TUSKEGEE UNIVERSITY
COLLEGE OF ENGINEERING
CHEMICAL ENGINEERING DEPARTMENT

Spring Semester, 2024

COURSE:	CENG 420 Unit Operations Laboratory II
INSTRUCTOR:	K. C. Kwon
OFFICE:	Room 103 or Room 514, Luther H. Foster Hall
Office Hour:	M: 12:00 pm (noon) – 5:00 pm Tu: 8:00 am – 1:00 pm
TELEPHONE:	334-724-4528
E-MAIL:	kkwon@tuskegee.edu
Laboratory	Room 101, Luther H. Foster Hall
TEXT:	I. Warren L. McCabe and Julian C. Smith, Unit Operations of Chemical Engineering, 5th Edition, McGraw-Hill, New York, 1993. II. Laboratory Manuals **without experimental procedures (designs)**, posted on Blackboard

COURSE OBJECTIVES:

Students will:

1. Apply knowledge of mathematics, basic sciences and engineering, and chemical engineering to laboratory experiments.
2. Design and conduct safe laboratory experiments in coordination with laboratory team members, and analyze statistically and interpret experimental data with computer software.
3. Design safe process equipment with given data similar with actual experimental data
4. Develop communication skills by writing lab reports and interpreting experimental data through computer software.

COURSE OUTCOMES:

Outcomes	1	2	3	4	5	6	7
Objective 1	x						
Objective 2	x			x	x	x	
Objective 3	x	x		x			
Objective 4			x				

Student Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors c
3. an ability to communicate effectively with a range of audiences.
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

PREREQUISITES: CENG 380
CLASS HOURS: Th 200 - 500 pm
ATTENDANCE: 100 % required

GRADING:

Reports:	50 %	A=90 - 100
Attendance:	30 %	B=80 - 89
Final Examination:	20 %	C=70 - 79
	100 %	D=60 - 69
		F= 0 - 59

Policies:

- Compulsory attendance.
- Utilization of Blackboard required for this class.
- Each student should prepare his/her own reports.
- Calculation sections and experimental procedures developed during experiments should be hand-written.
- Schematic diagrams of reports are prepared by each student, and not copied from lab manuals, textbooks, and websites
- Experimental reports, design reports, and answers to homework assignments are due next class.
- Experimental reports, design reports, and answers to homework assignments, one week overdue, are not accepted.
- Late submissions of experimental reports and design reports are penalized (5 points per day).
- Answers to homework questions, experimental reports, design reports, and answers to final examinations in pdf format should be written on 11-inch x 8.5-inch papers, using a word processor, and be sent via email.
- Additional policies will be issued, if they are necessary.

Covid:

All students in the class room must wear masks that covers both noses and mouths. Excuses related to **Covid infection** as well as exposure have to be received from the Dean of Students office. Students should request the excuse for absence from the Dean of Students office as soon as they become aware of covid infection or exposure. Students may request a class-missed memo by completing this form (https://forms.gle/4ozusHX2tTCUW4yK6) and then contact the Office of the Dean of Students and Student Conduct (334) 727-8421, via e-mail THarper@Tuskegee.edu or by going into the office located in suite 203 Tompkins Hall.

REFERENCES:

1. J. H. Perry and C.H. Chilton, Chemical Engineers' Handbook, 5th Edition, Mcgraw-Hill.
2. W. L. McCabe, J. C. Smith and Peter Harriott, Unit Operations of Chemical Engineering, 5th Edition, McGraw-Hill, 1993.
3. H. Scott Fogler, Elements of Chemical Reaction Engineering, 3rd Edition, Prentice Hall
4. J. M. Coulson and J. F. Richardson ,Chemical Engineering Volume 1, 3rd Edition, Pergamon Press, Oxford, England.
5. R. M. Felder and R. W. Rousseau, Elementary Principles of Chemical Processes, 2nd Edition, John Wiley & Sons.
6. Noel D. Nevers, Fluid Mechanics for Chemical Engineers, Second Edition, McGraw-Hill, 1991.
7. Schaum's Outline Series Statistics, 2nd Edition, McGraw-Hill, New York.
8. Schaum's Outline Series Probability and Statistics, McGraw-Hill, New York.
9. Smith and Van Ness, Introduction to Chemical Engineering Thermodynamics, McGraw Hill, New York
10. Physical Property Data, obtained via http://tuskegee.blackboard.com.
11. Equilibrium Staged Separations, Phillip C. Wankat, Prentice-Hall, Englewood Cliffs, New Jersey, 1988

COURSE OUTLINE AND READING ASSIGNMENT SCHEDULE

SESSION	TOPICS	READING ASSIGNMENTS, Pages
1	Discussions on mathematics, chemistry, material and energy balances, fluid mechanics, heat transfer, mass transfer, chemical reaction engineering, and health and safety relevant to laboratory experiments.	References
2-3	Distillation I and Distillation II	Distillation I and Distillation II Manual ***without experimental procedures (designs)***, obtained via http://tuskegee.blackboard.com.
4	Design Project-Distillation	Distillation I and Distillation II Manual via http://tuskegee.blackboard.com. References 2, 9, and 11
5-6	Flow through Packed Beds and Flow through Fluidized Beds	Packed-and-Fluidized-Beds Experiment Manual ***without experimental procedures (designs)***, obtained via http://tuskegee.blackboard.com.
7	Design Project - A Fluidized-Bed Container	W. L. McCabe, J. C. Smith and Peter Harriott, Unit Operations of Chemical Engineering, 5th Edition, McGraw-Hill, 1993.
8-9	Hydrodynamics of a Packed Column and Gas Absorption	Packed-Column-and-Gas Absorption Experiment Manual ***without experimental procedures (designs)***, obtained via http://tuskegee.blackboard.com.
10	Filtration	Filtration Experiment Manual ***without experimental procedures (designs)***, obtained via http://tuskegee.blackboard.com.
11	Chemical Reaction	Chemical Reaction Experiment Manual ***without experimental procedures (designs)***, obtained via http://tuskegee.blackboard.com.
12	Design Project – Flow Reactors	H. Scott Fogler, Elements of Chemical Reaction Engineering, 3rd Edition, Prentice Hall
13 - 14	Review for a final examination	Laboratory Reports
15	Final Examination	