Proposal of Changes to Physical Chemistry Laboratory
CHEM 4396→CHEM 3397/3398

Synopsis

- CHEM 4396 (4 cr./semester, WI) will be split into two separate semesters that are synchronized to the material covered in P CHEM I (3301) and P CHEM II (3302).
- The new lab courses, CHEM 3397 and 3398, will be 2 cr. courses.
- Each course will satisfy the WI course requirements.
- Only one of the two labs would be required for the BA degree. This lab course will replace the “Advanced Chemistry Course” elective (which was required to be WI).
- Both labs will be required for the BS (with or without ACS accreditation).

Advantages:
- Much more writing-intensive
- Affords an additional WI course in the major
- Fewer labs/reports per course but more lab experiments covered over the two course sequence than is currently covered in CHEM 4396 (8 vs. 7)
- Better (slower) pacing in each semester will enhance the educational experience of the student.
- Provides greater flexibility to the student in personalizing their degree to a particular area of Chemistry, providing ACS “Degree Tracks” to be implemented (specialization in Physical, Organic, etc.)

Disadvantages:
- May not relieve stress on Instructors significantly
Affected Student Populations:

- Chemistry B.S. Majors – ALL
  - Students who planned to take CHEM 4396 to graduate must have these courses available.
- Students who have taken CHEM 4396 but *NOT PASSED* will, in some sense, need to take CHEM 4396 again. This can be accomplished by the students signing up for BOTH CHEM 3397/3398 in a *single semester*. It may be necessary to “cross-list” 4396 with 3397/3398 to make this administratively simpler.
- Chemistry B.A. Majors – ALL
  - A 2\textsuperscript{nd} Writing-Intensive course is required for the B.A. Either CHEM 3397 or 3398 will accomplish this.
    - Also see above
- Biochemistry Majors – Few
  - See above

Advertising the Change-over:

- An EMAIL ANNOUNCEMENT of the program change will be sent out to all students who take CHEM 4396 (as per CST’s analysis).
- EMAIL ANNOUNCEMENTS to all students who have failed CHEM 4396 and those registered for FALL 2012 will go out this summer to make sure all affected students know about the impeding change and what to do about it.
- R. Stanley will meet with CST Advising to make them aware of the change and give advice on how CST Advisors are to sell the new program.
- R. Stanley will meet with F. Chang (Biochemistry Advisor in the Biology Dept.) to make him aware of the program change and answer any questions.
Proposed Implementation:

- Fall 2012-Spring 2013: Both CHEM 3397 and 3398 will be offered *each and every* *Fall and Spring semester*.

- *Students will be advised to start with CHEM 3397 in the semester following the successful completion of CHEM 3301.* CHEM 3398 should be taken upon completion of CHEM 3302.

- CHEM 3301 is a prerequisite for CHEM 3397 and CHEM 3302 is a prerequisite for CHEM 3398.

- Those students who have anticipated taking CHEM 4396 in either the Fall or Spring will be advised to split up CHEM 3397/3398 into a two semester sequence. If this is not possible then they can take 3397/3398 in the same semester as long as they have met the above-mentioned prerequisites.

  - *Students who have FAILED CHEM 4396 will be required to take CHEM 3397/3398. They may do so in one or two semesters.* (I am checking with CST regarding how a change of grade for CHEM 4396 will be made if they enroll in and pass CHEM 3397/3398).
**TENTATIVE MASTER SCHEDULE** – Chemistry 3397 (Formerly 4396)

Week 1:

08/29 M Introduction and Course Structure
08/30 Tu Heat Capacity I & II (Lectures/discussion)

Week 2

09/06 Tu Fundamental Concepts of Electrochemistry (Lectures/discussion)
Fuel Cells and Energy Management Systems

Week 3:

09/13 M Surface Tension (Lectures/discussion)
Tu Conductance of Solutions (Lectures/discussion)

Week 4:

09/19 M **Exam** (Questions drawn from all topics discussed above)
09/20 Tu Lab 1 (Experiment)

Week 5:

09/26 M Error Analysis (EA Lab 1)
09/27 Tu Lab 1 (Calculations Lab, CL/WW)

Week 6:

10/03 M Review, Discussions (of reading assignments and experimental results)
10/04 Tu Lab 2 (Experiment)

Week 7:

**Brief Format Report** (1st completed experiment)
10/10 M Review, Discussions (of reading assignments and experimental results)
10/11 Tu Lab 2 (CL/WW)

Week 8:

10/17 M Review, Discussions (of reading assignments and experimental results)
10/18 Tu Writing Workshop I

Week 9:

**Full Paper Report I** (2nd completed experiment: Grade = 50% original + 50% revised)
10/24 M Review, Discussions (of reading assignments and experimental results)
10/25 Tu Lab 3 (Experiment)

Week 10:

10/31 M Review, Discussions (of reading assignments and experimental results)
11/01 Tu Lab 3 (CL/WW)

Week 11:

**Revised Brief Format Report** (1st completed experiment)
11/07 M Review, Discussions (of reading assignments and experimental results)
11/08 Tu Lab 4 (Experiment)

Week 12:

**Brief Format Report** (3rd completed experiment, NO revision)
11/14 M Review, Discussions (of reading assignments and experimental results)
11/15 Tu Lab 4 (CL/WW)

Week 13:

**Revised Full Paper Report I** (2nd completed experiment: Grade = 50% original + 50% revised)
11/21 M Review, Discussions (of reading assignments and experimental results)
11/29 Tu Writing Workshop II

Thanksgiving recess: Thursday, November 25 – Sunday, November 28.

Week 14:

**Full Paper Report II** (4th completed experiment: Grade = 100% original, NO revision)
12/05 M Review for Final Exam
12/06 Tu **Final Exam**
Table 1a: Chem. 4396 (Current) Experiment Schedule/Detail

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Table 1b: CHEM 3397 (Proposed) Experiment Schedule/Detail

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Fall and Spring

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<td>Classical equipartition interpretation</td>
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Additional Possible Investigations for development

Table 2: Example Student Enrollments (assumes lower enrollment in 3398):

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<th>3397 (sections)</th>
<th>3398 (sections)</th>
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<td>80 (5)</td>
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Table 3: Reports to be evaluated

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<td>2 brief/2 full</td>
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<td>Fall</td>
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<td>32 b/32 f</td>
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<td>Spring</td>
<td>128 b/96 f</td>
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<td>Total Enrollment</td>
<td>288 b/216 f</td>
<td>160 b/160 f</td>
<td>96 b/96 f</td>
<td>256 b/256 f</td>
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Table 4: Proposed Personnel Requirements

**Faculty:**
- 1 per semester @ 100% commitment
- 2 per semester @ 50% commitment

**Teaching Assistants:**

Duties:
- Lab Support: 12 hr/week
- Error Analysis Support: 2 hr/week
- Quiz Grading: 2 hr/week
- Lab Preparation: 3 hr/week

**TOTAL:** 19 hr/week

**2 TAs/semester are required to support the new P CHEM Lab**
ACS Accreditation

5.5 Laboratory Experience.
- The certified major must have 400 hours of laboratory experience beyond the introductory chemistry laboratory.
  - CHEM 4396: 7 expts. X 3 hours/week = 21 hours
  - CHEM 3397(4): 4 expt. X 3 hours/week = 12 hours
- Laboratory course work must cover at least 4 of the 5 foundation areas of chemistry and may be distributed between the foundation and in-depth levels.
  - Taking only 3397 or 3398 could be considered a “foundational” course while both together considered as ”in-depth”.

If a student takes only one of the two P CHEM lab courses then s/he is free to fill out the ACS lab requirement with an additional laboratory course:

4003. Inorganic Synthesis (4 s.h.) F. $

4004. Solid State Analysis (5 s.h.) S.

4103. Instrumental Design (4 s.h.) F.

4107. Drug Analysis (4 s.h.) S. $

4108. Investigative Chemistry (4 s.h.)

4203. Qualitative Organic Analysis (4 s.h.) F. $

4207. Advanced Organic Preparations (4 s.h.) S.

4503. Introduction to Polymer Chemistry (4 s.h.) S. $

UG Research:

3881. Cooperative Research (3 s.h.) F S SS.

3891. Undergraduate Research (3 s.h.) F S SS. $

4891. Undergraduate Research (3 s.h.) F S SS. $.