GAZI UNIVERSITY
FACULTY OF ENGINEERING
CHEMICAL ENGINEERING DEPARTMENT
2023-24 SPRING SEMESTER

Course Code and Title	: CHE482 Chemical Engineering Laboratory III		
Section	: ING-1		
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Laboratory Program : Tuesday (13:30-17:20) Unit Operation Lab. (UOL)
Laboratory Documents : Sources related to the laboratory are available at;
http://mf-km.gazi.edu.tr/posts/view/title/laboratuar-dersleri-30251

Course Content
Laboratory applications of physical and chemical principles to chemical processes. Experiments mainly about mass transfer, simultaneous mass transfer, process control, instrumental analysis and technological applications. Laboratory and outside the laboratory applications.

Main Textbook and References:
Handouts prepared by the instructors, related text books, library and internet facilities.

Objective and Target of the Course:
Achievements based on the content of the course
- Refreshment of knowledge of especially mass transfer and process control before graduation and to gain experience on mentioned subjects by performing related experiments.
- With previously gained knowledge, as a team, determining the system of a term experiment, designing and operating the experimental system, deciding on the parameters, doing the experiment, discussing about the data and obtaining realistic results.
- Reviewing the basic principles of pilot scale separation processes and process control devices and operating these setups and gaining experience about the operation of them.
- To be able to switch the devices on and off safely, to present their work as a written report.
- Gaining the experience to prepare a poster presentation for term experiment.
- Teaching and encouraging group work.
- Gaining experience about simulation of basic unit operations by controlling the results calculated from experimental data with simulation programs in some experiments.
- Doing the analysis of the data obtained in the experiments, investigating the reproducibility of experiments and error analysis.

Achievements of the course based on program outcomes
- Ability to apply engineering knowledge.
- Ability to design experiments and analyze the results.
- Ability to design an experiment.
- Forming groups and working in groups
- Ability to define, formulate and solve engineering problems.
- Professional responsibility and ethical awareness.
- Gaining ability in written communication with the reports and that of in oral communication with the term experiment posters.
- Examining the problems of universal and social dimensions through the experiments.
- Awareness of the necessity of lifelong learning.
- Knowledge and experience in issues of this era.
- Ability to use the techniques, skills and modern tools required for engineering applications.

Tools Used to Achieve the Objectives
Quizzes and experimental performances: Five main experiments are going to be carried out.
Experiment Reports: Original reports prepared for five main experiments.
Term experiment: The report and poster presentation of the previously determined topic by the students.
Final Exam: Students are responsible from the five main experiments.

Group 01 – (Tuesday) 13:30-17:20

	Group A Experiments					Group B Experiments				
Date \ Gr	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
05.03.2024	GENERAL MEETING WITH ACADEMIC STAFF									
12.03.2024	GENERAL MEETING WITH STUDENTS									
19.03.2024	1a	2a	3a	4a	5	1b	2b	3b	4b	-
26.03.2024	1a	2a	3a	4a	-	1b	2b	3b	4b	5
02.04.2024	2a	3a	4a	5	1a	2b	3b	4b	-	1b
09.04.2024	**R A M A D A N EID**									
16.04.2024	2a	3a	4a	-	1a	2b	3b	4b	5	1b
23.04.2024	**APRIL 23 NATIONAL SOVEREIGNTY AND CHILDRENS' DAY**									
30.04.2024	3a	4a	5	1a	2a	3b	4b	-	1b	2b
07.05.2024	3a	4a	-	1a	2a	3b	4b	5	1b	2b
14.05.2024	4a	5	1a	2a	3a	4b	-	1b	2b	3b
21.05.2024	4a	-	1a	2a	3a	4b	5	1b	2b	3b
28.05.2024	5	1a	2a	3a	4a	-	1b	2b	3b	4b
04.06.2024	-	1a	2a	3a	4a	5	1b	2b	3b	4b
11.06.2024	TERM EXPERIMENTS' POSTERS PRESENTATION									

INSTRUCTORS RESPONSIBLE FOR EXPERIMENTS

Experiment No	Experiment Name	01 / Tuesday 13:30 – 17:20
1a	Pressure Control	P. Değirmencioğlu
1b	Temperature Control	M. Taşdemir
2a	Liquid-liquid Extraction	N. Ayvalı
2b	Fractional Distillation	A. Şahin
3a	Gas Absorption	D. Uysal
3b	Ion Exchange	B. Karaman
4a	Rotary Dryer	H.B. Murathan
4b	Spray Dryer	İ. Koçyiğit Çapoğlu
5	Size Reduction and Sieve Analysis	M. Gördesel Yıldız H. Öztan

Rules:

Each student is expected to make theoretical and practical preparation for the experiment within the week before the experiment. Each student must meet with the faculty member responsible for the experiment at least three days before the experiment. Otherwise, the performance score will be reduced by **5 points**. It is the student's responsibility to conduct the related theoretical research, to go to the laboratory for the experimental system, to examine the method of the experiment, to learn how to obtain the experimental data required.

The grouped experiments specified in the table above will be carried out in accordance with the program. The names and programs of five of the six mandatory experiments are given in the tables above. Groups are responsible for only one of the experiments in the specified group. Size Reduction and Sieve Analysis experiment is performed by all groups. In the experiments, the groups design the relevant experiments under the supervision of the lecturer and conduct the experiment by determining the experimental parameters. The sixth experiment that the groups have to do is the **term experiment**. Each student group will conduct term experiments under the supervision of a faculty member.

At the beginning of each experiment, the students will be evaluated with his / her preparation for the experiment. The students will not be allowed to do the experiment if they are not successful during this evaluation (written/oral quiz). Students who fail from three different experiments will automatically take a grade (D). Students who do not carry out the term experiment will also automatically take a grade (D). Students who fail utmost twice in quizzes will perform this experiment in the make-up week.

Term Experiment:

Each group of students should plan an experiment or a simulation study using a computer in which the experimental systems in the laboratory may be used. They would carry out this study under the supervision of a faculty member. Students are expected to use the facilities of our laboratory, to make a preliminary research on the subject that they are interested in, to plan an experimental procedure, to decide on at what conditions and what type of data should be collected, to perform experiments and to evaluate the experimental findings.

They should collect all these studies in a report and submit their reports to the faculty member **until Friday 07.06.2024 at 15:30**. Students should prepare a poster prepared about the term experiment. The posters would be presented to all faculty member & students in the Unit Operations Laboratory **until 11.06.2024 on Tuesday, 12:30**. All group members should be ready for this poster session.

The grade of the student who does not participate in any part of the term experiment (experiment, report, and poster) will be ZERO.

Report delivery date: One week after the experiment is completed.

Late report delivery: - 5 points / day

The contribution of an experiment report to the total grade will be ZERO if it is not written properly.

Grading:

Small exam + Performance	**15 %**
Report	**35 %**
Term Experiment	**20 %**
Final exam	**30 %**

REPORT WRITING FORMAT

Title Page
Abstract
Table of Contents
List of Figures
List of Tables
Theory
Experimental (System, Method, Data)
Calculations
Results (Table and/or Graph)
Discussions
Conclusions
Recommendations
Nomenclature
References
Appendix
Overview

Title Page: Experiment ID, names, numbers and groups of students, name of the responsible instructor, date of experiment and deadline should be given.

Abstract: The purpose of the experiment, characteristics of the devices, experimental conditions and parameters, the important results should be given. The summary should answer the following questions very briefly; What is done? How was it made? What has been found? What results have been achieved?

Theory: Theoretical information which directly related to your experiment that helps you in your calculations should be given.

Experimental: The system and experimental method should be explained. The experimental data could be given in tabular form.

Calculations: In this section, one sample calculation should be given in detail. Each student in the group would also provide other calculations Appendix.

Results: The quantitative findings obtained from the calculations should be given in tabular and/or graphical forms.

Discussions: The results are discussed experimentally and theoretically. The changes of the results with experimental parameters are investigated. In case of any deviation from theoretical expectations, there reasons for such results should be explained in detail. The source of deviations are not always experimental errors.

Conclusions: The quantitative results should be mentioned and main conclusions should be stated. For example, the effect of an experimental or dimensionless parameter on the performance of the system should be specified clearly. Generally quantitative results are not given in this section, except for required situations.

Recommendations: Suggestments, such as, how to run the experimental system better and more efficiently, what can be done to reduce experimental errors, what other work can be done with the current system, could be recommended.

Nomenclature: The meaning of all symbols and letters used in the report should be specified. Units in the SI system are listed alphabetically.

References: References should have the following format:

Book : Holman, J.P., Heat Transfer, 6th ed., McGraw-Hill Co., New York, 1986.
Article : Ergun, S., "Fluid flow through packed columns", Chem. Eng. Progr., 48, No.2, p.89, 1952.
Congress Paper : Sekhtira, A., Lee, Y.Y. and Genetti, W.E., "Heat Transfer in a Circulating Fluidized Bed", Proc. of the 25th National Heat Transfer Conf., Houston, Texas, 24-27 July, 1988.
Book part : Grace, J.R., "Fluidized Bed Heat Transfer", in Handbook of Multiphase Flow, G.Hestroni, Ed., McGraw-Hill, Hemisphere, Washington, pp. 9-70, 1982.
Thesis : Bucak, O., “Circulating Fluidized Bed Combustor”, M. Sc. Thesis, Gazi University, Ankara, 1996.

Appendix: Physicochemical properties used in calculations, nomograms and other calculations etc.