MEMORANDUM FOR STUDENTS ENROLLED IN CHEN 4320 – Section 01

SUBJECT: CHEN 4320 – Chemical Engineering Lab I - Administrative Instructions

Lecture times: MW, 11:15 – 12:10 pm, RBN 1034 (Changed from RBN 2011)

Laboratory times: Th 1:30 – 4:15 pm, RBN 1033

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Welcome to CHEN 4320 – Chemical Engineering Lab I. This course will provide opportunities for the students to apply scientific and engineering principles learned in lecture courses and acquire hands-on skills with Chemical Engineering equipment. The course has a lecture component which will introduce statistical techniques in addition to serve as a space for discussion of experimental plans, preparing students for the laboratory component. In the lab, students will carry out experiments, collect, analyze and discuss data. Final presentations for projects will be conducted in the lecture component.

Course Objectives - CHEN 4320 Chemical Engineering Laboratory I:

1. Plan and design experiments based on literature and equipment information.
2. Anticipate/identify potential equipment failures/hazards and include safety measures prior to the start of experiments.
3. Carry out experiments safely in a laboratory setting, properly recording information/data.
4. Work collaborative and in a productive manner with other members of a team.
5. Apply concepts learned in previous courses to analyze data collected in the laboratory.
6. Communicate experimental findings and conclusions clearly via well-organized technical written reports and oral presentations.

The course has prerequisites which must be completed successfully (minimum grade "C") prior to taking this course:

- ✓ MENG 3310, Fluid Mechanics
- ✓ MENG 3316, Heat Transfer
- ✓ CHEN 3320, Mass Transfer

1. The goal of our faculty is to be commonly available to you for assistance, so you are encouraged and expected to seek **additional instruction (AI)**. Take advantage of AI, it's FREE and really will help! There are several ways you can seek AI:
   - ✓ You are welcome to stop by the instructor's office at any time. However, for your own satisfaction, you can ensure the instructor is available at the office by using the following options:
   - ✓ Come to Office hours (To be announced in the first lecture). This is the time the instructor has set aside to answer your questions;
   - ✓ E-mail or call the instructor to set up a mutually agreeable time to meet with the instructor,

- ✓ E-mail your questions to the instructor (this is the least preferred option because of the limited effectiveness of e-mail communication), but it is acceptable if other options are not possible.

2. Projects

The following projects will be available in this course, and each group will carry out 4 projects. Description of the equipment will be available in Canvas.

1. Centrifugal pumps and cavitation
2. Prediction of flow in pipes
3. Reynolds experiment
4. Tubular heat exchanger
5. Shell-and-tube heat exchanger
6. Ion exchange apparatus
7. Mass Transfer and diffusion coefficients

Since this is a laboratory course, you will need to take charge of your own learning through observation, questioning, and evaluating answers. Moreover, lab work in this class is open ended. That is, you formulate your experimental plan in addition to executing it. Students will work in teams of two or three as randomly assigned by the course instructor.

3. Procedures:

a. *Textbooks:* Not required. But the following book will be referenced for lecture

Jay L. Devore, Nicholas R. Farnum, Jimmy A. Doi - Applied Statistics for Engineers and Scientists-Duxbury Press (2013)

b. Projects: The class will be divided into groups containing 2-3 members. Each group will be assigned particular Projects for the semester. Successful completion of each project will include the following:

   i. Oral and written planning reports. Written planning reports will include a thorough literature review, plan of experiments, explanation/justification for the plan, basis for calculations, interpretation of results, and expected results. The plan will be presented and discussed with the class during the lecture component.
   ii. Carry out the laboratory experiments in a professional, safe and clean manner with thorough clean up after the work is done.
   iii. Make appropriate analytical measurements and use those results for calculating relevant quantities that will ultimately affect process performance.
   iv. Oral and written final reports.

c. Open-ended Project:

One group open ended project will be assigned for the semester. The instructor will assign groups at the end of the first week and the groups will need to submit the topic for the project at the end of Week 3 for the approval from the instructor. Open-Ended projects are

characterized for not having a unique, single answer/solution. Instead, they are creative exercises in which you are encouraged to apply the concepts learned in the course. They may be qualitative or quantitative. In either case, make sure your answer is clear and detailed, because you will be evaluated by the approach and thought process you use in these exercises. You will need to implement systems thinking to come with an answer that covers the following aspects:

A) Environmental Literacy
B) Responsible Business and Economy
C) Social Responsibility
D) Environmental Impact Assessment
E) Materials Selection
F) Design

Each team member should contribute equally to the project, the students will also be asked to perform anonymous peer review rating the effort and conduct of each member. The group will present their work to the instructor at the end of the semester.

Written portion of the open-Ended projects must be submitted online via Canvas.

d. Safety: The most important aspect of laboratory work is the safety of all participants. To keep this goal, you are required to take safety training and comply with all guidelines as specified by the instructor. Never begin an experiment unless you are confident you can finish or arrive at a safe endpoint before the end of the laboratory period. Laboratory coats should be worn to prevent contact with chemical splashes and spills. You must wear safety eyeglasses, goggles, or reading glasses with tempered lenses and side shields. Non-prescription safety glasses are available in the lab. Proper protective gloves should be worn whenever the potential for contact with corrosive or toxic materials of unknown toxicity exists. In addition, never wear sandals, shorts, or short skirts. Exposure of legs and feet to spilled chemicals is the main cause of chemical burns. No eating, drinking, or smoking or chewing of gum is permitted in the work area. Contamination of food, drink, and smoking materials is a potential for exposure to toxic substances.

e. Laboratory sessions: When possible, data should be processed and interpreted during the course of the experimental work, thus helping to identify and correct experimental or data analysis problems. In this regard, any available data-processing computer programs (e.g., spreadsheets) must be run during the laboratory session, at least in a preliminary way.

Each team will use one Laboratory Notebook; Lab notebooks have "carbon," so you have two copies of each page. All data, observations, steps in the procedure, alterations, comments, calculations during the laboratory session, and rough plots are to be entered in your lab notebook.

4. Evaluations:

a. *ACADEMIC DISHONESTY:* Representation of other's work as your own will not be tolerated. Cheating on examinations, quizzes, and homework and the false representation of work will be interpreted as academic dishonesty. Academic dishonesty will be subject

to disciplinary action as outlined by the UT Tyler Student Guide on Conduct and Discipline.

b. *Fall Special Project:* The college of engineering is organizing the fall special event. Please see the document in canvas. The submission dates can not be changed under any circumstances as this project is organized with other classes in the college of engineering.

c. *Quizzes:* There will be four quizzes on scheduled dates during the semester. ***Quizzes will focus on the lecture components of the class, especially statistics***.

d. *Planning Reports:* Prior to carrying out experiments in the lab, students will conduct a literature review and turn in a detailed experimental design written report of the activity to be developed in the labs. This work plan should include clear objectives for your project and must describe the necessary tasks to be carried out, such as calibrations, specific data to be collected during the experimental work, and a brief description of how the data are to be analyzed. This overall description should make clear to the reader why you are doing the project as you have planned. The work plan must be well thought out, with specific process parameters to be measured and a specific description of your approach to performing the necessary data collection and analysis (include key equations). It is essential that students know the fundamentals and what needs to be done before going into the laboratory rather than figuring out what to do in the lab or afterward. The planning report will also be presented to the class in the form of a 5-minute PowerPoint oral presentation. Written reports should be 2-3 pages long (double spaced), and oral reports should be no more than 5 minutes long to allow time for discussion.

e. *Final Reports:* After the conclusion of the laboratory sections, teams will analyze results and prepare a detailed final report. The lab instructor will evaluate your laboratory reports for technical content and accuracy, as well as overall quality. Reports should discuss planned work and conditions, along with actual conditions. Literature cited must include at least four citations in addition to class handouts. The trial report should be sufficiently clear so that another group could repeat the experiments. A formal final report consists of the following items in order:

1- Cover page, including title, names of group members, and the date. The honor code should be included on this page.
2 - Table of Contents
3 - Abstract (between 125 and 175 words), outlining the equipment, the purpose of the project, how you conducted it, and your primary conclusions and results. The abstract must stand by itself and not refer to the main body of the report. Symbols should not be used except to accompany the term they stand for.
4 - Introduction. This section should explain the reasons for doing the work, give some background and your knowledge of the project, and clearly state the key goals and objectives of the assignment.
5 - Experimental Procedures. Outline in detail both the experimental work performed and any special data-processing techniques employed.

6 - Results. Results should be presented in tables and/or graphs, as appropriate. A brief description on your presentation of results should be included. Each table and graph presented here should be clearly explained in the text, in such a way that the reader should be able to understanding their meaning and how they were constructed. Pages of tabulated data do not need to be included if the data have been summarized graphically. Spreadsheets and other extensive listing of original laboratory data and other calculations should be relegated to the appendices.
7 - Discussion of results. The discussion should give a critical appraisal of what you have discovered. Also include comments on the major sources of error and any suggestions for improvements.
9 - Conclusions and Recommendations. A conclusion summarizes to the reader what was accomplished and the findings of the project. This should include recommendations for future trials.
10 - Notation Table. Include symbols and their definitions and units.
11 - References. These should include all pertinent information, for example:
Perry, R.H., and Chilton, C.H., eds., Chemical Engineers' Handbook, 6th. ed., McGraw-Hill, New York (1984).
12 - Appendices, should include all sample calculations, complete calculations (including spread-sheets), instrument calibrations (when not needed in the body of the report), and the original laboratory notebook pages, containing the notes and data recorded during the laboratory work. The final report will also be presented to the class in the form of a 15-minute Power point presentation.

f. Late Submissions. It is a basic principle of professionalism that **"Professionals are not Late."** A "COORDINATED LATE" submission occurs when you will miss the due date for a graded assignment and you contact me in advance. Notification immediately before the submission will not suffice. Point cuts up to the amounts below **may** be assessed for a "COORDINATED LATE" submission. 15% deduction per day will result in any grades received in the late assignment.

Obviously, there are circumstances that will occur and make a timely submission impossible and I will work with you when and if they occur. There will be NO late oral reports.

g. All homework, planning and final reports in this course must be properly documented. Information from the course textbooks (equations and outlines of procedures), class notes, or me is considered immediately available to all students and need not be acknowledged or documented with one exception. **YOU ARE REQUIRED TO ACKNOWLEDGE AND DOCUMENT ALL OTHER ASSISTANCE AND REFERENCES USED.** Documentation will be accomplished in accordance with any manual for writing, footnote or endnote, for papers, but for written homework, just place the documentation right at the point you received help using "Who and what" assistance.

h. *Laboratory Performance:* Attendance is required at the labs and lectures. Students are expected to be engaged in class and outside of the class. The instructor will assign a laboratory performance grade to each student based on the following factors:

1) Attendance and punctuality.

2) Peer evaluations to be conducted at the conclusion of Projects.
3) Engagement in laboratory recitation sessions, demonstrating initiative to work in teams.
4) Cleanliness and safety during lab section.

Your grade in this category will reflect the extent to which you have read and understood background material and use it in planning the experiments. Please read the material before coming to class and be prepared to discuss it with the instructors.

5. Grading:

The laboratory reports (oral/written and planning/final) are group reports. Group members are expected to plan and work together and to contribute equally to each of your assigned Tasks. The course points will be assigned as shown below:

Course Points	
Fall Special Project	12 (12 %)
Open-Ended Project	10 (10%)
Written and Oral group Prelab assignment (6 at 2.0 points each)	12 (12 %)
Oral final reports (6 at 3 points each)	18 (18 %)
Written final reports (6 at 7.0 points each)	42 (42 %)
Lab Performance, participation, safety, and cleanliness (1 at 6.0 points)	6 (6 %)
	Total 100 (100%)

Grade Scale based on points

A > 90
B > 80
C > 60
D > 40
F < 40

6. Collection of Student Work:

Throughout the semester I will collect student work (best, average, and worst) for the ABET course and outcomes notebooks. This will require me to make a copy of your work, keep your original and return a copy of the graded work to you. I will not draw attention as to what level of work you accomplished.

7. Assigned readings:

The class schedule will include assigned reading for every lecture. Students who read the corresponding sections of the book *before each class* will certainly make the most of the lectures, so this is highly recommended. In addition, the instructor will periodically post the lecture notes on the course website. Doing the assigned reading prior to class will help you to understand the material presented during the instruction and will fill in gaps for things we do not cover (***I will not cover everything***). It will also make you more familiar with terms and concepts to be covered.

8. **UT Tyler Honor Code** - Every member of the UT Tyler community joins together to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

9. **Students Rights and Responsibilities:** to know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php.

10. **Campus Carry** - We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php.

11. **UT Tyler a Tobacco-Free University** - All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

12. **Grade Replacement/Forgiveness and Census Date Policies** - Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar. Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract. The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:
    - Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
    - Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
    - Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
    - Being reinstated or re-enrolled in classes after being dropped for non-payment
    - Completing the process for tuition exemptions or waivers through Financial Aid

13. **State-Mandated Course Drop Policy** - Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public

college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

14. **Disability/Accessibility Services** - In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit https://hood.accessiblelearning.com/UTTyler and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at http://www.uttyler.edu/disabilityservices, the SAR office located in the University Center, # 3150 or call 903.566.7079.

15. **Student Absence due to Religious Observance** - Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

16. **Student Absence for University-Sponsored Events and Activities** - Revised 05/19 If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

17. **Social Security and FERPA Statement** - It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

18. **Emergency Exits and Evacuation** - Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.

19. **Student Standards of Academic Conduct** - Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

i. "Cheating" includes, but is not limited to:

- copying from another student's test paper;
- using, during a test, materials not authorized by the person giving the test;
- failure to comply with instructions given by the person administering the test;
- possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes". The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
- using, buying, stealing, transporting, or soliciting in whole or part the contents of an unadministered test, test key, homework solution, or computer program;
- collaborating with or seeking aid from another student during a test or other assignment without authority;
- discussing the contents of an examination with another student who will take the examination;
- divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
- substituting for another person, or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
- paying or offering money or other valuable thing to, or coercing another person to obtain an unadministered test, test key, homework solution, or computer program or information about an unadministered test, test key, home solution or computer program;
- falsifying research data, laboratory reports, and/or other academic work offered for credit;
- taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
- misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.

ii. "Plagiarism" includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another's work and the submission of it as one's own academic work offered for credit.
iii. "Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.
iv. All written work that is submitted will be subject to review by plagiarism software.

20. UT Tyler Resources for Students

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)

Schedule:

Week	Month			Due
1	Aug	M	Syllabus, Introduction	
		W	Preparing technical memos; lab notebooks	
		R	Safety lecture/ Fall Special Discussion/ Discussion Project 1	
		M	Basics of oral presentations	
2		W	Oral planning reports – Project 1	Prelab 1 (Oral and written)
	Sept	R	Lab session Project 1	
		M	Discussion on Open-ended-project	
3		W	Statistics Lecture	
		R	Work on Fall Special Project	
		M	Statistics Lecture	
4		W	Oral planning reports – Project 2	Prelab 2 (Oral and written)
		R	Lab session Project 2	
		M	Fall Special Report 1 Due / Discussion Project 3	Project 1 Final (Oral and written)
6		W	Statistics Lecture	
		R	Lab session Project 2	
		M	Statistics Lecture	
7		W	Oral planning reports – Project 3	Prelab 3 (Oral and written)
		R	Lab session Project 3	
	Oct	M	Statistics Lecture	Project 2 Final (Oral and written)
8		W	Discussion Project 4	
		R	Work on Fall Special Design Paper, Video Presentation	
		M	Oral final reports – Project 2	
9		W	Oral planning reports – Project 4	Prelab 4 (Oral and written)

		R	Lab session Project 4	
		M	Statistics Lecture	Project 3 Oral and Report Due
10		W	Oral planning reports – Project 3	
		R	Lab session Project 4	
		S	Fall Special- Water Testing and Product Display	
		M	Statistics Lecture	
11		W		
		R	Lab session: Project 5	
		M	Statistics Lecture	Project 4 Oral and Report Due
12	Nov	W	Open-ended-project discussion	
		R	Lab session: Project 6	
		M	Oral final reports – Project 3	
13		W	Open-ended-project discussion	
		R	Lab session: Project 2 (II)	
		M	Open-ended-project discussion	Project 1 II Oral and Report Due
14		W	Open-ended-project discussion	
		R	Lab session: Project 3 (II)	Project 5 Oral and Report Due
		M	Thanksgiving Break	
		W		
		R		
		M	Open-ended-project discussion	
15		W	Open-ended-project discussion	
	Dec	R	Open-ended-project discussion	Project 6 Oral and Report Due
		M		
		W	Open-ended-project Submission	
		F		

Project 1	Ex 1	Energy Loss in Bends	Group	A	Exercise A	1
Project 2	Ex 3	Tubular Heat Exchanger	Group	A	Exercise A, B, C, D, E	2
Project 3	Ex 5	Cavitation	Group	A	Exercise A	1
Project 4	Ex 7	Centrifugal Pump	Group	A	Exercise A, B, C, D,	2

Project 5	Ex 2	Gaseous Diffusion	Group	A	Exercise A	1
Project 6	Ex 6	Reynolds Apparatus	Group	A	Exercise A	1

Project 1	Ex 2	Gaseous Diffusion	Group	B	Exercise A	1
Project 2	Ex 4	Centrifugal Pump	Group	B	Exercise A, B, C, D, E	2
Project 3	Ex 6	Reynolds Apparatus	Group	B	Exercise A	1
Project 4	Ex 8	Shell and Tube Heat Exchanger	Group	B	Exercise A, B, C, D, E, F	2
Project 5	Ex 1	Energy Loss in Bends	Group	B	Exercise A	1
Project 6	Ex 5	Cavitation	Group	B	Exercise A	1

This is a tentative syllabus. It is within my discretion to change aspects of this syllabus as needed.