Illustrative Syllabus

NCSU Department of Chemical Engineering
CHE 205: Chemical Process Principles

Instructor (Section 1): Dr. Lisa G. Bullard, 2012 EB1, (919)515-****
Office Hours: M 1:30 – 3PM, T 10 – 11:30AM

Instructor (Section 2): Dr. Richard Felder, 2088D EB1, (919)515-****
Office Hours: T H, 2:30 – 4PM

Teaching Assistants: ...
Graders: ...


Course prerequisites: C– or better in MA 241, PY 205, and CH 201 or the transfer equivalent. This requirement is strictly enforced. If you have questions about it, see one of your instructors.

Course purpose: CHE 205 prepares you to formulate and solve material and energy balances on chemical process systems and lays the foundation for subsequent courses in thermodynamics, unit operations, kinetics, and process dynamics and control. More fundamentally, it introduces the engineering approach to problem solving: breaking a process down into its components, establishing the relations between known and unknown process variables, assembling the information needed to solve for the unknowns, and finally obtaining the solution using appropriate computational methods.

Course Objectives: By the end of the course, you should be able to do the following things:

- **Basic engineering calculations.** Convert quantities from one set of units to another quickly and accurately; define, calculate, and estimate properties of process materials including fluid density, flow rate, chemical composition variables (mass and mole fractions, concentrations), fluid pressure, and temperature.
- **Material and energy balance calculations.** Draw and label process flowcharts from verbal process descriptions; carry out degree-of-freedom analyses; write and solve material and energy balance equations for single-unit and multiple-unit processes, processes with recycle and bypass, and reactive processes.
- **Applied physical chemistry.** Perform pressure-volume-temperature calculations for ideal and non-ideal gases. Perform vapor-liquid equilibrium calculations for systems containing one condensable component and for ideal multi-component solutions. Calculate internal energy and enthalpy changes for process fluids undergoing specified changes in temperature, pressure, phase, and chemical composition. Incorporate the results of these calculations into process material and energy calculations.
- **Computation.** Use spreadsheets (EXCEL) and an equation-solving program (SOLVER) to solve material and energy balance problems.
- **Teamwork.** Work effectively in problem-solving teams and carry out meaningful performance assessments of individual team members.
CHE 205: Chemical Process Principles
POLICIES AND PROCEDURES

- **Academic integrity.** Students should refer to the University policy on academic integrity found in the Code of Student Conduct (found in Appendix L of the Handbook for Advising and Teaching). It is the instructor’s understanding and expectation that the student's signature on any test or assignment means that the student contributed to the assignment in question (if a group assignment) and that they neither gave nor received unauthorized aid (if an individual assignment). Authorized aid on an individual assignment includes discussing the interpretation of the problem statement, sharing ideas or approaches for solving the problem, and explaining concepts involved in the problem. Any other aid would be unauthorized and a violation of the academic integrity policy. This includes referring to problem solutions from previous offerings of the course or downloaded from the Internet. (Note that the instructors will provide all students with sample exams from previous years). Any computer work submitted must be completed on your own personal computer or from your own university account to avoid confusion about the origin of the file, and no sharing of files in any way is allowed. All cases of academic misconduct will be submitted to the Office of Student Conduct. If you are found guilty of academic misconduct in the course, you will be on academic integrity probation for the remainder of your years at NCSU and may be required to report your violation on future professional school applications. It’s not worth it!

- **Homework.** Students will submit homework individually for the first few assignments. Early in the semester, the instructors will designate teams of 3-4 individuals, and all subsequent assignments should be submitted by those teams unless otherwise specified. The assignment schedule will be posted on the course web site.

- **Homework format.** Use green (Bullard section) or yellow (Felder section) engineering paper (available in the Student Supply Store), one side of each page (clear side, not grid side); begin each problem on a new page; and box all final answers. Each completed assignment should be in one person's handwriting (the recorder's for group assignments). The problems should be submitted in the same order as in the homework assignment. Staple the pages and fold them vertically with the fold on the left hand side when you hand them in. Put your name and problem set number (individual assignments) or the names and roles (coordinator, recorder, checker, and monitor) of the participating team members (team assignment), and the problem set number on the outside. The problem numbers should be written vertically on the opposite side as your name. If a student's name appears on a solution set, it certifies that he/she has participated in solving the problems. To encourage you to follow the instructions given above, standard point deductions will be assigned for failure to use the appropriate paper, not stapling, no names and roles on group assignments, etc. (refer to the course web site for specifics).

- **Late homework.** Completed assignments should be turned in at the beginning of the class period. You may choose to turn in the homework in early in the CHE 205 homework box in the CHE student lounge. If it's your job to turn in the homework and you're late, so is the homework. Late assignments will receive a point deduction of ~20. Late solution sets may be submitted up to 8:15AM on the Monday after the due date in Dr. Bullard’s mailbox in 2009 EB1, which is inside the main office suite (2001 EB1). However, once an individual or a group hands in two late assignments, no more late assignments will be accepted.

- **Posted solutions.** Complete problem set solutions will not be posted, but the final numerical solution to each problem will be posted on Dr. Bullard’s bulletin board. It is your responsibility to make sure you find out how to solve the problems by looking at classmates’ graded solutions or asking about problems in class, during office hours, or in a problem session after the submission deadline has passed.

- **Individual effort assessments for team homework.** Teams will periodically be asked to submit individual effort assessments with completed assignments. These assessments will be incorporated into the assignment of individual homework grades. If repeated efforts to improve team functioning (including faculty intervention) fail, a non-participant may be fired by unanimous consent of the rest of the team, and a team member doing essentially all the work may quit. (Details of the required procedures are given in the handout on team policies and expectations.) Individuals who quit or are fired must find a team unanimously willing to accept them; otherwise they will receive zeros for the remainder of the assignments.

- **Exams.** There will be three exams during the semester and a comprehensive final exam. All tests will be open-textbook, closed-everything else (including course notes, graded homework assignments, computers, and smartphones). The lowest midterm test grade will count half as much as each of the other two. Tests will be given as common exams on scheduled Fridays from 3–5PM (see detailed course schedule for dates and locations). Students who are unable to take the exams at those times (with a documented excuse—not just that you don’t want to) will schedule alternative times to take them.
• **Test and homework grading.** If you believe that an error was made in grading the homework, you should write a short justification of your claim and attach it to the original homework assignment in question. Put the justification and homework paper (stapled together) in Dr. Bullard’s mailbox in 2009 EB1 or in the red homework box. Put the name(s) of the TA(s) who graded the problem(s) in question as well as your contact email. The TA or one of the instructors will review your submission and respond to you directly. The “statute of limitations” for submitting such claims is one week after the homework is returned.

• **Missed tests.** If you miss a test without either a certified medical excuse or prior instructor approval, you will take a makeup test at a designated time during the last week of the semester. The makeup exam will be fair but comprehensive (covering all the course material) and challenging. Tests missed with certified medical excuses or prior instructor approval will be dealt with individually. Only one missed test can be made up. *Note: if you show up to take a test, you must take the grade—you cannot decide mid-way through to walk out and take the makeup exam.*

• **Problem session.** All 205 students must be registered for one of the weekly problem sessions (205P). Several computer applications will be taught during the problem sessions. 10% of your grade is based on problem session quizzes and in-class exercises. Attendance is expected and is included as part of your problem session grade. You should not float between problem sessions; stay in the one in which you are registered. However, if it is necessary to miss a problem session, you may attend another session that week to make up the time as long as you notify the TA of the problem session you attend so that your attendance can be recorded.

• **Attendance.** Students who miss class due to an excused absence should work with the instructor or problem session TA to make up any missed work or tests. Documented medical excuses should be presented to the instructor. For a full statement of the university attendance policy see <www.ncsu.edu/provost/academic_regulations/attend/reg.htm>. Examples of anticipated situations where a student would qualify for an excused absence are:
  a. The student is away from campus for an official university function, e.g., to participate in a professional meeting or as part of a judging team or athletic team. These students would typically be accompanied by a University faculty or staff member.
  b. Required court attendance as certified by the Clerk of Court.
  c. Religious observances as verified by Parents & Constituent Services (515-2441). For more information about a variety of religious observances, visit the Diversity Calendar.
  d. Required military duty as certified by the student's commanding officer

• **Calculation of course grade.** A weighted average grade will be calculated as follows:
  - Exams (3) = 40%
  - Final examination = 30%
  - Homework = 20%
  - Problem session quizzes and in-class exercises = 10%

  The lowest exam grade counts half as much as the other two (lowest exam counts 8%, other two count 16%). The homework grades will only count if the average grade on class exams and the final exam is 60 or above—in other words, if you can’t pass the individual tests, then you can’t pass the course.

  The course grades will be determined as follows:

<table>
<thead>
<tr>
<th>Score</th>
<th>Grade</th>
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<tbody>
<tr>
<td>≥97</td>
<td>A+</td>
</tr>
<tr>
<td>92 – 96.9</td>
<td>A</td>
</tr>
<tr>
<td>89 – 91.9</td>
<td>A– or B+</td>
</tr>
<tr>
<td>82 – 88.9</td>
<td>B</td>
</tr>
<tr>
<td>77 – 81.9</td>
<td>B- or C+</td>
</tr>
<tr>
<td>72 – 76.9</td>
<td>C</td>
</tr>
<tr>
<td>67 – 71.9</td>
<td>C– or D+</td>
</tr>
<tr>
<td>62 – 66.9</td>
<td>D</td>
</tr>
<tr>
<td>60 – 61.9</td>
<td>D–</td>
</tr>
<tr>
<td>&lt; 60</td>
<td>F</td>
</tr>
</tbody>
</table>

If you fall into one of the “gray areas” (A- or B+, B- or C+, C- or D+), your grade will be determined by whether your performance has improved or remained consistent (higher grade) or gotten worse, especially on the final exam (lower grade).

*Note: We do not curve grades in this course. It is theoretically possible for everyone in the class to get an A (or an F). Your performance depends only on how you do, not on how everyone else in the class does. It is therefore in your best interests to help your classmates within the limits of the academic integrity policy.*
• **Instructors' commitment.** You can expect your instructors to be courteous, punctual, well-organized, and prepared for lecture and other class activities; to answer questions clearly; to be available during office hours or to notify you beforehand if they are unable to keep them; to provide a suitable guest lecturer when they are traveling; and to grade uniformly and consistently according to the posted guidelines.

• **Consulting with faculty.** We strongly encourage you to discuss academic or personal questions with either of the CHE 205 course instructors during their office hours or by email.

• **Students with disabilities.** North Carolina State is subject to the Department of Health, Education, and Welfare regulations implementing Section 504 of the Rehabilitation Act of 1973. Section 504 provides that: "No otherwise qualified handicapped individual in the United States. . . shall, solely by reason of his handicap be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." This regulation includes students with hearing, visual, motor, or learning disabilities and states that colleges and universities must make "reasonable adjustments" to ensure that academic requirements are not discriminatory. Modifications may require rescheduling classes from inaccessible to accessible buildings, providing access to auxiliary aids such as tape recorders, special lab equipment, or other services such as readers, note takers, or interpreters. It further requires that exams actually evaluate students' progress and achievement rather than reflect their impaired skills. This may require oral or taped tests, readers, scribes, separate testing rooms, or extension of time limits.