Gazi University
Chemical Engineering Department
2023-2024 Spring Semester

March 15, 2024

**Course Code and Name** : CHE 392 Chemical Engineering Laboratory I
**Coordinator Instructor** : Prof. Dr. Saliha ÇETİNYOKUŞ (ING-01)
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**Instructors:** *A. Tapan, D. Varışlı, H. Arbağ, D.D.Eslek Koyuncu, F. Turgut Başoğlu, L. Nuralın, M. Çelik Özcan, M.Y. Doğan, H. Akansu, O.S. Angı*

**Course Hours** : Friday 08:30 - 12:20 (ING-01)

***Course Content:*** Laboratory applications of Physical chemistry, fluid mechanics and heat transfer principles. Evaluation of experimental data and results. Written presentation.

***Prerequisites:*** None

***Objectives of the Course:***

- Acquisition of ability to apply background knowledge about fluid mechanics, physical chemistry, and heat transfer by experiments.
- Acquisition of experience by performing and designing experiments independently.
- Analysis of experimental data and learning methods of evaluation.
- Application and instruction of safety rules during experiments in the laboratory.
- To gain experience about group study.
- To gain written communication skills by preparation of lab reports.

**Program**

| | **Week** |
|---|---|
| General Introduction and Presentations<br>(Formation of teams, Laboratory Safety, Waste Management, Data Analysis, Report Writing) | 1-2 |
| Midterm | 1 |
| Experiments | 10 |
| Make-up experiments | 2 |

**Textbook and/or Supplementary Resources:** All library and web facilities, and periodicals.
Experiment sheets are available in the Laboratories section of the Chemical Engineering Department website.

**Evaluation:**

| | |
|---|---|
| Quiz (Pre-experiment exam and performance) | : % 20 |
| Midterm | : % 10 |
| Practice (Report) | : % 30 |
| Final Exam | : % 40 |

**General rules:**

**1.** Students are required to wear laboratory coats and laboratory glasses during the experiment. Students who do not comply with the rules will not be allowed into the experiment.

**2.** Each student must make the necessary preliminary preparations for the experiment in the week before the experiment. Before the experiments, it is mandatory to have a preliminary meeting with the relevant instructor about the experiment. It is the student's responsibility to conduct relevant theoretical research and learn the method of the experiment and how to obtain data.

**3.** Before the experiment, it is determined whether the student is sufficiently ready for the experiment through a written or oral exam. Working performance during the experiment is also evaluated.

**4.** Students who fail as a result of the preliminary evaluation before the experiment begins, make up their experiments in the weeks specified in the program.

**5.** Failure to attend the experiments without an excuse does not give rise to the right to compensation. Students with excuses have the right to repeat a maximum of one experiment. Students who have more than one make-up will be considered unsuccessful. Students who fail the make-up test will be deemed to have failed the course.

**6.** Students prepare the report as a group and submit the final version of the report to the Instructor at the beginning of the next experiment, two weeks after the experiment day. The report must be prepared following the given report writing rules. Reports must be prepared in Times New Roman font, 12 points and line spacing of 1.5. Apart from this, students must comply with the warnings and suggestions of the instructor responsible for the experiment regarding report writing.

**7.** The report grade will be accepted as ZERO for the experiment that does not have an acceptable report by the relevant instructor.

**8.** If the report of an experiment is not given, the group's report grade for that experiment will be ZERO.

**9.** The prerequisite for students to be successful in this laboratory is to have done all the experiments. Attendance will be taken every week and students must come to the experiment every week.

**10.** Groups with great similarities in their lab reports will automatically be given a ZERO lab report grade.

**11.** The communication channel between instructors and our students is corporate e-mail.

**Report Format and Scoring:**

The lab report should cover the sections specified below and be delivered to the relevant instructor the next week following the experiment.

| |
|---|
| COVER PAGE |
| SUMMARY **(10%)** |
| CONTENTS |
| LIST OF FIGURES |
| LIST OF TABLES |
| 1. THEORETICAL INFORMATION **(10%)** |
| 2. EXPERIMENTAL METHOD **(5%)** |
| 2.1.Experimental Data |
| 3. CALCULATIONS **(25%)** |
| 4. RESULTS AND DISCUSSIONS **(25%)** |
| 5. CONCLUSIONS **(10%)** |
| 6. RECOMMENDATIONS **(5%)** |
| 7. SYMBOLS |
| 8. REFERENCES |
| APPENDICES |
| GENERAL APPEARANCE **(10%)** |

**** Although the scoring is based on the method presented in the table above, the scoring may vary depending on the scope of the experiment.**

**Cover Page:** The name and number of the experiment, the names and numbers of the students, their groups, the name of the responsible instructor, the date of the experiment, and the date of the submission of the report should be indicated.

**Abstract:** The purpose of the experiment, the characteristics of the devices used, the experiment conditions and parameters, and the important results obtained (numerical and non-numerical) should be given. The abstract should answer the following questions in a very concise way; What was done? How was it done? What was found? What results were achieved?

**Table of Contents:** The table of contents is a resource that allows the reader to see which topics are covered in the report and shows which topics are included on which pages. Main headings should be written in capital letters and subheadings should be written in lowercase letters. The titles of individual sections and all subheadings in the report should be given in the table of contents with their section numbers.

**List of Figures:** All figures in the report should be numbered and presented in this list.

**List of Tables:** All tables in the report should be numbered and presented in this list.

**Theoretical Information:** In preparation for the experiment, you are expected to read the theory of the experiment. In this part of your report, you are also expected to provide information that is directly related to the experiment and helps you with your calculations, rather than general information.

**Experimental Method:** The experimental set-up (with a schematic drawing of the system) and the method should be described.

**Experimental Data:** The data obtained as a result of the experiments should be given as a table. (Original data recorded during the experiment should be presented in the appendix section of the report.)

**Calculations:** An example calculation should be given in detail in this section. Each student in the group will make these calculations themselves. Only one of these will be given in the main text of the report.

**Results and Discussions:** Numerical findings obtained at the end of the calculations should be presented in the form of tables and/or figures in this section. The findings obtained should be discussed and interpreted experimentally and theoretically. It sholud be stated and examined how the findings change with experimental parameters and whether they are compatible with theoretical expectations. Experimental errors, if any, are mentioned. (In cases where the results are not compatible with theory, it is not enough to cite experimental errors as the only reason.)

**Conclusions:** The results obtained after the experiment and in your discussion should be stated briefly and mostly qualitatively. (For example, it can be stated how an experimental or dimensionless parameter affects the performance of the system and the findings. It is necessary to avoid giving numerical results in this section unless necessary.

**Recommendations:** It should be stated how the experimental set-up can be operated better and more efficiently, what can be done to reduce experimental errors, and what other studies can be done with the existing experimental set-up.

**Symbols:** The meanings of all symbols and variables used in the report and their units in the SI system should be given in an alphabetical list.

**References:** The references used should be presented as they are presented in the literature and listed alphabetically, as in the examples below. Citations of each reference used within the report text should be made in the format "(surname, year)".

*Book :* Seborg D.E., Edgar T.F., Mellichamp D.A., Process Dynamics and Control, 2nd Edition, Wiley, NY, 50-55, 2004.

*Journal Publication:* Correia, V.M., Stephenson, T., Judd, S.J., "Characterisation of textile wastewaters-A Review", Environment Technology, 15:917-929, 1994.

*Conference proceedings:* 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.

*Chapter in An Edited Book :* Gökçay,C.F., Sağ, Y., "Industrial Applications", Industrial Wastewater Treatment, 1st edition, Chamber of Chemical Engineers, Ankara Branch, 310-317, 1992.

*Thesis:* Kayacan, İ., " Pyrolysis of Low and High Density Polyethylene Waste ", Master's Thesis, Gazi University, Graduate School of Natural And Applied Sciences, Ankara, December 2002.

*Internet: The Global Home of Chemical Engineers,* https://www.aiche.org/ *(Retrieved: 04.03.2024)*

**Appendices:** Physicochemical properties, nomograms, etc. used in calculations.