CHE 362 - Chemical Engineering Lab III: Heat Transfer
Course Syllabus – Spring 2009

**Meeting Times:** Thursday, 8:00-10:50 am; Chem. Eng. Lab or C-304

**Instructor:** Keith Flanagan
Office: 306 E St Joseph, Suite 200
Phone: 718-0372 ext 34 (office) & 645-6965 (cell)
Email: kflanegan@klenergycorp.com
*Office hours are by appointment.*

**Lab Technician:** Ivan Filipov, C-210, ivan.filipov@sdsmt.edu, 394-1280

**Teaching Assistant:** TBD

**Prerequisites:** ChE 317 (Heat Transfer)

**D2L Site:** [https://d2l.sdbor.edu/](https://d2l.sdbor.edu/)
D2L site contains lab manual, schedules, grades, and other handouts

**Goals:**

1. Apply the concepts of heat transfer, fluid dynamics and thermodynamics to the design and operation of heat transfer experiments.
2. Develop a practical understanding of common heat transfer equipment.
3. Develop skills in experimental design and troubleshooting.
4. Develop skills in data collection, analysis, and interpretation.
5. Develop technical communication skills (written and oral).


**Running the Experiments:**
You will be assigned to a group of 3 or 4 members to run the experiments and write reports. A different group member shall be appointed as group leader for each new lab. The group leader is responsible for preparing the pre-lab document before coming to class, but the pre-lab grade will be a group grade. The pre-labs will be collected at 8:00 AM on the first day of each new experiment. Late pre-labs will be docked 25% after 8 AM, 100% after one day. You are expected to follow all safety guidelines.
Course Grading:
Report grading criteria are listed below. Plagiarism from textbooks, references, and other student reports will not be tolerated, and will result in a zero grade or dismissal from the course. Graded reports will be returned so that you can learn from your mistakes (better yet, avoid making mistakes; read the Style Guide (Appendix F) and the Editing for Readability manual). The final grade will be determined as follows:

Grading:

<table>
<thead>
<tr>
<th>Student Deliverable</th>
<th>Number</th>
<th>Points Each</th>
<th>Total Points</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Memo: Individual</td>
<td>1</td>
<td>100</td>
<td>100</td>
<td>12.5%</td>
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<tr>
<td>Memo: Group</td>
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<td>100</td>
<td>100</td>
<td>12.5%</td>
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<tr>
<td>Formal Report: Group</td>
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<td>200</td>
<td>200</td>
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<tr>
<td>Oral Report: Group</td>
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<td>200</td>
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<td>Lab Notebook: Group</td>
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</tr>
<tr>
<td>Attendance/Participation/Pre-Labs</td>
<td>5</td>
<td>20</td>
<td>100</td>
<td>12.5%</td>
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<tr>
<td>TOTAL</td>
<td></td>
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<td>800</td>
<td>100%</td>
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Late report policy:
Written reports, both group and individual, are due at **8:00 AM** on the assigned due dates. The group leader (see below) is responsible for ensuring the report is turned in on time. If you or your group will be turning in a late report, you must inform the instructor. Late reports will be docked 10 percent of their report grade for every day the report is late, including weekends.

**Written report grading** (memo and formal reports)
- Technical content: 50%
- Organization, readability, and grammar: 25%
- Sample calculations, statistics: 15%
- Graphs, tables, and equations: 10%
- Ingenuity Extra Credit: Up to 10%

**Oral report grading**
- Technical content: 50%
- Organization and clarity: 25%
- Slides: 10%
- Presentation skills: 10%
- Time: 5%
- Ingenuity Extra Credit: Up to 10%
Grading scale:

<table>
<thead>
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<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90-100</td>
<td>A</td>
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<tr>
<td>80-89</td>
<td>B</td>
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<tr>
<td>70-79</td>
<td>C</td>
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<tr>
<td>60-69</td>
<td>D</td>
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<tr>
<td>below 60</td>
<td>F</td>
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</table>

This grading scale is guaranteed - I may curve down, but I will not curve up from this scale.

Explanation of “Ingenuity Extra Credit”

Most of these experiments are straightforward, with prescribed methods and outcomes. Extra credit will be awarded to groups that show exceptional effort to develop additional, pertinent information not required in the official lab manual, but which deepens the understanding from the experiment. For example, in Experiment 4-3, what would happen if a larger box lined with reflective aluminum foil was placed over the three bars? Or if a fan was placed near the experiment, blowing air across the bars? All ‘ingenuity’ concepts must be approved by either the instructor or TA to verify that it will be safe.

Pre-Lab Expectations

Pre-labs shall be a brief, typed memo prepared by that week’s group leader. They are due at 8:00 AM on the day of a new lab and shall contain the following:

1. Experiment name, author’s and group’s name, date
2. Brief experiment overview
3. Key deliverables – information to collect and calculate
4. Safety observations and precautions
5. Simple equipment sketch – this can be produced on a computer or neatly hand-drawn

Participation:

Absences should be minimized. Except for emergencies, all absences need to be approved in advance. Individuals will be docked 25% of their report grade for each unexcused absence and be required to make-up the any lab session missed. Class attendance will be taken at 8:00am, and participation during the lab will be determined by surveying each group member at the end of the period. For students not present at 8:00am or not participating during the lab, a 2% course penalty will be docked from their individual participation grade for each occurrence.

Expected outcomes:

1. Students should be able to formulate a plan of investigation for studying/troubleshooting a piece of process equipment/unit operation.
2. Students should be able to collect quality raw data from an operation, and interpret it using statistics combined with an understanding of the engineering principles.
3. Students should be able to manipulate experimental data in a manner that optimizes interpretation and analysis using chemical engineering principles. As a
result of this analysis, students should be able to compare observed with predicted performance, and recommend improvements to the system based on sound chemical engineering judgment.

4. Students should be able to communicate the results of their analysis effectively in written and oral reports, with the proper use of tables, graphs, and other visual aids.

5. Students should be able to function effectively in a lab team, and take leadership roles within the team.

Notes:

1. Safety is our foremost concern. Be safe at all times! Observe the rules listed in the Lab Safety Agreement.
2. For the group memorandum, all group members will receive the same grade.
3. All oral reports shall be a group effort and all group members will receive the same grade.
4. Only one lab notebook is to be kept. See the sample notebook page in the Lab Manual for reference. Points will be allocated based on the completeness of the notebook entries, including preliminary calculations made during the operation of the experiment with data from the experiment.

Special Needs
Students with special needs or requiring special accommodations should contact Keith Flanagan at 645-6965 and/or the campus ADA coordinator Ms. Jolie McCoy at 394-1924.

Freedom in Learning:
Students are responsible for learning the content of any course of study in which they are enrolled. Under Board of Regents and University policy, student academic performance shall be evaluated solely on an academic basis and students should be free to take reasoned exception to the data or views offered in any course of study. Students who believe that an academic evaluation is unrelated to academic standards but is related instead to judgment of their personal opinion or conduct should contact the dean of the college which offers the class to initiate a review of the evaluation.
## SCHEDULE OF DUE DATES AND REPORTS REQUIRED

### Experiment Number and Report Type

<table>
<thead>
<tr>
<th>Date</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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**Experiment Number and Title:**
- 4-1 - Double-Pipe Heat Exchanger
- 4-2 - MAPS Heat Exchanger
- 4-3 - Conduction; Natural Convection to Air; Radiation
- 4-4 - Unsteady State Conduction in a Solid
- 4-5 - Rotary Dryer

**Report Format:**
- O - Oral report, group grade,
- F - Formal Written, group grade
- MG - Memorandum report, group grade
- MI - Memorandum report, individual grade

**NOTES:**
1. On the days reports are due, they must be submitted by 4:00 PM to the department secretary.
2. The first day of class is to familiarize yourself with the experiment and begin taking data. The second week is to finish collecting data, correct mistakes, make any necessary repairs, and possibly conduct work for ‘ingenuity extra credit’.
3. The formal report is due at the end of the day on March 26. We will also begin conducting new experiments that day.