University of Alabama
Department of Chemical and Biological Engineering

CHE 491 – Operations Laboratory
Fall 2014

Instructor: Dr. Stephen Ritchie
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            348-2712
            sritchie@eng.ua.edu

Office Hours: By appointment
             713-560-7257

Textbook: None, but you will need access to your textbooks from CHE 254, CHE 255, CHE 304, CHE 305, CHE 306, CHE 354, and CHE 481

Time and Place:
CHE 491-023 MWF 11:00 AM – 1:50 PM, 0048 Bevill
CHE 491-020 MWF 2:00 PM – 4:50 PM, 0048 Bevill

Course Website: http://www.bama.ua.edu/~sritchie/teaching.html

Course Prerequisites:
CHE 305 Separation Processes
CHE 306 Heat Transfer Operations
CHE 319 Basic Chemical Engineering Laboratory

Course Description:
Operations of chemical engineering. Course includes problems and reports based on performance tests; writing proficiency is required for a passing grade.

Topics:
1. Distillation
2. Heat transfer
3. Mass transfer
4. Reaction engineering

Expected Outcomes:
The overall course objective is to teach operations of chemical engineering. At the end of this course, students are expected to have an ability to:
1. analyze and interpret experimental data
2. to communicate effectively in writing
3. to verbally communicate effectively
4. design experiments
5. conduct experiments
6. plan operation of large chemical-process-industry (CPI) equipment
7. operate large CPI equipment
8. trouble-shoot large CPI equipment
Important Dates (regular exam dates subject to change):
August 20       First class session
September 1     Labor Day Holiday (no class)
September 22    Exam I
November 26-28  Thanksgiving Holiday (no class)
December 3      Exam II (final exam)

Proposals:
It is necessary that you be well prepared for each laboratory. Therefore, no team will be permitted to start an experiment until a final proposal has been accepted for that experiment. Proposal rewrites are due at 8 AM in Bevill 0048 on the next day of class, or sooner. Proposals are reviewed by the instructor and the entire team must meet with the instructor to review comments. There will be four experiments, and one team member will be the team leader for at least one experiment. The team leader is responsible for submission of the proposal after it has been reviewed and signed by each team member.

Meetings:
The entire team is present at all meetings. Every team member will answer verbally, or in writing, questions regarding all aspects of the experiment. These conferences are informal working meetings. Teams will be ready with calculators, textbooks, ChemCAD output, pencil, paper, etc. at the start of every meeting. All actual calculations, writing and lab work is done by the students. Instructors may suggest courses of action. However, the team always remains responsible for preparing proposals, properly taking data and writing reports.

Experiments:
There are four experiments: distillation, heat transfer, mass transfer, and oxidation. Once the proposal has been accepted, you will have two days in the laboratory to run the experiment and collect data. Be sure to complete all laboratory activities in the designated time. There will be no “do-overs” or “extra time” to complete experiments. Consequently, you must carefully plan your experiments and take sufficient data to complete the report. Failure to take sufficient data will be reflected in your final grade for the course.

Lab operation:
A TA, or instructor, must be on duty when any team is in the lab. Work only in designated areas. Never work alone.

Logbook:
Keep a logbook. Use one logbook at a time. Record all data, descriptions of work, and instructions in the logbook. Record all data exactly as observed without round off, unit conversion or other modification. Experimental plan changes must be noted and approved in the logbook. Any team member may write in the logbook. All comments are timed and initialed. Pages are in duplicate. Work sheets (in duplicate) are allowed only in special circumstances. The TA will initial all sheets. At the end the day, the TL will give duplicate sheets to the TA for safekeeping.
Presentation:
The entire team must be present. A team member, other than the team leader, will make a 20-minute verbal presentation, using PowerPoint, to the team and instructor. All students must make at least one presentation. Presentations are scored using the Verbal Communications Rubric, so be sure to cover all aspects described in the rubric.

Reports:
The report presents the results of the experiment. The report compares the results to literature values. Drawings must be publication quality. Xerox or scanned copies must be properly cited and absolutely essential. The ChE literature provides guidance in the preparation of figures and tables. The original typed report must be submitted at or before the presentation. Reports will be reviewed and returned for rewrites in a similar process to proposals.

W designation:
1. Writing proficiency is required for a passing grade in this course
2. Exam one is three hours and includes the first required individual writing
3. The first required individual writing is graded and returned by midterm
4. The summary is individually prepared and is the second required individual writing
5. Both writings must be orderly, coherent, logical and carefully edited prose
6. Both writings will be criterion based graded using a standardized rubric

ChemCAD:
Proficiency in ChemCAD is required to pass this course.

Attendance and Make-up Policy:
On-time and regular attendance is REQUIRED. Missing meetings or lab work is unfair to team members who are planning and conducting ChE operations within a team framework. Therefore, you be must be available at these times. Attendance is mandatory at all meetings and lab activities. Your grade will be reduced for absences from or tardiness to meetings or lab work. Operation Laboratory is "hands-on" and cannot be "made-up." An absence, for illness or any reason, still constitutes failure to participate.

Safety:
Safety is always emphasized in the lab. Safety is an integral part of the experimental plan. Although the following list is not complete, some basic rules that must be adhered to are:
2. Report any injury, or unsafe situation, immediately to the TA or to the instructor
3. Eye protection worn in lab
4. Hard hats worn in designated areas [glass tower]
5. Appropriate clothing == heavy work shirt with sleeves; long pants; sturdy closed-toe shoes
6. No horseplay or fighting
7. Maintain housekeeping; clean-up spills promptly
8. Shop equipment, research labs, etc. are off limits
9. Electrical equipment must be properly grounded
A letter is due on Friday August 22, signed by you, stating that you have read the UA Chemical Hygiene Plan and Laboratory Guide. There will be a safety lecture on Friday, and you will be responsible to know this material on Exam I. A safety violation is grounds for immediate dismissal from the course.

Instructor accessibility and equipment:
Operations laboratory is modeled, as closely as possible within the academic environment, on the CPI. It is imperative that students solve problems on their own. Students must not expect the instructors, TA’s, or James Hill to answer all questions. Judgment must be exercised in seeking their help. In the CPI, problems and equipment failures are a way of life. A major purpose of operations lab is to allow students to deal with finicky CPI equipment. Dealing with process equipment is the life work of a chemical engineer. The lab instructor, and your future supervisors, expect you to demonstrate initiative and perseverance in planning and conducting your experiments.

Copying and ChE office use:
Ms. Libby Burks and Ms. Inge Archer are the contacts for use of ChE departmental office facilities. Please use the computer labs for proposal, report, and summary and presentation preparation.

Grade Composition:
Grades are based on the proposals, performance in meetings, performance in the lab, the exams, presentations, summary and reports. Final grades are based on the performance of each person in a team from the beginning to the end of lab. The preparedness of the team and the number of meetings needed to arrive at the experimental plan are important to the final grade. The following factors will be considered in assessing term grades. The presentation grades will be normalized. Their approximate weights are given:

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<tr>
<th>Individual Grades:</th>
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<tbody>
<tr>
<td>Exams</td>
<td>27%</td>
</tr>
<tr>
<td>Summary (Ind. Writing)</td>
<td>5%</td>
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<td>Peer Evaluation</td>
<td>6%</td>
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<tr>
<td>Presentation</td>
<td>5%</td>
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<tr>
<td>Performance in Lab</td>
<td>8% The TA’s evaluation will count toward this grade</td>
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<td>Performance in Meetings</td>
<td>7%</td>
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<td>Subtotal</td>
<td>58%</td>
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<th>Team Grades:</th>
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<tbody>
<tr>
<td>Reports</td>
<td>15%</td>
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<tr>
<td>Proposals</td>
<td>18%</td>
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<tr>
<td>Performance in Lab</td>
<td>5% The TA’s evaluation will count toward this grade</td>
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<tr>
<td>Performance in Meetings</td>
<td>4%</td>
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<tr>
<td>Subtotal</td>
<td>42%</td>
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Academic Integrity:
All students in attendance at the University of Alabama are expected to be honorable and observe standards of conduct appropriate to a community of scholars. The University of Alabama expects from its students a higher standard of conduct than the minimum required to avoid discipline. I expect everyone to abide by the Academic Honor Pledge. Violators will be dealt with in the strictest possible manner in accordance with University policy.

Academic Misconduct:

Plagiarism
Avoiding any appearance of academic misconduct is extremely important in operations lab and in your entire career. You grew up with computers and learned early how to “cut and paste” text from internet sites and old papers directly into a word document. Of course, you realize this is plagiarism, representing someone else’s work as your own. It is one of many forms of academic misconduct. In operations lab, we ask you to go even further by not even looking at old reports or using information from them. Discovering how to plan an experiment and write a technical document is a process you must go through.

IMPERATIVE
1. Make all team members shred all old paper lab material.
2. Make all team members destroy all electronic devices containing old lab material.
3. I am serious-----make all team members start with new flash drives.
4. Avoid looking at other group's material---except during joint work or by direction of instructor.
5. Avoid talking with other teams-----except during joint work or by direction of instructor.
6. Make notes from – not copies of – of resource material ---avoids unintentionally plagiarism.
7. When you “cut and paste” a correlation or chart from a textbook, make sure you adequately cite the source. In “real life” you will need to get the copyright holder’s permission.
8. Any doubt__be safe__please ask questions.
9. You are liable for academic misconduct of all team members!
10. FINALLY -- after lab, shred all paper and erase all electronic devices.