ChE 3820 (2 Cr.)
Chemical Engineering Unit Operations Laboratory
Fall, 2016, Section 001 & 002
1:30 - 5:20 F, 1320 Engineering

Instructors: Dr. Charles Manke, 2503 Engg, 577-3849, cmanke@eng.wayne.edu
Dr. Gina Shreve, 3160 Engg, 577-3849, gshreve@eng.wayne.edu
Dr. Da Deng, 3164 Engg, 577-5940, da.deng@wayne.edu

GTAs:
Aida Amini Rankouhi, aida.amini@wayne.edu
Hui Zhu, gb8423@wayne.edu
Amin Vossoughi, fx9188@wayne.edu
Chunsong Yu, fr8845@wayne.edu

Office Hours: Shreve: Tu & Th 3:00-4:00pm
Manke: M & W 2:00 - 3:30
Deng: Tu & Th 4:00 – 5:00
We are very flexible in arranging times to meet students outside of class for help on problems in the course. Just email and ask - we'll work something out.


References: Perry’s Chemical Engineer’s Handbook

Course Objectives: (1) To gain an understanding of the relationship between theory and practice. (2) Learn how to collect and analyze experimental data. (3) Learn the concepts of teamwork, effective communications and safety in a working environment. (4) To gain expertise in technical report writing.

Grading: Course grade will be determined on the following basis:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Total</th>
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<tbody>
<tr>
<td>Lab reports (3)</td>
<td>15%</td>
<td>45</td>
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<tr>
<td>Lab Report as Leader (1)</td>
<td>25%</td>
<td>25</td>
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<tr>
<td>Oral Presentations (4)</td>
<td>5%</td>
<td>20</td>
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<tr>
<td>Team Assessments (4)</td>
<td>2.5%</td>
<td>10</td>
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<td>100</td>
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Cheating: Each piece of work submitted for a grade must be solely the work of the student(s) who submitted it. All work should be signed and should state that no unauthorized assistance was obtained. Students cheating will receive an automatic failing grade.

CLASS RESPONSIBILITIES
This course is designed to provide students with an experience similar to a work environment.
As a result, students may have to deal with personality conflicts, open ended problems, poorly written instructions, and equipment malfunctions.
1.1 Experiments
   1. Teams are 100% responsible for performing their experiments. TAs can offer advice, but should never run the equipment.
   2. Equipment malfunctions happen. Students are expected to debug and resolve problems with their apparatus.
   3. Poor data are not always caused by faulty equipment. Check your technique and verify your data, calculations, etc, with known experimental data in the literature.
   4. Lab manuals may contain conflicting information, or may conflict with instructions given by the TA. When in doubt, ask the course instructors.
   5. Your problem might not be well-defined in the lab manual. It is your job to define it and carry out an appropriate set of experiments.

1.2 Group management
   1. Students should organize the report writing so that team members can work on their assignments independently, communicating with other team members as needed. This is usually more efficient than attempting to get everyone together in a group meeting before work on the report commences.
   2. Students are expected to split work evenly among team members, and leverage technology such as cell phones, email, and the Internet to complete their lab report.
   3. Teams should begin writing the lab report after the first set of experiments. This will help identify missing data that can be measure during the next lab period.
   4. Students are expected to communicate promptly with their team members. Under no circumstances should more than 1 day pass before returning an email or phone call.
   5. Students are expected to resolve personality conflicts in a professional manner. In the event that students are unable to resolve their differences, they should consult with the course instructors.
   6. The following actions will not be tolerated:
      (a) Leaving a student’s name off of the lab report for any reason.
      (b) Writing an individual lab report.
      (c) Not sharing experimental data with group members.

Attendance:
   1. All students enrolled in the course are expected to be in the lab during the full lab period. Groups that finish their lab work early must check out with the TA.
   2. Students who arrive more than 10 minutes after the start of the laboratory session will be assessed an individual grade penalty of 10% for that lab report.
   3. Students who miss an entire lab period will receive an individual grade penalty of 33% for that lab report.
   4. Students are expected to participate in the laboratory experiment while in the lab. Grade penalties may be assessed for students performing non-laboratory activities, such as surfing the Internet or reading email.

Report Guidelines:
   Students are expected to follow the editing checklist presented by Jeter and Donnell, pages 133-138. Additional information is provided by the report grading rubric.
   1. Introduction (5 points)
      (a) 1-2 paragraphs. Describe the objectives of the work and a brief description of the experiment(s) performed.
   2. Safety Assessment (5 points)
      (a) 1 paragraph. A discussion of specific hazards identified by the group.
(b) 2. MSDS for each compound used in the experiment.

3. Background theory, materials and methods (25 points)

3. Results and Discussion (50 points)
   (a) Results in tabular and/or graphical format combined with appropriate text to describe the results.
   (b) Any relevant equations used in the manipulation of data; presented in the context of where they were used.
   (c) A comparison of student data with available theories.
   (d) Data from control experiments.
   (e) A thorough error-analysis that defines the statistical uncertainty in all data. Legitimate sources of determinate error are identified.

4. Conclusions (5 points)
   (a) 1 paragraph. Summarizes the key results of the work.

5. Appendix (10 points)
   (a) All raw data in MS Excel spreadsheet format. Clearly labeled with units.
   (b) Sample calculations. Students are encouraged to use MathCAD for this section. Otherwise, sample calculations may be may be neatly written by hand on plain white paper or green “engineering” paper. Units must be included in all calculations.

Withdrawals: Withdrawals without permission must occur before the start of the fifth week.

List of Experiments and faculty and GTAs responsible

Distillation  Dr. Shreve and Amin Vossoughi
Diffusion  Dr. Shreve and Hui Zhu
Process Control  Dr. Deng and Amin Vossoughi
Blend Time (Mixing)  Dr. Deng and Chunsong Yu
Reaction Kinetics  Dr. Manke and Aida Rankouhi
Absorber  Dr. Manke and Aida Rankouhi
## Class Schedule
### ChE 3820 Winter, 2015

<table>
<thead>
<tr>
<th>Week</th>
<th>Day</th>
<th>Date</th>
<th>Lab</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Fri</td>
<td>Sept 2</td>
<td>-</td>
<td>Course Introduction – Room 1200</td>
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<tr>
<td>2</td>
<td>Fri</td>
<td>Sept 9</td>
<td>1</td>
<td></td>
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<tr>
<td>3</td>
<td>Fri</td>
<td>Sept 16</td>
<td>1</td>
<td></td>
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<tr>
<td>4</td>
<td>Fri</td>
<td>Sept 23</td>
<td>1</td>
<td>Class Presentations – Room 1200</td>
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<tr>
<td>5</td>
<td>Fri</td>
<td>Sept 30</td>
<td>2</td>
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<tr>
<td>6</td>
<td>Fri</td>
<td>Oct 7</td>
<td>2</td>
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<tr>
<td>7</td>
<td>Fri</td>
<td>Oct 14</td>
<td>2</td>
<td>Class Presentations – Room 1200</td>
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<tr>
<td>8</td>
<td>Fri</td>
<td>Oct 21</td>
<td>3</td>
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<tr>
<td>9</td>
<td>Fri</td>
<td>Oct 28</td>
<td>3</td>
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<td>10</td>
<td>Fri</td>
<td>Nov 4</td>
<td>3</td>
<td>Class Presentations – Room 1200</td>
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<td>11</td>
<td>Fri</td>
<td>Nov 11</td>
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<td>AIChE Annual Meeting – No Class</td>
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<td>12</td>
<td>Fri</td>
<td>Nov 18</td>
<td>4</td>
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<tr>
<td>13</td>
<td>Fri</td>
<td>Nov 25</td>
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<td>Thanksgiving BREAK</td>
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<tr>
<td>14</td>
<td>Fri</td>
<td>Dec 2</td>
<td>4</td>
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<tr>
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<td>Dec 9</td>
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<td>Class Presentations – Room 1200</td>
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