CBE 361L - Chemical Engineering Fluids Lab
Course Syllabus - Fall 2012

Meeting Times: Tuesday 8:00-10:50 am (Shende) and 2:00 to 4:50 pm (Flanegan)
Chem. Eng. Lab-131 and 225

Instructors: Prof. Rajesh V. Shende Mr. Keith Flanagan, PE
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Email: Rajesh.Shende@sdsmt.edu flanagan@gmail.com

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

Teaching Assistant: TBD

Prerequisites: CBE 218 (Fluid Dynamics)

Course website:/material
http://sdmines.sdsmt.edu/sdsmt/directory/courses/2012fa/cbe361LM001
F:\Dept\scheme-bioe\ChE361L\2012
Website contains lab manual, schedules, grades, and other handouts

Hackos and Mattingly, Editing for Readability, SDSMT


Class Content: The course consists of six laboratory experiments with reports as follows: pre-lab writeups for each lab, five group memo reports; two individual memo reports, one formal, and one oral report. Pre-lab writeups (up to 4 pages including P&IDs) should be ready for discussion and must be approved by the instructor or TA at the beginning of the lab period before starting any new lab experiment. Individual memo reports (1-4 pages) need to be prepared and submitted after lab completion as per lab schedule. Group memo reports are normally 5-7 pages long excluding graphs and tables. One group formal report will be required. Lab notebooks should be neatly written, filled out with experimental data for each experiment, and signed by the instructor or TA at the end of each lab. Please refer to the lab schedule for details and see Appendix A of your lab manual for report formats and 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:

- Pre-labs/Attendance/Participation 5%
- Group Memo Reports (2) 30%
- Individual Memo Report (1) 10%
- Group Formal Report (1) 30%
- Group Oral Report (2) 20%
- Quiz/HW 5%

List of Experiments
1. Flowmeter calibration
2. Head-flow rate characteristics of a centrifugal pump
3. Pressure drop in long, straight pipes
4. Pressure drop and fluid velocity in a fluidized bed
5. Rotameter calibration
6. Brookfield viscometer

Experiments: You will be assigned to a group of three to four members for the purpose of running the experiments. Each experiment will be run and completed by one group within two consecutive weeks. Groups will be rotated until all six experiments have been successfully completed. A group member should act as a group leader for each new lab (every two weeks). The group leader is responsible for preparing the pre-lab document before coming to class. A pre-lab survey or quiz may be conducted by the instructor or TA before running the experiment. You are expected to follow all safety guidelines.

Written Report Grading:
- Technical content 50%
- Organization, readability, and grammar 25%
- Graphs, tables, and equations 10%
- Sample calcs, statistics 10%
- Safety aspects 5%

Oral Report Grading:
- Technical content 50%
- Organization and clarity 20%
- Slides 10%
- Presentation skills 10%
- Time 5%
- Safety 5%

Grading Scale:
- 90-100 A
- 80-89 B
- 70-79 C
- 60-69 D
- below 60 F
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.

Late report policy: Written reports, both group and individual, are due at 8:00am 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.

Course Outcomes: After successful completion of this course students are expected to be able to:

1. Formulate a plan of investigation for studying/troubleshooting a piece of process equipment/unit operation.
2. Collect quality raw data from an operation, and interpret it based on understanding of the chemical engineering principles.
3. Manipulate experimental data in a manner that optimizes interpretation and analysis using chemical engineering principles, compare observed with predicted performance, and recommend improvements to the system based on sound chemical engineering judgment and safety.
4. Communicate the results of data analysis effectively in written and oral reports.
5. Function effectively in a lab team, and take leadership roles within the team.

ChE Program Outcomes (AY 2011–):

1. Graduates possess fundamental and practical knowledge of unit operations, thermodynamics, reaction engineering, process control and design of safe and economical chemical engineering processes.
   1a. Students will demonstrate their ability to solve technical problems through the application of engineering principles.
   1b. Students will be able to experimentally verify mathematical model predictions and theory in the areas of process measurements and feedback control loops; momentum, heat, and mass transfer; and reaction kinetics.
2. Graduates are able to apply critical thinking skills to the solution of chemical engineering problems
   2a. Students will be able to articulate the concept of critical thinking and practice it at a beginner's level.
   2b. Students will become proficient at applying critical thinking to technical and non-technical problems.
3. Graduates possess effective oral and written communication skills for work in a technical environment.
   3a. Students will be able to write memoranda and reports that effectively communicate technical information to technical and non-technical audiences.
   3b. Students will be able to present professionally to technical and non-technical audiences.
4. Graduates are able to interact effectively as team members and in leadership roles.
   4a. Students will be able to work effectively with others.
   4b. Students will be able to function effectively as team leaders.
5. Graduates are able to apply computer tools effectively in a variety of project situations.
   5a. Students will be able to solve complex problems by formulating and solving numerical solutions.
   5b. Students will be able to apply fundamental programming logic skills across a variety of software program platforms.
6. Graduates are motivated to be professional and continue learning throughout their lives.
   6a. Students will have positive experiences of learning material on their own.
   6b. Students will demonstrate awareness of engineering ethics, global issues and environmental impact.

**Relation of Course Outcomes to Program Outcomes (2011-):**
The following table indicates the relative strengths of each course outcomes in addressing the program outcomes (on a scale of 1 to 4 where 4 indicates a strong emphasis).

<table>
<thead>
<tr>
<th>CBE361L Course Outcomes</th>
<th>Objective 1</th>
<th>Objective 2</th>
<th>Objective 3</th>
<th>Objective 4</th>
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*For a list of Program Objectives and Program Outcomes, please go to [http://cbe.sdsmt.edu/undergraduate](http://cbe.sdsmt.edu/undergraduate)*

**ADA Statement:**
*Students with special needs or requiring special accommodations should contact the instructor, Prof. Rajesh Shende, at 394-1231 and/or the campus ADA coordinator, Ms. Jolie McCoy, at 394-1924 at the earliest opportunity.*

**Freedom in Learning:**
*Under Board of Regents and University policy student academic performance may be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards. Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. Students who believe that an academic evaluation reflects prejudiced or capricious consideration of student opinions or conduct unrelated to academic standards should contact the dean of the college which offers the class to initiate a review of the evaluation.*

**Tentative Schedule**

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<th>Week</th>
<th>Date</th>
<th>Activity</th>
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<tr>
<td>1</td>
<td>8/28</td>
<td>Introduction, syllabus, lab books, lab tour, safety</td>
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<td>2</td>
<td>9/4</td>
<td><strong>Safety Lecture #1 + Statistical Analysis</strong></td>
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<td>3</td>
<td>9/11</td>
<td>Lab</td>
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<td>4</td>
<td>9/18</td>
<td>Group Memo</td>
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<td>5</td>
<td>9/25</td>
<td>Lab</td>
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<td>6</td>
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<td>Group Memo</td>
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<td>Lab</td>
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<td>8</td>
<td>10/16</td>
<td>Individual Memo Report</td>
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<td>9</td>
<td>10/23</td>
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<td>10</td>
<td>10/30</td>
<td>Group Formal Report</td>
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<td><strong>Safety Lecture #2</strong></td>
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