels with units.
  - 1.3 Graphs should be done using a computer program (Matlab)
  - 1.4 Use different line types or symbols to distinguish multiple sets of data on the same graph. Use a legend.
  - 1.5 Explain your graphs using narrative texts.
6. *Spreadsheets, computer programs, and Matlab problems:* All of them should contain narrative text that explains the functions, variables, etc used.

**Exams:** In class exams will focus on problem identification, solution strategies, and developing of programs. All the exams will be open notes and tutorials. All this material must be in a binder. Exams will be administered during the lab sessions and they will take place in the computer lab (Stocker 308). You will not be allowed to leave the room early. Exams will count 55% of your grade. Each exam will have the same weight percentage of your grade. You can expect about 3 exams during the quarter. We will have in class review sessions before the exams (see tentative schedule). The day of the final exam will be used to administer the final exam. **Final Exam will be held on Tuesday June 10 at 4:40 pm (Stocker 308).**

### **Class project:**

As your class project (15% of your grade) you will get experimental data from an electrochemical system and perform a regression (more details will be given during the quarter). The electrochemical system that you will work on will be an electro-chem-e-car. Details about the project are given in the Final Project handout. It will be a team project. The team members will be selected by the instructor. Minutes of the meetings held by the team members should be submitted on the dates specified in the tentative schedule by the end of the class session (see Minutes handout). If minutes are not submitted on time your project will not be graded. Only

one minute per team per meeting should be submitted. Members of the team should rotate the responsibility of the “minute person.” Minutes’ discussions and tasks must show progress towards the completion of your projects.

**Software:** Your homework and exams will be solved using Matlab (or Excel). As a Department we take a consistent organized approach to the use of computer programming by committing ourselves to the use of Matlab throughout your undergraduate career. In this course we are going to introduce you to Matlab, input and output, program structure, as well as some of the basics of solving algebraic equations and using linear regression. In future courses Matlab will be used repeatedly and new numerical techniques will be introduced where they are appropriate. It will soon become your solution method of choice.

The Department of Chemical Engineering has created several tutorials covering topics commonly covered in the curriculum. They are located on the Department’s homepage (<http://webche.ent.ohiou.edu/matlab/matlab.html>). You are free to print them. I suggest you keep them in a three-ring binder with the practice problems using Matlab.

You are encouraged to print all the tutorials and handouts for the class and keep them in a binder. They will be really useful for your future courses (like a book). Additionally, you will not be allowed to use tutorials on the exams unless you have them in an organized folder. Go to [http://webche.ent.ohiou.edu/course\\_index.html](http://webche.ent.ohiou.edu/course_index.html) (click on ChE-101).

**Muddiest Point:** Because I firmly believe that teaching is a *two-way process between the instructor and the students*, I will survey your input frequently during the course in order to identify the muddiest point about a topic. The surveys are anonymous. The grader for the course will collect the surveys. The next class after the administration of the survey, I will emphasize/review the muddiest topic.

**Attendance:** Students are expected to attend every class and lab session. If you know that you are going to miss an exam, contact me (before the day of the exam) to schedule a makeup. There must be a honorable excuse for a makeup exam. If you know you *will* miss an exam, speak to me in advance to make arrangements. Refer to "Class Attendance" in the *Student Handbook* for the Ohio University policy on unanticipated absences.

**Computers:** Matlab is available in any computer lab in the Stocker building. You are suggested to use the Chemical Engineering Computer lab as the traffic of students is lower than other labs (Stocker 049). Access hours and other information about the PC lab in Stocker 049 are given at <http://webche.ent.ohiou.edu/matlab/pcfaq.html> .

**Stocker computer lab accounts:** In order to have access to printing in the computer labs in the stocker building it is necessary that you get a user name and password for the computer labs in Stocker. To do this, you must e-mail [labadmin@bobcat.ent.ohiou.edu](mailto:labadmin@bobcat.ent.ohiou.edu) and say that you are a chemical engineer student that needs a user name and password for the chemical engineering computer lab (this password will be valid for any computer in the stocker labs). **Do this before the first computer lab session.**

**Academic Conduct:** Engineering is a profession, and ethical behavior is expected of professionals. You are expected to act in a professional manner in this course. Academic dishonesty is defined in the *Student Handbook* and will be dealt with according to the guidelines therein. Exchanging information on assignments or exams where such an exchange has been forbidden and plagiarism are violations of the standards set forth in this course and the *Student Handbook* in general. Appropriate penalties will be imposed, which could include failing the course and a referral to the Office of Judicial Affairs (refer to the *Student Handbook* for descriptions of unethical behavior and the potential penalties). Other potential violations include any action that deceives your professor or your classmates, and any action taken without due consideration of its possible harmful effect on others.

I would not accept disrespect to me or to any of the students in the class. If you act in this way you will be ask to leave the classroom and you will loose any credits for the activity that takes place that day (including exams).