

ChEE 201L
Elements of Chemical Engineering - Computer Laboratory
Fall 2019
University of Arizona

Instructor: Dr. Paul Blowers Office Hours: To Be Determined
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Lecture: Day, Time, Location TBD

Instructional Managers:

Name(s) TBD

These are the people you should contact if there is a problem with a quiz, if you have a technology issue, if there is an aspect of the course that you are having an issue with, and if you do not know where else to turn. They have created an email that they both will monitor and it is:
cheeinstructionalmanager201@gmail.com

Learning Assistants, Office Hours SEL 3rd Floor

Name(s), Day(s), Time(s) TBD

Course Description:

This course will introduce you to the fundamental principles of numerical analysis through use of Excel and Visual Basic applied in Excel. This course is the companion course to ChEE 201 and will also begin demonstrating how mathematics and programming can be fundamental tools for solving complex engineering problems.

Text: None. Course handouts will be available on the D2L course website.

Course Objectives:

Upon completion of this course, students should:

- 1) be able to estimate computational errors using computer applications to solve problems
- 2) be able to develop Taylor series approximations for general functions
- 3) be able to apply linear algebra techniques to solve systems of equations
- 4) be able to apply root finding techniques for complex functions
- 5) be able to write short computer programs for specific applications
- 6) be able to integrate all of the above techniques with chemical engineering problem solving

Other metaconcepts the students should be proficient at:

- 1) be able to comfortably organize and present group material
- 2) be able to identify and rectify group conflicts
- 3) be able to identify personal difficulties during problem solving and to take corrective action
- 4) be able to knowledgeably think of everyday examples programming and Excel can make your work easier
- 5) be able to conceptually link levels of information and ideas in a problem solving framework

Course Prerequisites:

The courses you must have taken before this course are:

MATH124 or MATH125; AME 105. If you have not fulfilled the co- or prerequisite courses you may be dropped from the course at the instructor's discretion since you may not succeed based on past student performance.

Course Website: See d2l

Important Dates to Keep in Mind:

A listing of all important drop and add dates is here: (website updated each year) and here (website updated each year)

Course Grading Policy:Pre-Class Activities and Pre-Quizzes (10% of grade):

Part of sophomore year in engineering is learning that spacing out your work with small pieces continually is a lot more effective than studying a whole lot at the last minute. This class is designed to build in pre-activities that allow you to be really ready for what is going to happen when we meet. Doing these small pieces is very important to becoming a successful engineer.

Homework (20 % of grade)

Doing homework in small sections where you practice the skills taught in the preclass and class activities will help you know what to focus on for exams and become successful on those. Homework is due at 5 pm on Friday to the d2l assignment box. If you are late, you can submit up until 11:59 pm on that day and will be penalized 10%. Only the last submission with all required files in that submission will be graded.

To eliminate confusion and difficulties in staying current, students will have 2 weeks from the date homework, quizzes, or exams are returned to discuss grading criteria and scores. After the time limit has passed, students will not be able to petition for changes. Additionally, students who do their homework with a team are responsible for knowing their score and retaining copies of the scored coversheet for their records. On the final exam, students will have 1 week into the new semester to petition on final grading scores.

Exam (one midterm exam, 20 % of grade total)

Tests are a way of demonstrating to yourself and the professor that you have mastered the objectives of the class and will be able to use what you have learned when you go out into your future career. The in-class exam is **comprehensive** and is scheduled for Wednesday, date TBD. Because all of the work in this class is in Excel and VBA, you will need to have a computer you are familiar with using in class on the day of the exam. You will be expected to download an Excel file that has data, instructions, and details about what you are answering and to work on that in class and then submit to the dropbox as this will simulate how you will function in the workplace. You are allowed any resources you have on your computer, including notes you made to yourself, old homework files, etc. If you do not have a laptop you routinely use for homework and solve the problems for class, you can borrow one for free from the library. If you will be doing this, you should begin borrowing from the library, testing out what those computers can and cannot do, how you enable the tools you need to use on a computer that is wiped clean each night, and the mousepad/keyboard. You do not want to be slowed down by an unfamiliar computer on the day of the exam. Because you know this is coming, it is your responsibility to practice and make sure you can use the tool(s) you will have on the midterm. The same rules will apply for the final exam. If you are borrowing a computer from the library, they are available from the Main Library, Engineering Library, and Fine Arts Libraries and can typically be checked out for 3 day periods so you can practice with the same computer for a few days before each exam. Remember to charge your computer the night before or throughout the day as access to electricity may not be possible during the exam.

During the exam, you will be expected to download the exams from D2L, which will be in Excel, with one problem per sheet. You will then work on and answer those questions, clearly putting your answers into the cells provided that are highlighted in yellow near the question statements. The exams will test you only on material you should be able to do in a reasonable amount of time and are based on the content you have received graded homework back on. A sample midterm will be available in D2L at least one week before the exam so you can practice with the format and your computer, or the one you borrow from the library. The instructor/preceptors will remind students 2 weeks before the exam, one week before the exam, and the day before the exam on the rules and that you **MUST** have a computer to solve the exam on that you are comfortable with.

Make-up exam: A make-up exam may be arranged if you notify the instructor before the regularly scheduled exam. A makeup exam will be scheduled only if the student has a valid reason for missing the regularly scheduled exam. Verifiable illness with notification from the emergency dean or family emergencies are valid reasons for missing an exam.

Project: (small pieces will be submitted as homework, but the final technical memo will be 10%):

Most programming is learned best in context of a real world problem that has to be solved. We will be using a combination of Excel tools and VBA to break the data analysis up and to create a program that can achieve a specific goal, with small pieces being due every week or so. The project will be due on the last day of classes before Dead Day.

Group Presentation (10 % of grade):

Employers routinely ask students if they have given a presentation when they are interviewing for internships or permanent employment. Each week, a team will give a presentation on some part of Excel/VBA/programming and will be evaluated by their peers on their ability to give a good presentation that has elements that are rewarded in industry. A grading rubric will be available that details exactly what a good presentation should contain. The presentation topic is described in the week one materials for group 1 presenting next week. The group should cover those topics, plus one useful Excel shortcut/tip. The presentation should also have students do an activity that helps them understand the material.

Final exam: (20 % of grade).

Comprehensive final on Wednesday December XX, 20XX from (time TBD). A comprehensive final will be given during the scheduled period during finals.

Attendance: (10% of grade)

Showing up and participating in class is important for student success. While you might not have had to show up in high school or some freshmen year classes and still gotten an A, those times are about over. You will be rewarded for showing up and participating with this portion of the grade. At the end of group presentations (discussed later in this document), teams will evaluate the audience for their ability to pay attention and remain respectful. Their rating will be used to set a score for the class. The first two weeks will be done without the grades being recorded to explore what being a good audience means so that students will not be penalized until they know the qualities that teams notice.

Grading Policy:

Letter grades on exams or assignments will not be determined; a final letter grade will be given at the end of the semester instead. This course will be graded on a straight scale as follows:

<u>Total percentage of points earned</u>	<u>Final Grade</u>
90 - 100 %	A
77 - 89.999 %	B
65 - 76.999 %	C
52 - 64.999 %	D
< 52.999%	E

Course Lectures and Policies:

This class uses an active learning environment and attendance is not optional for students to be able to learn the material. A variety of measures will be used to ensure students are in class and excuses are not accepted unless they are substantiated by documented and verifiable methods. Some of the methods that will be used to verify attendance include submission of homework, submission of extra credit assignments in class, and visual inspection of the classroom. The instructor will know all student names and recognize students by the end of the third week of class so students are expected to be present at all times during class. Please note that the campus health center does not verify illnesses so other means must be used. The instructor will work with students to meet this requirement with email prior to class absenteeism.

SALT Center: Students who are able to use the services of the Strategic Alternatives Technology Center or may have other educational needs may see the professor at any time to discuss accommodations for their needs. However, this should be done at least 1 week prior to the first exam to allow for preparations that may be needed.

Standards for Homework Problems and Quizzes:

1. Briefly restate the problem using a sketch or diagram where appropriate. Label the sketch or diagram with all quantities involved.
2. Indicate the basis you select, and indicate any change of basis within the problem. State assumptions.
3. Include both the numerical value and units for all quantities involved, including intermediate results.
4. Answers should be circled or otherwise marked, and reported to an appropriate number of significant digits.

5. Values obtained from a handbook or other reference should be accompanied by a citation. For example:

CCl_4 boiling pt. $76.5\text{ }^\circ\text{C}$ (CRC, pg C-373)

6. Show how you have checked your work if appropriate.

7. Be clear and concise when writing answers to questions.

Standards for Style and Presentation of Problem Sets

1. All assignments are to be submitted on 8.5 x 11 inch paper with writing on one side only. Multiple pages must be stapled together. Unlined paper may be used if the work is done neatly. Handwriting must be legible.

2. Each page must have the student's name, the course number and the page number in the upper right hand corner.

Substandard work will result in a loss of credit.

Plagiarism: Although this course is not writing intensive, plagiarism is strongly discouraged. The plagiarism policies within the Student Code of Academic Integrity will be strictly followed:

<http://doc.web.arizona.edu/uapolicies>.

Threatening Behavior: The general policies against threatening behavior by students will be followed:

<http://policy.web.arizona.edu/~policy/threaten.shtml>

Required Extracurricular Activities: none

Special Materials Required for the Class: It is expected that you will have an electronic device for evaluating group presentations when we meet in class each week. The survey will work on any smart-device or laptop. We will also be coding, testing Excel, and doing activities that will be most useful if you have Excel on your computer. You will be able to work with other students on the in class activities, but you'll learn more if you have your own device. If you do not have a portable device, the library system will allow you to check out devices for use for free.

Changes to the Syllabus: The information contained in the course syllabus, other than the grade and absence policies may be subject to change with reasonable advanced notice as deemed appropriate by the instructor.

ChEE 201L Fall 20XX Class Schedule (subject to change - check website for updates):

Week	Date	Reading Due	Elements Due	Group Presenting	Topics
1	x/xx	None			Class Start – Team Formation – Excel and VBA
2	x/xx	Reading 1	First Project Steps (W)* Group Information (W) D2L Quiz 1 (W) HW 1 (F)*		Resumes, Start of Project, Importing Data into Excel
3	x/xx	Reading 2	Resume (W) Great Circle Mapper Try (W) D2L Quiz 2 (W) HW 2 (F)	1,2	Data Sort, Insert Table
4	x/xx	Reading 3	New Ideas About Project (W) D2L Quiz 3 (W) HW 3 (F)	3, 4	Recording a Macro, Gaussian Elimination by Hand
5	x/xx	Reading 4	Resume Redo (W) D2L Quiz 4 (W) HW 4 (F)	5	Data in and Out of Excel
6	x/xx	Reading 5	D2L Quiz 5 (W) HW 5 (F)	6	Active Sheet Manipulations, Review for Midterm
7	x/xx	Reading 6	D2L Quiz 6 (W) HW 6 (F)	7	Debugging Tricks, Taylor Series Expansions
8	x/xx		Midterm Exam		
9	x/xx	Reading 7	Bulk Class Advising	None	Questions about ChEE or EnvE B.S. Programs for Michelle
10	x/xx	Reading 8	D2L Quiz 7 (W) HW 7 (F)	8	Solver in Excel, Root Finding Techniques & If then statements in Excel
11	x/xx	Reading 10		9	Solver in a Loop in VBA
12	x/xx	Reading 11	HW 9 (F)	10	Trace Dependents, Precedents, and Show Formulas
13	x/xx	Reading 12	HW 10 (F)	11	Editing a Macro and Putting it in a Loop
14	x/xx	Day Before Thanksgiving, No Class			
15	x/xx	Reading 14	HW 11	12	Strategies to Use All the Topics to Solve the Project
16	x/xx	Review - Last Day of Classes	Resume bullets added this semester	13	Review for Final Exam & Course Evaluations

Commented [CB1]: Need to redo this quiz with randomized banked questions

*(W) indicates the item is due on Wednesday
(F) indicates the item is due on Friday to the Dropbox

Discussion Session Projects

The class meetings will involve different teams of students who will present a targeting topic to the class. A grading rubric is available online and will be used to assign scores and students should try to structure their talk to earn as many points as possible. The group will typically present on at least one topic that is on a homework assignment due later on in the week.

Group duties may be divided among the students as they see fit, as long as each person contributes something to the finished presentation. Possible tasks that can be divided up are: group presenter, developer of a hand out, fielding questions during the presentation, creation of supplementary material, general preparation, etc. Students are encouraged to be creative while keeping their presentation to approximately 15 minutes in length.

The objectives of the presentations are to:

- 1) learn how to use the strengths within your group to produce a finished product
- 2) become more comfortable and capable of giving good presentations
- 3) learn how to apply computer methods more successfully
- 4) learn how other students approach topics
- 5) learn how to ask and respond to verbal questions

This is not meant to be a high stress event, but it is designed to help you develop strong presentation skills and teamwork skills that will be asked about in future presentations.

Grading: The class will use an online survey tool to assign scores in the five minutes after the presentation and those submissions of peer ratings will make up the record of attendance for class participation. Teammates will evaluate each other on a teamwork rating rubric as another measure for evaluation. One-quarter of the presentation grade will be the group grade while 1/2 will be from the team peer evaluations. After completion of the presentations, the team should review the recording of their presentation and then rate themselves, as a team, giving the score they felt they earned. This self-evaluation will be submitted along with an explanation of 2 concrete things the team could have done differently to improve their score, and is due at the beginning of class in the next class meeting after their presentation. This part of the team project will make up 1/4 of the presentation grade. This set of exercises is teaching the skill of self-reflection for improvement.